

Jason L. Stienmetz
Berta Ferrer-Rosell
David Massimo *Editors*

Information and Communication Technologies in Tourism 2022

Proceedings of the ENTER 2022
eTourism Conference, January 11–14, 2022



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International Federation
for IT and Travel & Tourism


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turismo e innovación

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ISBN 978-3-030-94750-7 ISBN 978-3-030-94751-4 (eBook)
<https://doi.org/10.1007/978-3-030-94751-4>

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Preface

The 29th Annual International eTourism Conference ENTER22@Nankai features new research, innovative systems, and industry case studies on the application of Information and Communication Technologies (ICT) in travel and tourism. Organized by the International Federation for IT and Travel & Tourism (IFITT), ENTER22@Nankai will take place online, during January 11–14, 2022, with the theme “Preparing for Travel’s Return: The New Future of e-Tourism.” The research track of ENTER22@Nankai received a total of 76 full and short paper submissions, covering a diverse variety of fields within the area of ICT and tourism. Each research paper submission went through a rigorous double-blind review process. As a result, 32 full papers and 15 short papers were accepted for presentation at the conference and are included in these proceedings. While still maintaining a broad topic, the papers presented in this volume advance the current knowledge base of ICT and tourism in the following areas: social media and sharing economy, technology including AI-driven technologies, research related to destination management and innovations, COVID-19 repercussions, and others. We hope these proceedings will serve as a valuable source of information on the state of the art in ICT and tourism research. We greatly appreciate the considerable time and effort put in by all members of the ENTER22@Nankai Scientific Committee who helped us to ensure that the content of the research papers is of high quality. We also would like to thank the panel of experts who helped with additional reviews in order to select candidates for the best paper award. Furthermore, we are thankful to the ENTER22@Nankai conference chairs Hanqin Qiu and Anyu Liu and the rest of the conference organization team, the IFITT President Juho Pesonen, and the IFITT Board for their support while managing the research track. Finally, we would also like to thank all the authors for their willingness to disseminate their latest research at ENTER22@Nankai. This conference would not be possible without their efforts.

Jason Stienmetz
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Contents

Technology

Full Papers

Video Game Experiential Marketing in Tourism: Designing for Experiences	3
Mattia Rainoldi, Arne Van den Winckel, Joanne Yu, and Barbara Neuhofer	
Mixed Reality (MR) for Generation Z in Cultural Heritage Tourism Towards Metaverse	16
Dimitrios Buhalis and Nurshat Karatay	
Virtual Reality: A Simple Substitute or New Niche?	28
Victoria-Ann Verkerk	
Emergence and Rapid Popularization of Paid Web-Conferencing-Application-Based Tours in Japan: An Analysis of Their Business Potential	41
Kennichiro Hori, Ibuki Yoshida, Miki Suzuki, Zhu Yiwen, and Yohei Kurata	
Users Versus Non-users: The Impact of Experience on Hotel Guests' Attitudes Towards Service Robots in Hotels	55
Patrycja Brylska, Cihan Cobanoglu, and Seden Dogan	
Short Papers	
Video Games as a Media for Tourism Experience	67
Yang Junko, Chia-Hsiang Hsu, and Tsong-Zen Liu	
Online Travel Planning for Families with a Child with a Disability	72
Mohamed Reda Khomsi, Karl Delorme, and Cyril Martin-Colonna	

Leveraging Blockchain in Medical Tourism Value Chain	78
Sreejith Balasubramanian, Shalini Ajayan, and Cody Morris Paris	
Social Media and User Generated Content	
Full Papers	
“Better Not Let Me Know”: The Mediating Role of Regret on the Relation Between Social Comparison Discrepancy in Online Hotel Review and Revisit Intention	87
Sunny Zhenzhen Nong and Lawrence Hoc Nang Fong	
Analysis of Instagram Users’ Movement Pattern by Cluster Analysis and Association Rule Mining	97
Zehui Wang, Luca Koroll, Wolfram Höpken, and Matthias Fuchs	
Beyond Influencer Credibility: The Power of Content and Parasocial Relationship on Processing Social Media Influencer Destination Marketing Campaigns	110
Yi Xuan Ong, Tao Sun, and Naoya Ito	
Management Response to Online Review: The Case of Hong Kong Luxury Hotels	123
Suki Siuki Tam, Lawrence Hoc Nang Fong, and Rob Law	
The Usage of Emoji in Tourism-Related Instagram Posts: Suggestions from a Marketing Perspective	134
Viktoria Distel, Roman Egger, Ugljesa Petrovic, Viet Linh Phan, and Simon Wiesinger	
Destinations	
Full Papers	
Navigation by Revealing Trade-offs for Content-Based Recommendations	149
Linus W. Dietz, Sameera Thimbiri Palage, and Wolfgang Wörndl	
Multisensory VR Experiences in Destination Management	162
Barbara Prodingler and Barbara Neuhofer	
Do DMOs Promote the Right Aspects of the Destination? A Study of Instagram Photography with a Visual Classifier	174
Lyndon Nixon	
Personalization of Multi-day Round Trip Itineraries According to Travelers’ Preferences	187
Elif Erbil and Wolfgang Wörndl	

Destinations and Data State-of-the-Art in Switzerland and Liechtenstein	200
Elide Garbani-Nerini, Elena Marchiori, and Lorenzo Cantoni	
Identifying the Main Service Elements for Customer-Oriented Live Guided Virtual Tours	213
Rosa Repo and Juho Pesonen	
Short Papers	
Travel Incheon as a Metaverse: Smart Tourism Cities Development Case in Korea	226
Taehyee Um, Hyunkyuu Kim, Hyunji Kim, Jungho Lee, Chulmo Koo, and Namho Chung	
CoViD-19	
Full Papers	
Communicating to Tourists During and Post-Covid-19: What Do They Want (Need) to Hear?	235
Laura Zizka, Meng-Mei Chen, Effie Zhang, and Amandine Favre	
An Exploratory Study of Consumers’ Travel-Related Concerns About COVID-19	245
Wenqi Wei and Irem Önder	
Building Resilient Smart Cities for Sustainable Urban Tourism in Africa Post-COVID-19 Pandemic	256
Erisher Woyo and Dandison Ukpabi	
Special Track on the Sharing Economy in Travel and Tourism: Experiences and Social Networking	
Full Papers	
Identifying the Elements of Great Online Customer Encounters	271
Johanna Heinonen and Juho Pesonen	
Using Machine Learning Methods to Predict Demand for Bike Sharing	282
Chang Gao and Yong Chen	
Short Papers	
A Framework of Resilience for Peer-to-Peer Accommodation Hosts Under COVID-19	297
Yu-Hua Xu, Shihan (David) Ma, and Xin-Yue Li	
Platform Stress in Hospitality – Focusing on the Technology dimension	304
Jae Eun (Francesca) Park, Namho Chung, and Chulmo Koo	

Window to the Destination: Tourists' Local Experience via "Online Experiences" on Airbnb Amid the Pandemic	310
Junjiao Zhang and Hanqin Qiu	

Special Track on Big Data and Smart Tourism

Full Papers

Data-Supported CRM as a Lever for DMO Success: A Social Exchange Relationship Approach	319
Birgit Bosio and Melanie Scheiber	

Towards a Strengths-Based Personal Informatics Framework for Transformative Tourism Experiences: A Phenomenological Study on Serious Leisure Practitioners	331
C. K. Bruce Wan, Cees J. P. M. de Bont, Paul Hekkert, and Kenny K. N. Chow	

Destination Image of DMO and UGC on Instagram: A Machine-Learning Approach	343
Roman Egger, Oguzcan Gumus, Elza Kaiumova, Richard Mükisch, and Veronika Surkic	

Topic Modelling of Tourist Dining Experiences Based on the GLOBE Model	356
Roman Egger, Angela Pagiri, Barbara Prodinger, Ruihong Liu, and Fabian Wettinger	

Content-Based Recommendations for Craggs and Climbing Routes	369
Iustina Ivanova, Marina Andrić, and Francesco Ricci	

Understanding Preferences in Tourism Email Marketing	382
Elide Garbani-Nerini, Elena Marchiori, Rossella Reale, and Lorenzo Cantoni	

Using the Behaviour Change Wheel to Design an App to Change Tourist Behaviour and Increase Dispersal into Regional Areas	395
Martha Wells, Kristy de Salas, and Anne Hardy	

Short Papers

Exploring "Planned Serendipity" and On-site Information Behavior on Smartphones	406
Micol Mieli	

Understanding Hotel Employees' and Guests' Perceptions of Smart Hotels Using Q Methodology	412
Ye Shen	

**Business Intelligence and the Public Management of Destinations:
The View of DMOs** 417
Francisco Femenia-Serra, Aurkene Alzua-Sorzabal,
and Aitziber Pousa-Unanue

**Visualizing and Comparing Online Travel Reviews of the Great
Walls: A Data Mining Approach** 423
Jin Ling and Nadezda Sorokina

**Special Track on Digital Education and Training in Tourism
and Hospitality**

Full Papers

**Analyzing Individual, Institutional, and Regional Contributions
to E-tourism: The Case of ENTER Proceedings (1996–2021)** 431
Suki Siuki Tam, Huiyue Ye, Rob Law, and Lawrence Hoc Nang Fong

**eLearning for Tourism During COVID-19 - Learning from Students’
Perspectives. A Pilot Study** 443
Lea Hasenzahl, Soha Ghezili, and Lorenzo Cantoni

Short Papers

**An Empirical Study on the Impact of Prior Information Provision
Methods on Participants’ Perceptions in Tasting Marketing** 455
Hisashi Masuda and Kengo Matsumura

**Special Track on Travel in the Metaverse: The Future of Smart
Tourism Cities**

Full Papers

**How to Design Hotel Gamified Applications Effectively:
Understanding the Motives of Users as Hotel Visitors** 463
Demos Parapanos and Elina (Eleni) Michopoulou

Escaping Loneliness Through Tourist-Chatbot Interactions 473
Peng Wang and Jun Shao

Short Papers

**Exploring the Impact of Travel Vlogs on Prospect Tourists:
A SOR Based Theoretical Framework** 486
Wenliang Li, Yoo Ri Kim, Caroline Scarles, and Anyu Liu

**Monitoring Human-Wildlife Interactions in National Parks
with Crowdsourced Data and Deep Learning** 492
Bing Pan, Virinchi Savanapelli, Abhishek Shukla, and Junjun Yin




**Exploring the Utilitarian and Hedonic Value Derived from Tourism
Pre-experiences with Virtual Reality: Differences Between
Destinations and Accommodations 498**
Carlos Flavián, Sergio Ibáñez-Sánchez, and Carlos Orús

Author Index 505

Technology



Video Game Experiential Marketing in Tourism: Designing for Experiences

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Abstract. While film and television have a long tradition in tourism marketing, the potential of video games is overlooked. This study unlocks a novel era of marketing by investigating the interplay between experiential factors and in-game experiences, and how they may contribute to one's intention to visit in-game destinations. By taking Assassin's Creed Odyssey as the study context, game world dynamics, level of immersion, level of freedom, connection to characters, and sense of realism are identified as the five pillars that shape gaming experiences. Drawing upon experience design, this study lays the groundwork for emerging marketing opportunities using video games for tourism and contributes to the broader field of media-induced tourism literature.

Keywords: Video game-induced tourism · Experience design · Media-related tourism · Experiential marketing

1 Introduction

With the advent of experience economy [1], marketers have been attempting to engage potential tourists in pre-trip stages by designing experiential marketing stimuli [2] through various mediums such as television programmes, films [3, 4], and emergingly, video games [5]. Commonly known as media-related tourism, the central idea is that destination image and future visitation are interwoven with each other due to the influence of media [6]. Yet, the focus of existing studies is rather limited to the scope of film and television [4, 5, 7]. Most recently, the application of video games has been adopted to amplify the level of freedom, emotion, immersion, and interactivity [8]. Video games are novel in that they give gamers an opportunity to freely roam in a virtual world [7] and stroll around like tourists. Similar to virtual tours [9], gamers, defined as potential tourists, can find out experiential marketing messages of a destination (in-game location) and evaluate them before their actual visit [10]. That is, experiential marketing is not about promoting a product or service, but allowing potential tourists to see, feel, and have a glimpse of live experiences [11]. Because of

the immersive nature of in-game experiences, gamers often feel deeply connected to the main characters and the virtual world they live in [12]. Hence, gaming can be considered as an experiential vehicle that engages potential tourists, generates positive image, and improves communication [7].

However, the potential of video games is still an under-researched area [5]. Using gaming for promotion has neither been embraced as an experiential marketing tool in the tourism industry, nor has it reached the stage of maturity development [6, 7]. Since gamers are still a relatively small market in tourism, it remains unfeasible for game developers to design tourism-specific games exclusively for this group [13]. Additionally, the fact that most popular games are violent by nature (e.g., first-person shooting) [14] makes it difficult to integrate tourists' needs (e.g., memorabilia and inner growth) and gamers' desires (e.g., aggressive feelings and behaviours) [13]. Other scholars argue that one potential factor hindering the development of video game-induced tourism is because the design of experiences is not engaging [6] because game developers may be unaware of tourists' needs [13].

Although recent literature has initiated a call for video game-induced tourism, there is a strong focus on tourist motivations and destination image [6, 7, 12], whereas the fundamental concept, experience, is overlooked. Thus, this research aims to exploratorily expose experiential factors that are influential to in-game experiences, and how they may contribute to gamers' intention to visit in-game locations. Intrigued by the ambiguity of video game-induced tourism, this study goes beyond the traditional marketing discipline by borrowing the lens of experience design. By outlining the main experiential factors that inspire gamers to visit certain in-game locations, this paper lays the groundwork for new experiential marketing opportunities through video games and contributes to the broader field of media-induced tourism literature.

2 Literature Review

2.1 Video Game and Video Game-Induced Tourism

Increasingly, video games have received attention in education, health, and other non-gaming businesses [13] such as tourism. In tourism marketing [6], video games stand out from all types of media as the engagement in the gaming experience often extends over 30 h [15]. Video games are based on gamification, referring to the practice of applying gaming methods to engage and increase the overall experience in a non-gaming context [16]. However, current interest in gamified experiences seem to be limited to mobile games (e.g., Pokémon Go as a marketing tool) [6], whereas video games in tourism marketing still receive little attention [5, 7].

The intangible nature of tourist experiences intensifies a need for marketers to tell stories [17] and craft immersive and engaging experiences [18]. Video games are valuable in that they allow potential tourists to pre-experience the reproduction of a destination [6]. A recent study discovered that emotional attachment, historic experiences, adventurous journeys, scenic views, and the hero feeling are some of the key drivers for young gamers to visit a destination [12]. Other motivations include, freedom

in a virtual world, excitement [10], role-playing, character development, immersion, escapism [19], and social interaction [13], among many others.

In tourism marketing, in addition to hedonic consumption, video games provide information of a location in real-time [5]. Since locations in video games are often an ideal or apocalyptic representation of a real-life environment in accompanied by fantasy [20], video games could be useful for pre-experiencing points of interests and promoting tourists' attractions to gamers [13]. By doing so, video games may encourage gamers to visit the location portrayed in the game. While video game-induced tourism is considered as one of the most effective approaches to leave a lasting impression on gamers due to the high level of immersion [7], marketers should be aware that tourists might crave for experiences exactly as they are depicted in games [5]. Thus, given the infancy of gaming in tourism marketing, there is an urgent need for game developers to harmoniously integrate the desires of tourists and gamers [7, 13]. Yet, insufficient understanding towards in-game experiences and gamers as an emerging market [13] often constrains the development of video game-induced tourism.

2.2 Bridging Experience Design to Video Game-Induced Tourism

With a growing interest in video games which resemble an interactive and socialising environment [21], challenges emerge because gamers expect more personalised and experiential forms of travel through games rather than a simple form of entertainment [13]. Since experiential marketing heavily relies on imagery processing, visualisation, multi-sensory experiences, and symbolic features of a destination serve as the key factors influencing the effectiveness of marketing messages [2].

Similar to virtual reality tours [22], video games allow gamers to explore destinations, but at a higher level of interactivity and immersion [23]. Drawing upon the four realms of experiences (i.e., entertainment, education, escape, and esthetic) [24], gamers move from passive absorption to active participation in gaming experiences. In such a highly engaging environment, gamers are offered a sense of escapism, which often occurs outside one's daily life [19]. Apart from the missing link between experience design and video game-induced tourism [6], what is more urgent is that gamers have gradually entered the next-phase of experiences where personal development, self-actualisation, and positive emotions are valued [18, 25, 26]. Yet, those experiences do not happen occasionally. In video games, gamers are called to adventure to explore in-game locations [12]. They leave their ordinary life and step into a liminal space by immersing themselves in the extraordinary virtual environment. Gamers encounter challenges and rewards, which act as a source of motivation for them to have a goal throughout the process. Potentially, they acquire new knowledge and skills upon return.

In line with using the Hero's Journey as a design thinking tool [27], tourism marketers and game designers can optimise the storyline and the flow of the journey [28]. By examining gamers' actions, emotions, and thoughts, potential design opportunities can be identified. What is common between experience design and video games is intentionality [6, 29]. Experience design utilises a human-centered approach by intentionally creating new offerings [30]. Yet, due to the infancy of applying video games in tourism, their current performance as marketing tool may not necessarily

exceed that of other mediums (e.g., film) [7]. It is thus critical to further explore in-game experiential marketing elements and improve the design of video games to ultimately lead to positive outcomes (e.g., visit intention).

3 Methodology

3.1 Study Context: Assassin's Creed Odyssey

Assassin's Creed Odyssey, an action role-playing video game set in the years 431–422 BC, was selected as the study context. The story centres on the Peloponnesian War, an ancient Greek war, between Athens and Sparta. Gamers are allowed to choose a main character and can develop relationships with non-player characters (NPCs). Within the game, gamers can virtually explore the culture, history, and beauty of the ancient Greek world. The '*I was there when that happened*' experience is what differentiates Assassin's Creed Odyssey from other games [23]. Gamers can take screenshots and share them with the game community, just like how tourists often share travel photos on social media and/or with friends. Assassin's Creed Odyssey is designed in a non-violent concept, which is what makes it suitable in video game-induced tourism [7].

3.2 Sample and Sampling Procedures

A qualitative in-depth interview approach was used in this exploratory study. A purposive sampling technique was applied to invite people experienced in Assassin's Creed Odyssey. Participants with considerable experience playing the game were recruited through social media channels, gamer forums, and the researchers' personal contacts in the game industry. A total of 12 male participants was interviewed, ranging between 20 to 37 years old. On average, participants spent about eight hours on video games per week and have been playing for seven years. More than half of them (58%) have travelled to Greece. This sample size is also similar to other studies analysing underexplored topics in tourism [32–34].

Questions were constructed based on literature in video game-/film-induced tourism [5, 7, 31] and experience design [16, 18]. The semi-structured interviews centered on a) emotional experiences, b) atmosphere, culture, history, and nature of in-game locations, c) perceptions towards the plot, d) personal connection with the character, e) perceptions towards in-game functions, f) resembling of the real-life setting, as well as g) intention to visit in-game locations. Interviews were conducted in English via online meeting platforms from April to June 2020. Each interview lasted about 30 min. All interviews were manually transcribed. Due to the infancy of video game-induced tourism, an inductive thematic analysis [35] was adopted to uncover emerging patterns and re-occurring phenomena. Five main themes with 30 experiential sub-themes were identified, which overall, enhance participants' intention to visit the destination.

4 Results and Discussion

This study conceptualises five main experiential marketing factors that are influential to in-game experiences and one's intention to visit Greece, namely a) game world dynamics, b) level of immersion, c) level of freedom, d) connection to the characters - being 'the hero', and e) sense of realism (Fig. 1). A detailed discussion of each dimension and its sub-themes follows.

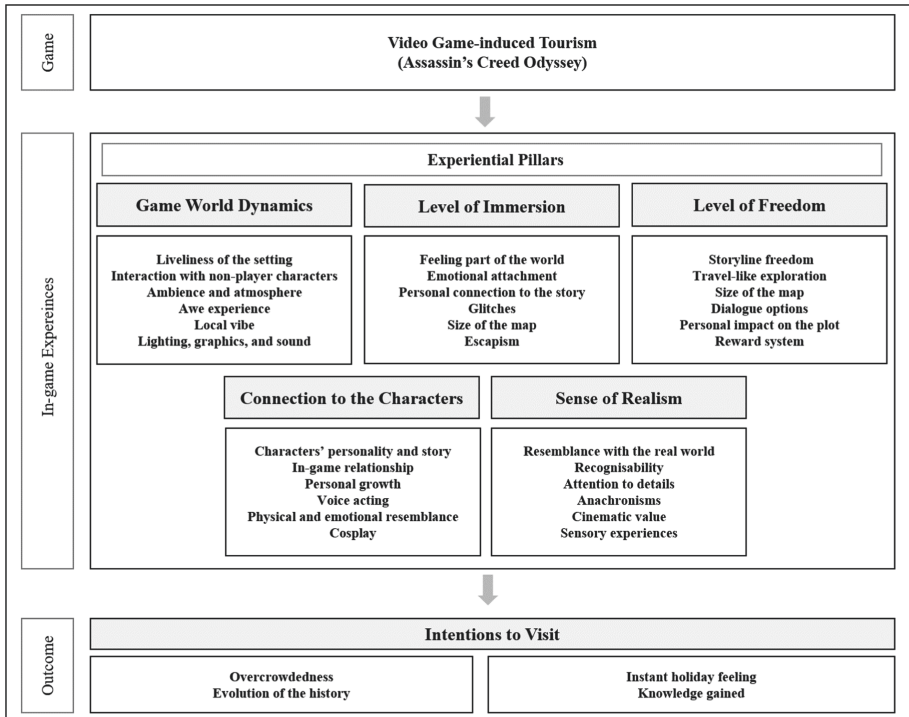


Fig. 1. Experiential marketing pillars of video game-induced tourism.

4.1 Game World Dynamics

The dynamics of the in-game world is found to be one of the most important factors to players. An exemplary quote is, *'The cities were very alive with many people walking around and doing their daily things, [...] like I was walking through the cities myself'* (11). This corresponds to the characteristics of tourists, who appear to share similar behaviours in the game as they would behave in actual travel [20]. Other participants highlighted the role of NPCs in enhancing the feeling of realness (e.g., *'[The NPCs] made the place feel so alive'* (10)). The way the participant interacted with the local people reinforced the idea of being gamers (e.g., *'[The NPC] can talk to you, it improves the interaction and gives a good impression about the daily life'* (3)). As

video games often offer a higher level of interactivity [23], interactions with NPCs serve as key drivers in making the experiences more active and engaging [36].

Meanwhile, the ambience and atmosphere of the virtual environment left most of players in awe, characterised as one of the most intense and positive emotional experiences. One participant stated, *‘[I am] really impressed [...], especially the landscapes, the building, historical accuracy of the building, [...] I was just in awe’* (5). In fact, this phenomenon can be explained from the power of natural scenery. Scholars have underpinned the effectiveness of vast geological landscape as awe-inducing stimuli [37], having the potentials to foster personal growth [38]. Also, many participants mentioned the uniqueness of local vibe. An example is, *‘You could go to the other side of the map and you would feel a totally different vibe [...]so dynamic and alive’* (1). The vibe was not just made up by physical locations, but co-created with the locals (e.g., *‘When you walk through these little villages [...], you see people buy stuff and talk to each other. Yes, it’s a really dynamic experience’* (4)). Existing literature have explained the interplay between objects and players in video games from the lens of affordance theory [39]. These findings affirmed that the affordance in video games can have an indirect impact on the destination choice of participants.

4.2 Level of Immersion

Immersion is another factor that influences the destination choice of gamers. Several participants stated that they felt part of the world and that they were really walking through ancient Greece (e.g., *‘I was immersed automatically [...] you are more focused on learning new things, and you run to the different point’* (2)). Some participants compared the level of immersion between watching a film and playing a video game (e.g., *‘Video games are always more immersive than movies [...] because you can actually control the characters and have an actual effect on the story’* (10)). Supported by the study of Sajid [12], video games could possibly bring more emotional attachment for the gamers than a film.

However, to prevent boredom in the large open world (e.g., *‘Sometimes walking through the endless nature or forests could be a bit boring when there is nothing to do’* (11)), the participants proposed that sound effects and background music are important to keep gamers immersed (e.g., *‘You can let the exploration music play a little more [...] because it offsets some of the really quiet moments while exploring’* (5)). Moreover, certain graphical glitches can result in a loss of immersion as it does not correspond with real-life settings. The participant mentioned, *‘Only maybe the glitches sometimes [...] This took away the immersion in the game sometimes’* (10).

Other participants mentioned that playing video games serves as a form of escapism from the real world as they often lose track of time (e.g., *‘It helps to manage stress and getting away from all the negative news nowadays, because it takes a lot of your time’* (8)). In fact, games that are similarly to real-life tourism [6] can offer gamers a way to escape from daily tasks and routine [19]. Likewise, due to the captivating nature of the story, several gamers felt emotionally connected to the story of characters. One participant stated, *‘Some of the characters were very deep and had a bigger meaning to the main character’s life [...] I could really emotionally connected and immersed’* (6).

4.3 Level of Freedom

The third experiential pillar is the extent of freedom which players are offered. An example was, *'You could actually keep on going and going. You can follow the main story [...], but you can also choose to discover all the secret islands and the view-points'* (4). Some gamers emphasised that the freedom to explore the game world resembled travelling in real life, such as *'You could travel freely and if I would go to Greece, I would want to do island hopping, as I did in the game'* (2). One of the main features that enhanced the feeling of freedom is the size of the map in the game that allowed one to keep exploring new things. One participant stated, *'You could literally walk for hours. I've spent around 70 h and I still haven't explored everything yet [...] it gives you a sense of freedom when exploring the world'* (5).

Another feature that conveyed a sense of freedom was the open dialogue function. Through this feature, gamers could influence the way the story progressed with their own decisions. For instance, *'You can answer the tricky questions and intentionally select the wrong answers to see how far they can go'* (8). Also, the fact that gamers were empowered to have an impact on the plot heightens the sense of freedom (e.g., *'It was like finding your own story and the different plots that came later. [...] I really liked the multiple storylines and how you could go through them however you wanted'* (1)). The in-game reward system (e.g., treasures and bonus points) was an additional factor influencing the feeling of freedom. An example was, *'[Side missions] were something I tried to do a lot, just see the side quests and side stories [...] also just for gameplay reasons you get a higher level, you get some rewards for doing them'* (12).

The findings suggest that open world games can better serve as a resemblance of real tourism settings. Yet, game designers should be aware of flow experiences in the concept of gamification [16]. An optimal flow state suggests that an individual is capable of solving the presented challenges [28], which is thus crucial in influencing the sense of freedom, engagement, and immersion [18].

4.4 Connection to the Characters - Being 'the Hero'

Several participants indicated that they felt personally connected to the main character in terms of his/her background story and ideas. Described by one participant, *'As I played [with Cassandra], I really felt connected to the character. I was actually really touched by some of the things that happened to the character and the characters around her'* (7). This notion of building in-game relationships, as also described by Teng [40], affected the gamers in a way they experienced the sense of escapism and temporarily residing in an alternative world. Going beyond the emotional attachment, other participants stated that they have grown together with the character. One participant stated, *'I liked how you were able to grow together with the main character and feeling what they were feeling at certain moments'* (12). Hence, some participants would like to even follow the footsteps of the character in real life by visiting the in-game locations. For instance, *'I can follow my footsteps in the game. I would really consider doing this [in reality] to see how everything is compared to in the game'* (1).

Similarly, few participants shared that they would love to dress up and 'being' in that character for a day in real life (e.g., *'It would be interesting to dress up and have*

some certain designated street for that. Let's say you collect some gamers around the world and let them dress up as an Assassin' (8)). This suggests that one of the motivational factors for visiting in-game locations is to walk in the shoes of a character [12]. Interestingly, the findings also reveal voice acting as a critical element in enhancing the connection. For instance, one participant stated, *'I played as Cassandra [...] The voice acting made me feel a connection with her' (6).* Consistent with the context of film tourism, the personality of a character in the film, the casting choices and the involvement of celebrities were found to be some of the key factors motivating one's intention to travel [41]. Presumably, the involvement of well-known historical figures in video games (e.g., Hippocrates) could replace the celebrities often found in films.

4.5 Sense of Realism

As for the sense of realism, participants compared in-game locations with what they have already seen in real life (e.g., *'I went to Kos in real life [...] The first thing, when you come to Kos in the game, you immediately find out it is all about wine and there are huge vineyards' (3).* Interestingly, the recognisability of in-game locations also contributes to the level of realism (e.g., *'You could recognise some of the landmarks and it was amazing to find all these things, wander around Greece just from behind your desk actually' (1).* Also, several participants highlighted attentions to details in terms of the in-game design (e.g., *'The way it all was shaped, the different islands, something typical about Greece, but also the way they made the lighting, the sculptures, the Greek architecture, the mountains you had to travel' (4).* These findings correspond to the significance of scenery and landscapes mentioned by Sajid [12] as the main factors for gamers to travel to a destination.

However, there were noticeable anachronisms in the games since some of the elements were not historically accurate, which may lower the level of realism (e.g., *'There was a woman, she had a lot of power. I don't think in ancient Greece, females had that kind of power' (7).* Yet, such reflection also depends on the experiences and knowledge of gamers. Other participants emphasised the cinematic value of the game, especially the graphics and sound effects, and how it resembles a movie. One interviewee stated, *'If you have a good sound effect, you will be more engaged.'* (8). Another participant described, *'The impressive graphics of the game had definitely an impact [...] The lighting and the colours were just perfect and resembled the real world' (10).* However, some of the participants added that games would never replace the actual experience of visiting a destination despite the richness of sensory experiences (e.g., *'I think if to stimulate this gaming experience in relation to holidays, a game can never replace the actual experience in the game' (6).*

4.6 General Perceptions and Intention to Visit Greece

Overall, the destination image of Greece has changed slightly as a result of playing the game. It is usually a combination of the previous knowledge or image about the destination and what gamers have learned during the game. Certainly, few participants held an opposite viewpoint. For example, gamers can be alone at some of the sceneries

and landmarks, as opposed to real life where overcrowdedness might be expected. The participant stated, *'You're not going alone to those kind of tourist locations, you're always surrounded with a lot of people. And playing the game, I must admit that I didn't see a lot of unrecognisable stuff'* (7). Likewise, participants shared their concerns on the landmarks being destroyed over time as the game was set more than two thousand years ago (e.g., *'You have the ancient temples and so on [in the game], but I don't know if they still exist in Greece. So, I don't know if I could go there'* (11)).

Yet, most of the participants expressed their interest to visit Greece and witness the landmarks in person. For instance, *'The island of Crete is something I have always wanted to see but now I really want to go there because I have seen the different landmarks there and I really want to see this actually'* (2). Participants also stated that seeing and exploring certain landmarks in the video game has increased the willingness to pay for an entrance fee for some of the attractions from the game. An exemplary quote is, *'It's genuinely nice to see the landscapes and for me it gives like a stimulation to go on a holiday. This game actually makes me think to go on holiday and especially the landscapes could convince me to go there'* (3).

Finally, it is important to note that although the identified pillars, per se, may not directly motivate one's visitation, experiential marketing does play an important role in facilitating and influencing gamers' subsequent actions. Altogether, the experiential factors discussed above co-shape gamers' willingness to visit some of the in-game locations in real life.

5 Conclusions

5.1 Theoretical Contributions

Through an exploratory investigation, this research deepens our understanding towards how in-game experiences shape potential tourists' perceptions and visitations, and vice versa, based on the case of Assassin's Creed Odyssey. By uncovering key experiential marketing factors that are compelling to in-game experiences and intention to visit in-game locations, this study contributes to novel ways of understanding video game-induced tourism by bringing knowledge from the lens of experience design. Different from previous studies heavily focusing on the end factors such as tourist arrivals and motivations [3, 4, 10], this research specifically looks into the *what* and *how* experiences can be constructed. Overall, to motivate gamers to visit in-game locations, the findings shed light on the dynamics of game world, immersion, freedom, connection to the characters, and sense of realism as some of the dimensions that merit attention. Rooted in the field of experience design, an interconnection between the identified factors has been showcased. Their interwoven relationship spotlights potential challenges and opportunities of video game-driven tourism. This study is thus valuable in that it expands the status quo of in-game marketing and adds empirical knowledge to experiential marketing practices and the broader field of media-induced tourism literature.

5.2 Practical Implications

By outlining the main experiential marketing layers, this study provides guidelines to optimise in-game experiences from the lens of experience design, which ultimately may drive actual travel. First, to improve a sense of realism when using video games for experiential marketing practices, the findings highlight attention to details as design essentials. Yet, designers and marketers need to be cautious with potential glitches in the game that could diminish the level of immersion. Meanwhile, this study underlines the dynamics of sound effects and background music, which appear to be overlooked by game developers. Due to the size of the virtual environment, not every location was filled with quests. Music, however, can counterbalance the feeling of boredom and enhance the level of freedom while gamers are wandering around to keep the flow and emotions. Additionally, game developers are encouraged to collaborate with destination marketers to strengthen the authenticity of tourist experiences. Seeing the importance of emotional/physical connections, marketers may consider role-playing as an offer to tourist players on site. By incorporating storytelling in experiential marketing, for example, tourism businesses can prepare costumes and allow gamers to dress up like in-game characters to specifically tailor their needs. Finally, it is important to note that the non-violent nature of the video game seems to perform better than the violent ones. In this study, gamers could learn the history of ancient Greece without relating to any negative aspect. Yet, in another study investigating the violent context [7], gamers were more likely to think about grim events happening in this game (e.g., shooting violence). Destination marketers are thus suggested to consider the intended experiential marketing messages. For example, violent video games, which is more a mainstream in the video game industry, could have more potential in marketing war-related destinations and adventurous activities.

5.3 Limitations and Recommendations

This research is not without limitations. First, transferability of the findings is in question due to the limited response to the interview invitations. This might be resulted from the specific criteria of being a gamer for only one particular video game. However, since the sample size is similar to recent research focusing on underexplored topics [33, 34] and has reached data saturation, the exploratory nature of this study still provides valuable insights on underlying experiential factors contributing to the context of video game-induced tourism. Future research is recommended to investigate how the identified experience pillars in different types of media-related tourism may shape travel experiences. Likewise, the choice of using one specific game limited the type of gamers that participated in the study. Because the genre of *Assassin's Creed Odyssey* is action-adventure and role-playing-oriented, the majority of the participants was male. Scholars are suggested to replicate the study's methods and compare how experiences differ in different genres of video games. Also, *Assassin's Creed Odyssey* is based in Greece, which is already a well-known touristic destination. Researchers are encouraged to investigate the effect of video games in less popular destinations. Finally, from an experience design perspective, it is important to explore the long-term impact of in-game experiences. Because immersive and extraordinary experiences are long-lasting

by nature [18], longitudinal research is recommended in order to go beyond the immediate effect of gaming experiences (e.g., visitations) and move into the wider context of its impact on gamers' lives (e.g., personal development).

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Mixed Reality (MR) for Generation Z in Cultural Heritage Tourism Towards Metaverse

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Abstract. Generation Z is transforming tourism by demanding the cocreation of transformative experiences. Cultural heritage professionals must comprehend the needs and desires of the Gen Z to support the cocreation of transformative experiences. This study analysed the role of Mixed Reality (MR) from the perspective of Gen Z guests through 18 semi-structured interviews and inductive qualitative research. Participants believe that cultural heritage experiences can benefit from immersive technology. Technology supports cocreation of experiences between developers, service providers, DMOs, and consumers. Cultural heritage sites, as a key element of tourism destinations, should consider how to use MR to enhance consumer experiences. Participants express the opinion that cultural heritage sites and tourism destinations require considerable modernisation to create transformative experiences. Metaverse in tourism and cultural heritage sites will undoubtedly support Gen Z to cocreate transformational experiences.

Keywords: Mixed reality · Generation Z · Cultural heritage tourism · Co-creation · Immersive technologies

1 Introduction

Metaverse, defined as a parallel, virtual universe that uses ambient intelligence to enhance physical spaces, products and services, emerges as a collective, virtual shared space of value cocreation. Metaverse in Tourism uses physical reality combined with MR (AR and VR) to converge all needs and stakeholders in a shared, 3D virtual space and enhances physical spaces to MR spaces, transforming the internet to a parallel virtual universe. Generation Z (Gen Z), is the population group that follows Gen Y (Millennials) and comes before Gen A. They include people born between the mid 1990s and the early 2010s. Gen Z are “digital natives” as they were born in a period when technological developments were progressing rapidly, due to the internet expansion. Gen Z is the first social group to have grown up with connectivity to the Internet and handheld electronic devices from an early age. They are technologically savvy, despite not being specifically technology educated as they grew up in a connected world. Gen Z are generally well-behaved, ascetic, and risk averse as compared to past groups. They benefit widely from smart tourism developments to enrich their experience [2, 34].

Gen Z travellers are increasingly interested in transformational experiences. Virtual Reality (VR) enables them to have more engaged and diverse encounters [3]. More than 84% of consumers around the world would be interested in using VR or Augmented Reality (AR) for travel experiences, and 42% believe that VR and AR are the future of tourism [13]. Ambient intelligence initiates a new era of cultural tourism, in which the distinctions between physical and digital experience of culture and tourism are obscured [2]. The memorable performance of low-cost VR innovations – such as the Oculus Rift, HTC Vive, and Sony PlayStation VR – as well as Mixed Reality (MR) Interfaces – such as the HoloLens – leads to major technological progress and the growth of innovative applications [7]. Young adults increasingly travel more and for extended lengths of time. They seek transformative and meaningful experiences, challenging the traditional operations of the tourism industry. Gen Zers already have transformed the entertainment industry and require more engaging experiences from all industries [1].

2 Mixed Reality in Tourism

Mixed Reality (MR) describes a very realistic augmentation of the real world for users. It is so realistic that users cannot distinguish virtual content from physical objects, providing a seamless experience between real and digitally constructed environments. MR requires special hardware, such as smart glasses, where the lenses are replaced by transparent screens and contain multiple sensors to track the user's environment. MR devices seamlessly integrate and merge realistic-looking 3D content into the user's physical environment [26]. Microsoft's HoloLens 2 device is an example of such technology. As nanotechnology develops these machines can be reduced in size and increase in power. Future devices therefore will offer even more realistic experiences using more ergonomic glasses [27]. Mixed Reality (MR) is becoming more popular, primarily in cocreating cultural heritage [14, 39] and tourism experiences. MR can help revolutionise visitor interaction and satisfaction by providing information to educate and animate experiences [19]. AR/VR/MR are all equally fascinating platforms with the primary goal to digitise space for human experiences. However, each have their own unique qualities and make distinctive contributions. The main distinction is that VR users get a completely immersive digital space and they don't have the ability to see the real world when using VR sets. AR users have digital features added to their actual experience of the real world. Users can explore AR possibilities at a destination by experiencing augmented destination features through their devices. Pokémon GO is the most well-established AR application that was used widely, when users were invited to overcome challenges, catch Pokémon, and forge friendships through playing in real environments. However, AR may conflict with experience the destination freely. Gen Z consumers, who are keen on using AR, most likely give up the AR opportunity, to avoid the technology overuse and see everything by their own. In the same way that AR projects 3D visual files that is spatially conscious and sensitive, MR does the same with 3D visual files [22]. The MR has the capability to transpose digital data on real items and environments [6]. Hence, physical objects can be brought into a simulated universe or virtual objects can be brought into reality [23] (Fig. 1).

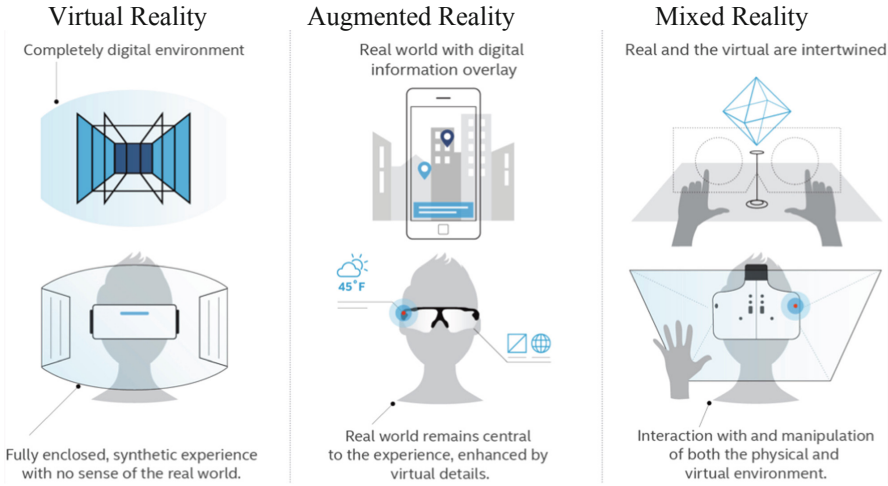


Fig. 1. Difference between VR, AR, MR. Source: appliedart.com

The travel industry is an information-intensive sector [12]. Enhancing cultural heritage sites with immersive MR experiences adds value to the entire user engagement, particularly in conjunction with customisation based on the preference of every customer [25]. MR encourages users to experience and interact with historic items whilst in the real world by integrating engaging ways of narrative to involve visitors. It supports the integration of physical and digital displays by projecting digital information in real environments and also by displaying items with no material availability. Immersive and holographic interfaces have a wider variety of applications in the MR spectrum as illustrated in Fig. 2. There are several gamification examples using AR and VR [35, 36]. The engagement with machine figures or symbols in a software world is the primary purpose of video or computer games [10]. Single-player videogames contain a lot of tasks that gamers must achieve in order to receive the prize at the end. Gamers can play alone or with the support of other gamers to earn the prize. Portable games, which were quickly implemented provide a gaming experience that extends into the actual world [29]. Two widely used examples, namely Pokémon Go and City VR, demonstrate the capabilities of MR to engage Gen Z.

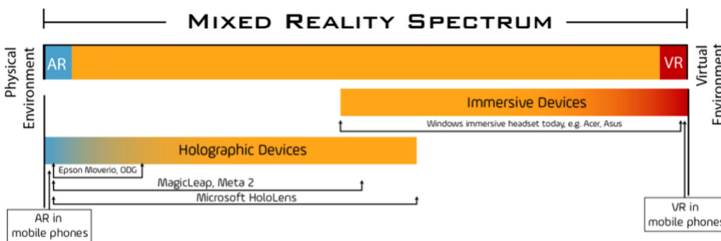


Fig. 2. MR spectrum, the allocation of holographic and immersive devices. Source: Microsoft.com

One of most widely AR played games ever is Pokémon Go. Since the introduction of Pokémon GO game in 2016, places all over the world have started using this AR app to promote themselves and attract visitors. The application achieved more than 100 million downloads [8, 19]. 46% of the users are between the age of 18 and 29, indicating that they were born and raised during the original Pokémon frenzy in the late 1990s. Around 22% of the users are between the ages of 13 and 17, with 6% over the age of 50. These statistics indicate that half of the game's multimillion audience is Gen Z gamers. The City VR Experience [<https://cityvr.com/>] is an immersive virtual reality experience. It allows gamers to discover new perspectives to look upon the world we live in like never have done before. Dozens of roads, structures, cars, and diverse metropolitan areas are available in the game, each of which has a real-life counterpart. City VR is more than just a 3D plan- it provides a revolutionary way to design environments using a range of perspectives. Gamers may wander through the city like a giant, see objects from above and below, scale in and out, alter the climate, and take great photos. It provides a thorough glimpse of any location the player desires to visit. From a tourism point of view, visitors can plan their vacation by viewing the whereabouts of that area and engage with different locations. They can also explore sustainability vulnerabilities and alternative environments. Despite the listed advantages, there are numerous conditions needed to make the game happen: A VR headset, a tracking movement joystick, and a space playground are all required for the play. VR games, unlike AR games, necessitate significant amounts of data and the VR headset might be costly for users and providers. The city adventurer game has a brief lifespan as long-term usage of VR can cause drowsiness, disorientation, and sickness.

3 Methodology

MR research in tourism is in its infancy. Exploratory research was therefore used in this study to explore the concept and determine MR features for the future. Qualitative research was used to allow researchers to explore all elements of Gen Z's interaction with technology and appreciate their perceptions and requirements. Online in-depth semi-structured interviews ensured that all needs, wants and requirements were captured through conversation. Given the health and safety regulations during the COVID-19 lockdown periods, online meetings were organised with respondents. Interviews were conducted via Zoom. Based on the research literature a range of open-ended questions were used for the in-depth interviews. Questions included but were not limited to the following: Have you ever experienced Mixed Reality? How and when have you used MR? Do you see the MR as a potential way to find out and gain information about a destination before travel? Do you think that MR technology will enhance visitors' experience at a destination, why? Are you ready to purchase MR service at a destination to experience MR technology? How much are you ready to pay for MR services? Can you indicate advantages of MR in cultural heritage site? Can you indicate disadvantages of MR in cultural heritage site? How can MR technology add more value for visitors? How can MR technology to add more value for a destination?

The research benefited from personal interviews with 18 Gen Z users, born between 1995 and 2000. The consumers' age range was applied as a selection criterion in order to select and interview people that would feel more comfortable to use and take full advantage of the opportunities new technologies offer. The consumer age was also designed to include active travellers that are in a position to make travel decisions. Out of 26 consumers contacted, 20 (76.92%) responded, and 18 (69.23%) interviews materialised between April and May 2021. The interviewees' locations breakdown was as follows: Kazakhstan (5), India (3), Kyrgyzstan (1), Uzbekistan (1), Russia (1), Vietnam (1), Thailand (1), Cambodia (1), Azerbaijan (1). To give the initial understanding of the capabilities of MR in cultural heritage tourism, it was decided to show interviewees a short video about MR HoloLens by Microsoft. All interviews were digitally recorded for further transcription by the researchers. Zoom simplified the process by automatically transcribing interviews to save time. Overall, 18 interviews were conducted for this research, and the point of saturation was reached after the 15th interview as no new inferences were emerging from the interviews. To systematise and analyse the qualitative material collected with the interviews a formal coding scheme was adopted to annotate the transcribed text and identify the relevant themes. The thematic analysis and aggregation reflected the research objectives and guided the analysis.

4 Results

The results illustrate that the awareness of respondents of all MR capabilities is still limited. They, however, appreciate that MR introduces great capabilities for cocreating tourism and heritage experiences. Respondents anticipate that the developments of this technology will generate major benefits for tourism globally. To employ cutting-edge innovations, such as MR, the willingness to adopt and use emerging technologies is critical. The aesthetic reaction induced by the integration of virtual objects in the actual environment is also an important aspect of employing MR. As a result, users who utilise MR must consider the aesthetic impact, as the sensory factor can determine the software's utility. Perceived usefulness of MR use was influenced by aesthetic value and enabling factors. Visual appeal and favourable settings have been highlighted as significant factors affecting the establishment of technology acceptability in studies connected to technology [9, 23, 30, 37]. The influence of aesthetic value on the MR performance expectancy was validated in this research.

"I work in the tech field. I think technology is really exciting, especially VR and MR, all of this new, well-presented and beautifully stunning stuff, for some people, I know it might be scary for some people. But it is cool immersive experience, where you can really put yourself into the moment and kind of just lose yourself to your imagination. I can see that, having a similar effect, especially with cultural sites and heritage sites which I think are super important you don't want them to be boring. You want them to be engaging and immersive and I feel like it's a really good way to help audiences and visitors lose themselves to their imagination and really step into the past."

Most of the participants confirmed that MR provides a new form of travel experience, especially for cultural heritage. They suggested MR adds value for cultural

heritage sites and also for consumers. When asked if they were familiar with MR 33% of the participants confirmed they were aware of the MR capabilities and only 2 of the respondents (14%) have used MR. Only 3 (20%) tried VR in computer games and shopping and only 1 (7%) tried AR during travel. However, it was clearly evident that not all of the respondents are fully aware of how MR can be used in tourism.

“I was born in 2000 and I do not remember myself without the Internet. Growing up during the development of the Internet, the fastest shift in technology was in my childhood. Now I am already a student and have experience using Google Cardboard (VR headset). For the first time, I tried a headset for university tours - viewing panoramic views of faculty buildings, lecture halls, workshops, dormitories and libraries with a specially designed guide.”

Respondents suggested that MR should be advantageous for daily life in order to boost their use for tourism experiences [18]. P5, P7, P13, and P15 also agreed with the benefits of MR. Van Krevelen and Poelman [32] advised that a reliable strong network is necessary to support MR use and provide clear benefits.

4.1 MR Usability Development at Cultural Heritage Sites

Over the last few decades, innovation and technology have gradually permeated the tourism sphere, especially in cultural heritage. As a result, the area of Cultural Technology has emerged, to use digital technology and cultural heritage research disciplines to reflect, strengthen, broaden, and convert artistic systems and services in the areas of cultural heritage [17, 33]. Despite that, the absence of successful user interface design still evident in the tourism ecosystem is the greatest roadblock to successful implementation of digital tools [38]. The interaction with an online product, product usage intention, purchase intention, location choice, and location picture are all influenced by product design efficiency [4–6, 16, 21, 24, 28, 35]. Designing cultural heritage applications with 3D functionality is technologically challenging and costly. Usability is described as an act of fulfilling consumer needs in terms including both output and the picture they get [13]. The term “usability” was mentioned by 73.3% of the survey participants, which indicates its importance. In the case of MR includes the ability to browse, store, and filter data, as well as the ability to use various languages provides additional benefits [19]. Respondents suggested that being able to interact in many languages would facilitate not only the functioning of the design in numerous locations, but also the access to essential material without struggling to pass linguistic hurdles.

“For me, as a user, several parameters in use are especially important, such as: understanding the proposed content without unnecessary finesse, eye-safe sharpness of reproduced visuals, safe sound level and the duration of the excursion itself, if it is at the site of cultural heritage.”
“It will be nice if the safety of content for mental and physical health is taken into account in the future. I mean that the younger generation can be especially receptive and impressionable, like a sharp change of pictures or a very loud sound can adversely affect the user, and this in turn, can lead to such unpleasant consequences as insomnia, nightmares or paranoia.”

One of the biggest advantages of MR is that it places the spectator in the main role; making people feel and react in the same way as the subjective viewpoint figure. This can lead to a certain empowerment. Interviewees suggested that while creating MR experiences, it's crucial to conceive the user as a player, instead of an observer, and to

design adventures that emphasise traveller engagement. Gamification can help developing interfaces and scenarios for optimising the experience.

“I think it’s good to use this technology, because sometimes you cannot touch the actual sites, like cultural heritage, just maybe they are fragile. In my country, Vietnam, I went to the Royal Palace, and I really enjoyed first 20 min there, reading interpretation panels and looking around the place. But then, I got bored, and I didn’t know what to do, even though I wanted to find out more information about the palace or entertain myself anyhow. MR would have supported live interaction”

“I get easily bored at cultural heritage places due to lack of activities to do. I can always find any information on my phone, searching internet, but I don’t want to look in a small screen on my phone. Instead, it would have been nice to have an immersive experience, to spend more time in the palace, hence, to get more memories and positive impression from the visit.”

People experience at least one kind of MR they develop clear expectations and requirements. However, the technology is still new and interesting enough to entice consumers because it offers some distinctive features that other types of media cannot provide. Table 1 summarises responses on the functionality of MR in cultural heritage tourism.

Gen Z specifically is constantly searching for more authentic and unofficial interactions with local resources. Cultural heritage sites which have been neglected and suffer from lack of visitation have a chance to increase visitation flows through MR technology by making visitation exciting through innovation and cocreation. Engaging visitors with more enticing interactions can support meaningful experiences and develop the competitiveness of sites but also entire destinations. Destination promotion organisations should build their expertise and invest in MR technology and know-how to benefit from this opportunity.

4.2 Participants’ Perspectives on Mixed Reality

Interviewees were accustomed with using technology apps in their daily lives. They have specific requirements for future cultural heritage guides, such as a map that displayed the ratings for each object on the site. They explained that Gen Z require fast and interactive interactions that address their curiosity but provide instant gratification. Respondents explained that they are excited for cultural heritage sites implementing MR towards improving visitor experience. Table 1 illustrate participants’ perspectives on the Usage of MR in cultural heritage tourism.

“Old people or people who are keen on history, love to go there, but gen Z are not interested in cultural heritage sites anymore, because they find visiting them quite boring. I think if the technology is combined in cultural heritage, and if they have some different activity for young tourists to get involved in”.

“I think the MR could be helpful to engage youngsters in cultural heritage. As a result, cultural heritage won’t be a place to check in, but a place for a proper and quality time spending for Gen Z.”

Table 1. Functionality and impacts of MR for cultural heritage

<i>Functionality</i>	<i>Impacts for cultural heritage</i>
Cultural heritage	Advantages
History of the location	Automated Workflow
Time travel	Staff Offload
Disappeared objects recreating	Less queueing
Surroundings information	Reduced Operational Cost
Demo presentation	Improve satisfaction
Preservation	Tourists' time spend increase
Human interaction	Preservation
Accessibility	Disadvantages
Personalization	Visitors' opposition
Multi-language	Age limitation
Holograms	Importance of human interaction
Notifications	Avoidance out of habit
Real-time updates	Complex technology
Digitalization	Equipment service
	Possible malfunctions & Breakdowns

Respondents were sceptical about the adoption of MR in tourism in the next few years. They suggested that unless there are significant investments in equipment, design and production, these technologies will not be emerging soon. They acknowledged however that the COVID-19 pandemic pushes digitisation and therefore the design of more progressive types of experience cocreation at cultural heritage sites will be expedited.

4.3 Willingness to Use and Buy MR Services

Immersive technologies are changing everyday human lives. Gen Z increasingly demand goods and services to be exhibited in an immersive practice. Respondents expect MR to introduce a mixture of user involvement through digital augmentation to artificially enrich their experiences and create exciting adventures. Table 2 illustrates participants' perspectives on the usage of MR.

“This technology can help me decide which brand of car to buy. I don't have to go to car dealerships or run into annoying salespeople. VR showrooms are available from Cadillac, Audi and General Motors. I can leisurely browse a number of cars that interest me”.

“I would love to try out a cultural heritage destination using MR technology to see if I should travel to this place or not. If all travel companies or agencies had such a service, it would make the choice much easier for tourists”.

Gen Z is primarily concerned about the environmental crisis and often practice conscientious consumerism. Participants explained that they want to put sustainability over affordability. They expect therefore that cultural heritage tourism managers will focus on sustainability, rather than just on aggressive marketing. Although respondents are at ease in their solitary and often spend time in digital cocoons, Gen Z is fundamentally a sociable group. Wherever feasible, its members seek out to participate in

cocreation of collaborative and elevated events. This is a great example of how MR-based cultural heritage tourism may employ innovation to provide real and immersive experiences for Gen Z tourists by instigating transformational experiences. Gen Z travellers not only seek to satisfy their needs but also project their experience for their social circle online.

“As a member of Gen Z, I can tell that we don’t only buy goods. We spend money to get experiences. We want to get a genuine travel experience.”
“A purchase isn’t just about what you buy; it’s also about how your social media followers react to it. If cultural heritage sites want to appeal to this adaptive, portable, and high-income generation, they’ll need to build individualised unique entertainment.”

Table 2. Tourists’ Perspectives on the Usage of Mixed Reality for tourism experience

Advantages for tourists	Disadvantages for tourists
Responsive system	Technology Limitations
Convenient usability	Speech speed/Language/Accent hardship
Timesaving	Visual accuracy
Crowd flow management	Appliance contradiction between devices
Friendly manner and Human-like dialogue	Subjection on 5G connection
Individualised and Personalised Options	Privacy Concerns
100% attention from the ‘guide’	Safety risks
Individual smart voice assistance	Private records
Additional Attraction	Manufactural tracking
Novelty benefit	Additional price
Contactless cooperation	Unfavourable weather
Social distance	Non affordable for everyone
Impartial	Required technology savviness,
Inclusive Access	Limited accessibility
Access for people with disabilities	

Participants admitted that using MR at cultural heritage sites can enhance their experiences by providing inclusive experience, personalised content, and newer interactions. The findings suggest that cultural heritage managers should fully explore the opportunities of MR technology in order to revolutionise visitor experience. Respondents also revealed cautiousness and had a little hostile perception after using MR apps. There were a few comments that could be deemed unfavourable but had beneficial undertones. *‘I appreciated getting lost in the adventure, yet I felt completely absorbed and somewhat disoriented when using MR apps’* as P13 put it. MR may also experience problems with voice detection, different languages and pronunciations, when speaking to the online guide; given that many tourists come from different countries, speak a range of languages and may have strong accents.

5 The Future of Mixed Reality in Cultural Heritage Tourism

This study explored the Gen Z tourist perception of MR when visiting cultural heritage sites. MR can benefit the travel industry in terms of marketing, economic, tourist, and organizational benefits. MR possibilities increase value cocreated, engagement and the length of time Gen Z visitors spend in cultural heritage. Gen Z explained that they already experience a blended life, often struggling to distinguished between the real and virtual realms. The ability to move fluidly among physical and online environments is natural for them and they are “dual zone travellers” [11]. With strong digital skills, they are comfortable with online encounters. MR allows immersion for spectators in otherwise inaccessible environments. Gamification is the best way to highlight the attractiveness for Gen Z [36]. The cultural heritage tourism sector seeks innovative methods to attract visitors, through the use of cutting-edge technology advances [31]. MR has great potential to enhance customer experience in tourism industry in general and cultural heritage in particular. Respondents expect MR to allow them to interact dynamically with cultural heritage artifacts, re-enact animations and cocreate value through blended experiences. Designing dynamic MR experiences needs to take into consideration the different needs and requirements as well as vulnerabilities of various stakeholders. Future studies should look into the effects of MR on visitor experience, leading towards on innovate use of MR in cultural heritage for Gen Z.

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Virtual Reality: A Simple Substitute or New Niche?

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Abstract. Since 2020, the tourism industry worldwide has been devastated as a result of the COVID-19 pandemic. Governments across the globe imposed strict national lockdowns in order to curb the spread of the pandemic, with negative effects on tourism. This forced many tourism companies and organizations to turn to virtual reality (VR) to survive. As a consequence, numerous tourism scholars began to question whether VR would replace conventional tourism after COVID-19. The study aims to address this concern and to determine if VR will be a substitute for conventional tourism or whether it can be considered as a tourism niche. It is a conceptual study which adopts a comparative analysis of conventional tourism models and VR. It uses two popular conventional tourism models, namely N. Leiper's (1979) tourism system model and R. W. Butler's (1980) destination life-cycle model. Based on this analysis, this paper suggests that VR will never be a substitute for conventional tourism, but should rather be considered a future tourism niche.

Keywords: Virtual Reality · Conventional tourism · Tourism models

1 Introduction

Tourism has faced several crises in the past [9, 14], however, none of these have had such an impact on tourism as the novel coronavirus disease of 2019 (COVID-19) [14]. To try to minimize the spread of the virus, the majority of governments have implemented non-pharmaceutical measures, such as quarantine, lockdowns, physical distancing, canceling events, and closing land borders to tourists [2, 9, 14]. This caused the tourism industry to come to a literal halt [14]. The United Nations World Tourism Organization estimated that by the end of 2020, international tourist arrivals declined between 70% to 75%, and as a result, tourism revenue dropped by US\$711.94 billion to US\$568.6 billion, which represented a loss of 20% [20, 28].

It is difficult to predict when, and if, tourism will ever really recover from COVID-19. It is estimated by some that it will take the tourism industry up to 10 months to recover after the pandemic [8]. Therefore, it is argued that international tourism will only return between 2021 and 2022 [28]. But the recovery of tourism could take even longer. For example, it took tourism 4.5 years to recover after the 9/11 terrorist attack

[26]. Thus, tourism scholars argue that technology will play a critical role in building resilience in tourism. One such technology is virtual reality (VR) [1, 14].

In light of this, tourism scholars have begun debating whether VR will act as a substitute for conventional tourism once the COVID-19 pandemic is under control or is over. This study, however, considers whether VR can be regarded as a substitute for conventional tourism or a tourism niche. This will be determined by comparing the most renowned conventional tourism models with VR, namely: N. Leiper's tourism system model (1979) and R.W. Butler's destination life-cycle (TALC) model (1980).

2 Virtual Reality in Tourism

The tourism industry has used VR since the 1990s [4, 15]. Despite this, there is no precise definition of VR in tourism literature [3]. Scholars often rely on and cite the well-known definition of D.A. Guttentag [15]:

the use of a computer-generated environment [the virtual environment] that one can navigate [the ability to move and explore the virtual environment] and possibly interact [to the ability to select and move objects within the virtual environment] with resulting in real time simulation of one or more of the user's five senses.

According to Guttentag, there are six main areas where VR provides benefits in tourism, namely: marketing; planning; sustainability and preservation; accessibility; education; and entertainment [15]. For many tourism scholars, VR is also seen as a benefit to tourism, however, they generally tend to focus on two of these areas, namely marketing and sustainability. In terms of marketing, tourism companies and organizations perceive VR as a superior marketing tool. In fact, VR has been described as having revolutionized the way tourism products, services, and experiences are promoted and sold [21, 29]. For example, Tussyadiah et al. [27] state that VR offers potential tourists a "try before buy" experience, which enables them to experience a destination virtually beforehand [7]. This is beneficial as it might encourage potential tourists to physically travel to the actual destination [15].

Tourism scholars and practitioners also regard VR as an ideal sustainable tool. As tourists and tourism-related activities have led to over-tourism, many tourism destinations/sites, especially those that are fragile and sensitive, have been restricted to tourists. However, VR enables tourists to gain "access" to these destinations/sites, without causing physical harm or degradation to the actual destination/site. According to tourism scholars, the reason is that VR provides tourists a substitute, or alternative, version of the real destination/site [7, 15, 29].

On the other hand, for many tourism scholars, VR poses a threat to tourism. According to this view, the major drawback of VR is that it is an individual activity that does not allow tourists any physical interaction with the local community or other tourists. This is a major concern as interaction plays an integral part in the tourist experience as people are social beings that want to be in the company of others [7, 24]. Even though VR can motivate potential tourists to visit the physical destination, it could replace the need to travel - having COVID-19 enhance this. VR might even offer potential tourists a better tourist experience than the real one. This means that potential

tourists no longer have the desire to travel to the actual destination. For many countries that are dependent on tourism revenue, specifically those in the global South, this is detrimental as it may lead to them suffering economically [7, 23].

Despite these benefits and drawbacks which permeate the scholarship, there is a major gap in the literature as tourism scholars have not yet paid adequate attention to VR as a tourism niche in its own right, but rather as a substitute for conventional tourism. The purpose of this study is, thus, to address the gap, as well as determine whether VR can be regarded as a substitute for conventional tourism or as a tourism niche.

3 Literature Review

As indicated, the literature on tourism and VR is relatively limited, with only certain aspects having received any attention. It is apparent that the literature on tourism and VR has essentially focused on select key aspects: marketing, sustainability, VR as a substitute for conventional tourism, and COVID-19. Marketing has been a popular area in VR literature during the last three decades [17]. This is indicated by the wide range of topics, which include some of the following: VR compared with traditional marketing media (e.g., travel brochures) [21], presence [27], and Second Life [18].

Tourism scholars have also discussed how VR can be used as the ultimate tool for sustainability. One of the most-cited authors in this regard is J.M. Dewailly who focuses on how VR contributes to sustainability in tourism [11].

Another area that has become popular among tourism scholars is VR as a substitute for conventional tourism. In his latest publication, Guttentag discusses VR as a substitute for conventional tourism. He concludes that VR will never substitute conventional tourism [16]. In contrast, D. Sarkady et al. disagree by stating that although tourists used VR as a substitute for conventional tourism during COVID-19, they will also do so after the pandemic [25].

Lastly, since 2020, tourism scholars have begun paying attention to how VR can contribute to tourism during COVID-19. O. Atsiz, is one of many scholars that has addressed this topic, focused on how VR can offer tourists an alternative travel experience, while still adhering to physical distancing (or social distancing) regulations [2].

When considering tourism models, it is Butler's TALC model which emerges as one of the most popular conventional tourism models in tourism literature. It has stood the test of time as tourism scholars continue to reference this model and his work as seminal. In addition, the conventional tourism framework model by Leiper is also often favored among tourism scholars.

In terms of VR, the only authors that have paid attention to a conventional tourism model thus far are J. Bulchand-Gidumal and E. William. In their work, they use Leiper's tourism framework model for VR and augmented reality to discuss the main stages of travel - dreaming, planning, booking, transit, experiencing, and sharing. The results of their study show that VR is applicable in the following phases: dreaming (i.e., the "try before buy" concept), planning (i.e., the "try before buy" concept), booking (i.e., the "try before buy" concept), transit (i.e., entertainment), experiencing (i.e., the

complete tourist experience), and sharing (i.e., social media) [5]. Given the limited attention this topic appears to have received, this study addresses this gap.

4 Methodology

As in the case of many tourism studies, this study does not use empirical research such as qualitative and quantitative research methods as it does not rely on experiments. Instead, it adopts a conceptual research approach and a comparative analysis. The conceptual research approach is of relevance as it is often used to address difficult questions and to “develop new concepts ... or [to] reinterpret existing ones” [30]. A multiple comparative methodology was also adopted to more effectively “gauge the significance, validity and reliability of the outcome” [12]. The conventional tourism models devised by Butler and Leiper were selected as benchmarks based on the reason that they have remained popular and reliable since they emerged in the literature. Therefore, they still apply to modern-day tourism research. Another reason is that tourism is constantly changing, thus, the study compares two established conventional tourism models and argues that in doing so the position and status of VR within the tourism realm can be evaluated.

5 Results and Discussion

This section focuses on the conventional tourism models by Leiper and Butler and how they can be applied to VR. It is divided into two sections. The first section explains these models in terms of conventional tourism, and the second assesses the similarities and differences between VR and conventional tourism. In other words, it appraises the VR dimension in terms of the two key conventional tourism models.

5.1 Conventional Tourism Models

Over the past half-century, as tourism has evolved as a subject of intense academic research, a plethora of tourism-related models have been developed. This section briefly discusses the two conventional tourism models devised by Leiper and Butler that have been selected for this analysis as they have stood the test of time and are still regarded among tourism scholars as key analytical tools. In 1979, Leiper developed the “tourism system” model in order to understand and manage tourism (see Fig. 1). The model comprises of tourists, geographical elements (tourist generating region, the tourist destination region, and the transit and route region), and the tourism industry [19].

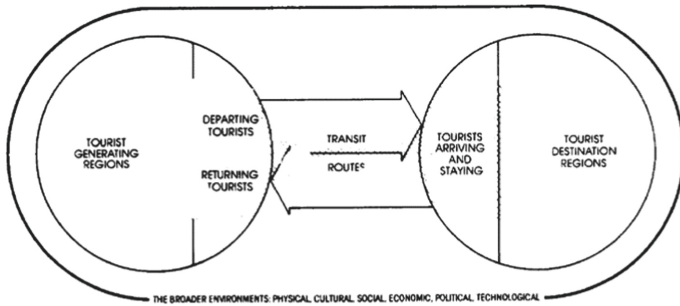


Fig. 1. The tourism system (Source: Leiper, Leiper, N. (1979) The framework of tourism towards a definition of tourism, tourist, and the tourist industry. *Annals of Tourism Research* 6 (4):404)

According to Leiper's model, the integral component in tourism is the tourists. Fletcher et al. [13] state that tourists "initiate the demand for travel for tourism purposes". Thus, the tourism industry cannot function at all without them [19].

In terms of the geographical elements, they consist of the tourist generating region, the tourist destination region, and the transit and route region. Leiper states that the tourist generating region is "the place where tours begin and end", in other words, tourists' residences [19]. Based on the model, the tourist destination region refers to the area that tourists stay in temporarily, namely the destination [19]. Some scholars are of the opinion that the tourist generating region and the tourist destination region align with G.M.S. Dann's "push" factors (the reason tourists want to travel) and "pull" factors (features of the destination that encourage tourists to travel to the destination) [10]. Based on the model, the tourist generating region "pushes" tourists to travel, while the tourist destination region "pulls" tourists to it [13].

Leiper states that the transit and route region include destinations tourists visit on route. The transit and route region are important factors in tourism as they link the tourist generating region and the tourist destination region with one another [19].

The last element in Leiper's model is the tourism industry. According to him, the tourism industry includes the tourism organizations, companies, and facilities that serve tourists, for example, shops and restaurants [13, 19].

Lastly, as indicated by Leiper, there are five external factors that influence the elements of the model, namely physical, cultural, social, political, and technological [19].

The second model, and one of the most cited in tourism literature, is the "TALC model" (see Fig. 2). In 1980, Butler developed the TALC model in order to showcase the different phases that a conventional destination undergoes. He argues that a conventional destination goes through various phases, including the exploration stage; the involvement stage; the development stage; the consolidation stage; the stagnation stage; the decline stage, and finally the rejuvenation stage [6].

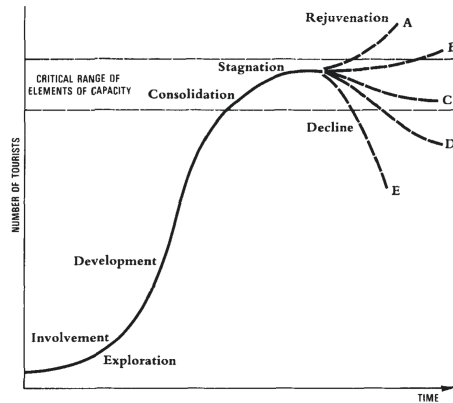


Fig. 2. The tourist destination life-cycle (Source: Butler, R.W. (1980) The concept of a tourist area cycle of evolution: implications for management of resources. *Canadian Geographer* 24 (1):7)

According to Butler's TALC model, the first phase is the exploration stage. The destination is still unaffected by tourism and is mainly visited by 'early tourists', such as "explorers" (they want to get away from the so-called 'beaten track') and "allo-centrics" (adventurous tourists). Since the destination is intact, there is physical interaction between the locals and the visitors. It is for this reason that visitors use local facilities as the infrastructure has not yet been developed for tourism [6].

The TALC model indicates that the second phase is the involvement stage. In the involvement phase, the destination becomes more popular among tourists as it is now being marketed. The locals begin to realize the potential of tourism and start to provide facilities to cater for tourists. It is also during the involvement phase that a tourism season emerges [6].

Butler states that the third phase in the TALC model is the development stage. The destination is still gaining popularity, especially among "mid-centrics" (they visit the destination during its "heydays") and the "institutionalized tourist" (they prefer organized tours). However, the locals' involvement begins to decrease, which opens the door to external tourism organizations. Unfortunately, the external tourism organizations begin to replace the locals and bring in auxiliary facilities, update the existing facilities, and import labor to cater for tourists [6].

The model shows that the next phase in Butler's TALC model is the consolidation stage. The destination is now in its "heyday" as tourists are still increasing and its economy now depends on tourism. But increasingly tourists are no longer interested in the old facilities. Therefore, the external tourism organizations begin to replace the old facilities with newer and improved facilities. This leads to the locals opposing tourism [6].

The fifth phase in Butler's TALC model is the stagnation stage. During this phase, the destination has finally reached its peak in terms of tourist numbers. Tourists still regard the destination as "old fashioned". Only the "organized mass tourist" (who prefers flexible organized tours) and "psychocentric tourist" (who desires a well-

developed and safe destination) travel to the destination. It is also at the stagnation phase that the natural and cultural attractions deteriorate and, therefore, external tourism organizations replace them with artificial facilities [6].

After the stagnation phase, a destination can either pass through the decline phase or the rejuvenation phase, or both. This depends on how popular the destination is among tourists. Regarding the decline phase, the destination is considered in a tourism slump due to overuse of resources or as a result of war, disease, or any other catastrophic event (as shown by Curves D and E). It is during the decline phase, that the locals begin to show renewed interest in the destination by visiting the destination and purchasing the facilities [6].

In terms of the rejuvenation phase, the destination can be restored to its former glory through successful redevelopment, minor modification, and adjustment to capacity levels, and protection of resources (as shown in Curves A, B, and C) [6].

5.2 Virtual Reality Tourism Models

It is argued that Leiper’s tourism framework and Butler’s TALC model can be used to highlight the similarities between conventional tourism and VR. This section substantiates this viewpoint.

The study argues that Leiper’s tourism system is similar to the VR tourism system. The reason is that the VR tourism system also consists of the same core elements, namely tourists, geographical elements, and the tourism industry (see Fig. 3).

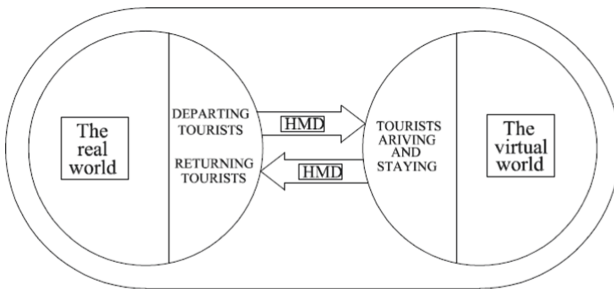


Fig. 3. The tourism system. (Adapted from LeiperN. (1979) The framework of tourism towards a definition of tourism, tourist, and the tourist industry. *Annals of Tourism Research* 6(4):404)

As indicated by Leiper’s model, tourists play a key role in conventional tourism. This is also the case with the VR tourism system. In VR, tourists (i.e., virtual tourists) are important as tourism companies and organizations rely on them to purchase and use their VR-related products and services. Therefore, similar to conventional tourism, it is impossible for VR to function properly without virtual tourists.

In terms of the geographical elements, VR also comprises of three elements similar to those referred to by Leiper. With regards to VR, the real world is considered as the tourist generating region. In the real world, tourists often face challenges and issues on a daily basis, for instance, the COVID-19 pandemic. The tourist destination region

changes to the virtual world. As highlighted, the tourist generating region and the tourist destination region correspond with Dann's push and pull factors. The reason is that the challenges and issues (e.g., COVID-19) "push" tourists, while the virtual world "pulls" them to it. This is because the virtual world offers tourists a temporary escape from their daily challenges and issues. In order to get to the tourist destination region, tourists "pass through" the transit and route region. In VR, the transit and route region equate to the head-mounted display (HMD). Similar to the conventional tourism model, it is noted that virtual tourists also travel from the tourist generating region (i.e., the real world) pass through the transit and route region through an HMD, and end up at the tourist destination region (i.e., the virtual destination).

Lastly, as regards to Leiper's third aspect, the tourism industry, it is argued that in VR, this comprises of tourism organizations and outlets that order VR-related services and products from VR developer companies to offer tourists the VR tourist experience. It can, therefore, be concluded that Leiper's model shows that VR is in many ways similar to conventional tourism.

The next conventional model is Butler's TALC model. It is argued that a virtual destination also passes through most of the stages referred to by Butler in his TALC model as shown in Fig. 4.

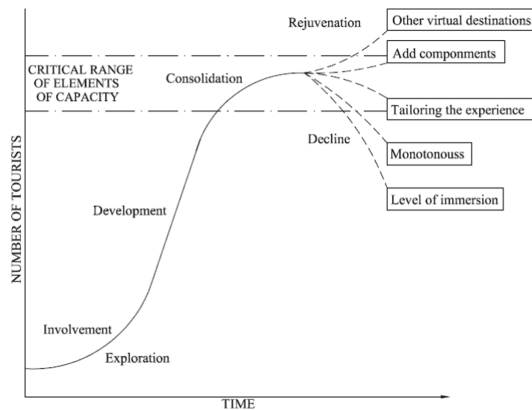


Fig. 4. The tourist destination life-cycle (Adapted from: Butler, R.W. (1980) The concept of a tourist area cycle of evolution: implications for management of resources. *Canadian Geographer* 24(1):7)

The first phase according to Butler, is the exploration stage. During the exploration phase, not many people are aware of the virtual destination. The only visitor that 'travels' to the destination is the "curious visitor" (who has an eagerness to explore the virtual destination on, for example, the internet due to his/her curiosity). The quality of the virtual destination is poor as tourism organizations provide a very basic or elementary virtual tour since it is cheaper for a start-up. The only downside in the exploration phase, unlike conventional tourism, is that VR does not offer tourists any

physical interaction between the locals (i.e., VR developer companies) and the curious visitor, as indicated earlier.

The next phase in Butler's TALC model is the involvement stage. Visitor numbers increase as they are becoming more aware of the virtual destination. For this reason, the local VR developer companies begin to show a keen interest in the virtual destination and begin to market it through, for instance, virtual advertisements on the internet. In addition, the local VR developer companies also start to improve the virtual destination by adding other elements, such as higher quality visuals and improved sound.

Following the involvement phase is the development stage. The virtual destination now attracts a new type of tourist, namely the so-called "virtual tourist" (they prefer to explore virtual destinations). It is at the development phase that the virtual destination is in its prime due to its popularity. As a result, there are more virtual tourists compared to the local VR developer companies. In fact, VR has the ability to attract more people than conventional tourism because, for instance, an app of the virtual tour can be downloaded or viewed by many people in comparison to conventional tourism which only allows a certain limited number of tourists according to physical capacity. Unfortunately, the local VR developer companies' involvement can begin to decrease and they are then replaced by international VR developer companies. The international VR developer companies begin to change the virtual environment by upgrading and improving the virtual destination through integrating new components, such as an HMD.

The fourth phase in Butler's TALC model is the consolidation stage. As indicated by the number of downloads or viewers, virtual tourist numbers are still increasing. In addition, the international VR developer companies transform the virtual destination from a basic 360° video/image virtual tour to a more immersive tour as they add new elements, such as movement (e.g., touch) and sound. The virtual destination begins to rely on the revenue gained from tourism. Hence, the international VR developer companies begin to charge fees for tourists to view the virtual destination. As a result, the local VR companies feel left out and retreat and often go bankrupt.

It is contended that a conventional tourism destination does not always pass through all the phases mentioned in Butler's TALC model. This is also the case with VR. The phase that does not apply to the virtual destination is the stagnation stage. The reason is that a virtual destination will never experience a peak in tourist numbers, cannot be destroyed, and suffer as a result of other issues (i.e., environmental, social, and economic). Moreover, the virtual destination does not have to rely on repeat visitation and lower-income tourists as, unlike a conventional tourism destination, it does not rely on repeat visitation because it is able to attract new and potential tourists regularly.

After the consolidation phase, the virtual destination can pass through the decline phase or the rejuvenation phase, or both. In a sense, the virtual destination does not always experience the decline phase. Again, the reason is that the virtual destination does not exist. Therefore, the virtual destination does not face the same issues as a conventional tourism destination would. However, if the virtual destination does experience the decline phase, it might start to lose tourists due to the tourist experience becoming monotonous and boring, or the level of immersion (as shown by Curves D, and E). In addition, the local VR companies might be involved again in the

development of the virtual destination. Lastly, the virtual destination will mainly be visited by attitudinal loyal tourists (they show affection towards a certain brand) and behavioral loyal tourists (they continually use or buy the same brand) [22]. In terms of VR, attitudinal loyal tourists are considered poor tourists. They are loyal to the virtual destination since they cannot afford to travel to the actual destination. Behavioral loyal tourists in VR are wealthy tourists that will only visit the virtual destination in order to decide whether it is worth it to visit the actual destination beforehand.

Should the virtual destination experience the decline phase, it can attract tourists again in the rejuvenation phase. VR developers can achieve this by offering tourists another aspect of the virtual destination, make the virtual tour more immersive by adding other components or to tailor the experience according to the need of the tourist (as shown in Curves A, B, C). Therefore, the study argues that the VR destination can be seen to undergo most of the phases that a conventional tourism destination undergoes according to Butler's TALC model.

6 Conclusion

As COVID-19 has devastated the tourism industry, many tourism companies and organizations were forced to move to VR in order to survive. VR literally transformed the tourism industry, especially in terms of marketing and sustainability. Therefore, the aim of the study was to determine if VR could become a substitute for conventional tourism or whether it can be considered as a tourism niche, especially in the future. A conceptual and comparative analysis was conducted by comparing two of the most popular conventional tourism models with VR, namely Leiper's tourism system and Butler's TALC model.

Based on the results, VR will not likely be a substitute for conventional tourism. It is, therefore, argued that VR should rather be considered as a tourism niche in its own right. In fact, the conventional tourism model by Leiper supports this. As indicated, VR also consists of similar elements mentioned in Leiper's model, namely tourists, geographical elements, and the tourism industry. Similar to Leiper's conventional tourism system model, in VR, virtual tourists are also regarded as vital as the industry relies on them. In terms of the geographical elements, virtual tourists also have to pass through the tourist generating region (i.e., their reality), the tourist destination region (i.e., the virtual world), and the transit and route region (i.e., HMDs). Lastly, the tourism industry in VR is considered to be the tourism organizations and companies that rely on VR developer companies to develop a VR tourist experience for them to sell to virtual tourists.

Even Butler's TALC model shows that VR is similar to conventional tourism. Based on the model, a virtual destination (i.e., a simple 360° video/image or live-stream tour of an actual or fabricated destination) also passes through many of the phases, especially the exploration stage; the involvement stage; the development phase; the consolidation phase; the decline phase and the rejuvenation phase. However, the only phase that does not apply to VR is the stagnation stage. Compared to a conventional tourism destination, the virtual destination is virtual, in other words, not "real". Thus,

the virtual destination will never experience its peak in tourist numbers, destruction, and issues.

Lastly, in order for VR to be considered as a tourism niche in the future, two problems need to be addressed by future scholars. The first major issue is that VR does not entail any physical interaction between the local VR developers and virtual tourists. As indicated, it is important to address the issue because interaction plays a key role in the tourism domain as humans are considered social beings. The second vital issue that has to be focused on is that VR does not provide tourists the full tourist experience as in the case of conventional tourism, where tourists are able to experience a destination through all of the five senses (i.e., sight, sound, smell taste, and touch). This issue needs serious attention because a full sensorial tourist experience will result in a more authentic experience for tourists. For now, VR appears, thus, not to be a substitute for conventional tourism, but rather as a dynamic futuristic niche in its own right.

Acknowledgments. The author would like to thank her supervisor, Prof K.L Harris (Head of Department of the Historical and Heritage Studies and Director of the University of Pretoria Archive) for all her support and guidance during the writing of this paper. The author wishes to thank the University of Pretoria for granting her the necessary funds for her Ph.D. research. Moreover, the author thanks her family and friends for their support. Lastly, the author thanks the ENTER Conference for the opportunity.

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Emergence and Rapid Popularization of Paid Web-Conferencing-Application-Based Tours in Japan: An Analysis of Their Business Potential

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Abstract. Following the emergence of COVID-19 pandemic, people in Japan were asked to refrain from traveling, resulting in various companies coming up with new ways of experiencing tourism. Among them, the online tourism experience of H.I.S. Co., Ltd. (HIS) drew more than 100,000 participants as of August 29, 2021. In this study, we focused on an online tour where the host goes to the site and records real time communication using a web conference application. The destinations of online tours were analyzed through text mining, and the characteristics of online tours were analyzed using Latent Dirichlet Allocation (LDA) of topic models. The results show that the number of online tours is weakly negatively correlated with distance and time differences. From the topic model, it is evident that the guide is important in online tours. In addition, the sense of presence, communication environment, and images, which are considered to be unique topics in online tours, are also relevant to the evaluation.

Keywords: Online tour · e-Tourism · Web conference · COVID-19 · Text mining

1 Introduction

In the past decades, the global tourism industry has experienced major losses and damages caused by various unfortunate events, including natural disasters, epidemic crises, and man-made disasters [18]. Currently, the industry is in dire straits due to the COVID-19 outbreak, which was declared a pandemic by the World Health Organization (WHO) on March 12, 2020 [8, 26]. Governments at regional and national levels across the world have so far announced and implemented policies, such as travel bans, community closures, stay-at-home orders, voluntary or mandatory quarantines, and business-specific retrenchments [7], to combat the negative effects of COVID-19. In Japan, a state of emergency was declared on April 7, 2020, in seven prefectures, requesting people to refrain from going out, and its scope was expanded to the whole country on April 16 [1]. A state of emergency empowers governors in affected regions to call for restrictions on movement and commerce while offering minimal ways of enforcement [22].

1.1 Current State of Japan's Tourism Industry

First, we present the current condition of the tourism industry in Japan, comparing the situation before and after the outbreak of the COVID-19 pandemic. The annual number of hotels and guests in 2020 decreased by 48.9% compared to the previous year. The rapid spread of this infectious disease has prompted people to rethink and change their lifestyles in several ways [27]. As a result, online tourism emerged as a new form of e-tourism, which involves the use of information and communication technology (ICT) to experience virtual tourism. Furthermore, the number of monthly Japanese departures has consistently declined by 98.1%–99.8% year-on-year since April 2020. Therefore, the Japanese travel agency HIS, which carries out the second largest number of overseas travel transactions in Japan as well as a high percentage of overseas travel business, also started offering online travel experiences. Among them, “Online Tour,” which uses a web conference system where the host guide visits the site and takes real time communication (RCT), is considered to be a close substitute for group tours. HIS was established in 1980, and as a venture company in Japan's tourism industry, it has repeatedly undertaken novel attempts, such as providing low-cost airline tickets, establishing hotel business in Australia, and an airline company—Skymark Airlines—in 1996. This research is based on paid online tours, which have already attracted more than 100,000 participants [9].

2 Theoretical Background

2.1 What is “Online Tour”?

There are three types of online tour platforms that can be found in Japan:

1. Video streaming sites, such as YouTube.
2. Web conferencing applications, such as Zoom.
3. Original websites.

The concept of e-tourism is presented as a bundle consisting of three distinctive areas: business management, information systems, and tourism [4]. According to the analysis [13], which aimed to develop and present a conceptual framework of e-tourism system based on the factors and conditions in the emergence and development of e-tourism, it was found that some authors have included characteristics of “electronic excursions, also called virtual, as well as electronic delivery of tourism services” to the concept of “e-Tourism” [15]. The “online tour” we discuss in this paper is therefore considered to be a type of e-tourism because it constitutes a digital excursion with interactive communication, conducted by travel agents as business management (Table 1).

Table 1. Specific examples of online tours using web conferencing systems

Tour title	Contents	Features of the tour Chat, quizzes, polls, etc.	Prices		Comments/Responses
Korea's hot spots right now	<ul style="list-style-type: none"> live streaming Recorded video (city walk) 	<ul style="list-style-type: none"> text chat question and answer 	free		There is an emphasis on promotion, including their preventative measures to Covid-19.
A spectacular view created by nature! Mureungwon Live Tour with over 3000 stone pillars	<ul style="list-style-type: none"> Mainly live streaming 	<ul style="list-style-type: none"> text chat 	paid	gratuity to support the guides	
Odd festivals! Thailand's version of Halloween! Let's go to "Peter Kong Festival" with colorful ghosts live on air!	<ul style="list-style-type: none"> Mainly live streaming 	<ul style="list-style-type: none"> text chat 	paid	The festival could not be broadcasted due to rain on the day of the event, hence half of the tour fee was refunded.	Getting immediate answers to the chat questions gave a sense of participation.
Belgian Beer at Home Seminar & Beer Cafe Live Tour	<ul style="list-style-type: none"> Beer seminars by experts Street + Beer Cafe Broadcast Tour 	<ul style="list-style-type: none"> text chat 	paid	<ul style="list-style-type: none"> seminar only USD\$24.99 seminar and beer delivery USD\$68.72 	There is a "let's drink together" approach. It may help with the telepresence.
Which one do you want to connect in Turkey or Dubai?	<ul style="list-style-type: none"> Description of Dubai and Turkey live streaming 	<ul style="list-style-type: none"> text chat Voting feature * Vote on whether you want to connect in Turkey or Dubai. 	paid		The voting match seemed an effective way to foster a sense of participation.

Changes in lifestyle have also been observed due to lack of physical travel. In particular, e-tourism, which does not involve going to the site, has attracted attention as an alternative to physical travel. However, the online tours currently available in Japan are considered to be intellectual and/or emotional access to cultural properties (tourism objects) under the International Cultural Tourism Charter [10], but do not satisfy the urge of physical access. Therefore, it is not considered to be a complete substitute for travel.

Compared to existing modes of travel, online tours are considered to have the following three advantages:

- No travel costs (time and money).
- All participants can sightsee from the same point of view.
- Less restrictions on participants (Fig. 1).

**Fig. 1.** Typical picture of online tours

2.2 Research Purpose

Due to the COVID-19 pandemic and restrictions on movement, travelers are looking for new ways to travel to relieve boredom and anxiety [21]. We focused on new ways of traveling for those who were unable or unwilling to go on actual trips due to COVID-19. Understanding tourists' experiences and revealing their perceptions based on user-generated content (UGC) can be useful [28]. For this purpose, we collected voluntary non-paid customer reviews available on the HIS website as comments on each online tour offered by HIS. To analyze the huge amount of data, text mining [17, 20] was chosen as our research method to help establish trends and patterns on specific topics. In addition to LDA, a topic model method was proposed for the analysis of UGC, using unstructured data, such as reviews in marketing research [2]. Data mining approach, including text mining approach, has a major weakness: the temporal distribution of individual sequences is lost [25]. Nevertheless, by looking at the ranking of topics created from the topics of multiple corpus separated by attributes, readers can grasp the common characteristic topics of online tours.

The investigation adopted HIS' online tour as a case study and analyzed it using text mining and topic models. The current status of e-tourism using online conference systems in Japan is explored, and the possibility of the online tour being a new travel style in the future is discussed.

3 Research Methodology

3.1 Data Acquisition

In this study, we retrieved data from the HIS website three times. The HIS website was chosen because it is one of the largest online tour providers and the only website which currently has reviews from participants with their attributes. The data acquisition is summarized in Table 2. The first set of data was obtained on April 17, 2021, and processed, while the second set of data was obtained on April 25, 2021, and used for the analysis of the target locations, using the URL of the processed data. The third set of data was acquired on July 13, 2021, assuming that topic modeling using LDA would be performed.

Table 2. Summary of data acquisition

	Date of data acquisition	Kinds of acquired data	Number of cases
1st collection	April 17, 2021	title, URL, price	1222
2nd collection	April 25, 2021	review title, review content, reply from HIS, posting date, participation date, gender, age	1746
3rd collection	July 13, 2021	review title, review content, reply from HIS, posting date, participation date, gender, age, evaluation score, participation type	2904

After the 1st data acquisition, the following steps were performed on the acquired online tour titles and the contents of each page.

- (i) Because this study focused on new travel methods, knowledge-based webinars (seminars), lessons, fortune-telling, shopping, and English conversations were excluded from the analysis since they were not centered on physical sightseeing.
- (ii) Domestic travel was excluded because overseas travel was more restricted than domestic travel, and the residence of the participants was unknown.
- (iii) For the remaining 516 cases, we checked the titles and contents of the websites, added the country names to the data, and assigned region names to the country names by referring to the destinations data in the International Airline Passenger Survey [11] by the Japanese government.

Table 3. Break down of data

Gender	Males	Females			
2nd collection	419	1327			
3rd collection	727	2176			
Age	10s	20s	30s	40s	50s
2nd collection	31	128	322	582	476
3rd collection	57	196	556	1026	758
Age	60s	70s	80s	90s	Over 90s
2nd collection	157	40	8	1	1
3rd collection	233	63	12	2	1
Evaluation Score	Score1	Score2	Score3	Score4	Score5
3rd collection	19	25	98	492	2270
Participation type	Dates	Family	Friends	Alone	Others
3rd collection	72	1190	182	1408	52

In Table 3, 25% of the respondents were male, and 75% were female. In terms of age, the majority of respondents were in their 40s (33%), 79% were in their 30s to 50s (middle generation), 9% were in their 20s or younger, and 12% were in their 60s or older. From the above, it can be seen that middle-aged women are the most likely to participate in online tours and write reviews.

The breakdown of gender and age was almost the same as that in the second time. In terms of the evaluation scores (score5 is good, score1 is bad.), score5 was the most frequent score, accounting for 78%, and score4 and score5 together accounted for 95% of the high ratings, while score1 and score2 were the lowest, accounting for only 1.5%. Therefore, the reviews on the online tours were generally favorable. The largest number of participants (48%) were solo, followed by family (41%), friends, and dates (9%). Therefore, the proportion of single participants to multiple participants is approximately the same, and in the case of multiple participants, it is often families.

3.2 Target Locations for Online Tours

Compared to physical trips, online tours cost less in terms of time and money, and fewer restrictions on participants. Accordingly, it was anticipated that there would be a high demand for remote destinations, unlike physical trip, which has a high demand for nearby destinations. Therefore, the following hypotheses were tested:

Hypothesis 1: Actual destinations and online tour destinations tend to be different.

Hypothesis 2: The number of tours and that of word-of-mouth comments will increase in distant areas where the actual travel costs are higher.

The two hypotheses were tested by comparing the implementation of online tours (number of online tours, reviews, tours with multiple reviews) with the number of Japanese departures, distance, and time difference (Fig. 3).

Comparison with the Number of Departures

In Table 4, the number of departures and the number of online tours are shown based on the destinations of the International Airline Passenger Survey [11].

Table 4. Number of departures and online tour implementation

Region	column1	column2	column3	column4
Africa	9.5187	12	82	5
Indonesia	39.9321	4	2	1
Oceania	74.4484	87	46	8
Guam and Saipan	60.8729	0	0	0
Singapore	75.1002	11	53	6
Thailand	156.9081	9	3	1
Hawaii	154.0943	11	15	4
Philippines	64.8596	9	0	0
Vietnam	85.0781	33	14	4
Malaysia	39.2896	11	0	0
Europe	222.0372	79	231	21
Korea	281.8991	6	81	1
Hong Kong and Macau	59.2915	26	24	7
Southwest Asia (Other Asia)	25.8552	63	144	17
Taiwan	203.8528	12	12	2
Middle East	14.8315	27	80	9
China	224.9926	13	12	1
Central and South America	15.0324	41	58	7
North America	154.2499	34	59	10
Total	1962.1442	488	916	104

column1: Number of Departures by Destination (ten thousand)

column2: Number of online tours

column3: Number of reviews

column4: Number of tours with multiple reviews

First, we thought of testing the ratio of the populations with the χ -square test. However, the Pearson's χ -square test could not be performed because 0 also has a meaning in our analysis. Thus, normality was checked using the Shapiro-Wilk test. As a result, normality could not be confirmed for all the data. Instead, the Wilcoxon signed rank test, which is a nonparametric test of the difference in the median of the representative values between two corresponding groups, was conducted to check if there was a difference in the representative values of the data. Because the values of the online tours and the number of departures differed significantly, the test was performed after correcting the total values to be the same.

Result

Table 5 shows that there is no difference in the representative values of the number of departures by destination and the data showing status of the implementation of online tours.

Therefore, hypothesis 1 was rejected.

Table 5. Summary of test results using Table 4

	column1	column2	column3	column4
Shapiro-Wilk test (p-value)	0.031*	0.001**	0.001**	0.005**
Combination	column1*column2	column1*column3	column1*column4	
Wilcoxon signed rank test	0.953	0.679	0.966	

Comparison with Distance and Time Difference

A test of zero correlation was conducted to see if the number of online tours, the number of reviews, and the number of online tours with multiple reviews related to the distance and time difference between the capital cities in each country and Tokyo. The Pearson correlation coefficient was calculated.

Result

Table 6 shows that there is a weak negative correlation between the linear distance, the capitals, and the number of online tours. There is also a weak negative correlation between the time difference and the number of online tours.

Table 6. Correlation between distance/time difference and online tour implementation

Distance	Number of online tours	Number of reviews	Number of tours with multiple reviews
Tests of uncorrelation	0.012*	0.240	0.087
Correlation coefficient	-0.307	-0.147	-0.212
Time Difference	Number of online tours	Number of reviews	Number of tours with multiple reviews
Tests of uncorrelation	0.034*	0.658	0.403
Correlation coefficient	-0.370	-0.085	-0.151

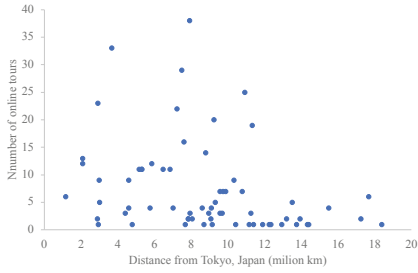


Fig. 2. Distance from Tokyo and number of online tours scatter

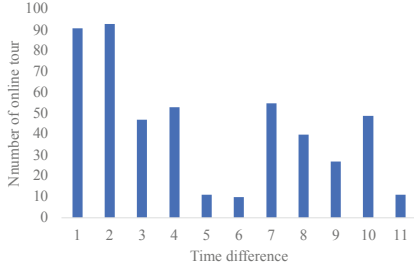


Fig. 3. Number of online tours by time plot difference

3.3 Topic Model

To clarify the impressions and evaluations of the online tour participants, reviews of the online tour were analyzed. The researchers applied a topic model, a probabilistic language model that expresses the process of word generation probabilistically, assuming that each document in a document set is generated based on a potential topic. LDA is a topic model method proposed by Blei [3]. The model assumes that the distribution of topics in each document and the distribution of words in each topic are generated by the Dirichlet distribution. Therefore, in this study, the LDA model is introduced as a data-mining method for online tour reviews. In LDA, the input vector of words is usually the bag-of-words, which is a word occurrence matrix that does not consider lexical relations in the document. In this study, we weighted the bag-of-words by the TF-IDF value, which is an index that considers the frequency of occurrence and rarity of words, to improve the accuracy. The LDA module of Gensim, a Python machine learning library, was used for the analysis. The number of reviews to be analyzed was 2904, excluding webinars, lessons, fortune-telling, shopping, and English conversations. The reviews were subdivided by rating, gender, age, and type of use, and LDA was used to estimate topic models from each corpus.

In LDA, the analyst needs to set the number of topics in advance. Two metrics, perplexity and coherence, were used to determine the number of topics. Perplexity is a measure of the generalization performance of a model and is obtained by normalizing the predicted likelihood of a set of words in a trained model. While perplexity has been used to evaluate many topic models, it has been pointed out that even models with excellent perplexity do not necessarily have high interpretability, and that perplexity may not be appropriate for human evaluation. For this reason, coherence has been proposed as an evaluation index to measure whether the extracted topics are easy to

understand [5]. Since the definition of coherence is ambiguous for “ease of interpretation from the human point of view,” many coherence calculation methods have been proposed to improve calculation efficiency and accuracy. In this study, the authors adopted *c_v* [19], which has the best accuracy among the coherence calculation methods. Figure 2 shows the relationship between perplexity and coherence in Score5. The lower the value of perplexity, the better the prediction performance of the model. Therefore, we set the number of topics with low perplexity and high coherence [16]. As shown in Fig. 4, the number of topics in the score5 example is introduced.

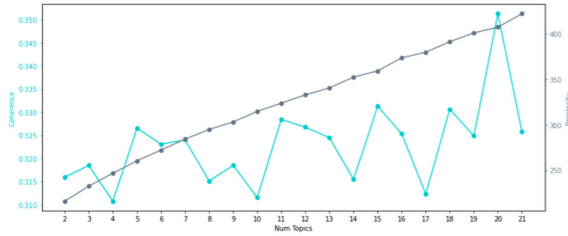


Fig. 4. Coherence & perplexity example score5

Result

The number of topics in each corpus is summarized in Table 7 based on the relationship between perplexity and coherence. The total number of topics covered in this study was 79, out of which three were uninterpretable. A total of 23 different topics were estimated. In Table 8, the most common topic was guide, followed by explanation/question-and-answer, enjoyment, real travel, and telepresence.

Table 7. Number of topics per corpus

Score				Gender	
score5	score4	score3	score2&1	men	woman
5	5	9	5	9	10
Age			Participation Form		
~39	40~59	60~	one	two	family
4	5	5	12	5	5

Table 8. Characteristic topics

Identified topic	Definition	Keywords	Corpus	number of topics
guide	about the guide himself or herself	guide, name of the guide, interesting, Japanese, local	score5, score4, score3, men*2, ~30, 60~, one*2, two, family	11
explanation and Q&A	about explanation and Q&A	question, explanation, answer, understand, Japanese, chat	score4, men, ~30, 40~59, one*3, family	8
enjoyment	about enjoyment	fun,enjoy, interesting, happy, feeling	men*2, ~30, 40~59, one*2, family	7
real travel	about real travel	travel, local, go, COVID-19, COVID-19 pandemic	40~59*2, 60~, one*2, two, family	7
telepresence	a sense of being there	presence, taste, local, experience, feel, virtual, crowded, feeling, nostalgic	score5, men*2, woman*2, two	6
see the local	about seeing the local	local, see, atmosphere, scenery, overseas travel, feeling, city, COVID-19 pandemic, situation	score4, men, ~30, 40~59, 60~, one	6
world tours	tours to multiple countries at once	several different countries, places, and sightseeing spots (ex. Australia & Egypt, Statue of Liberty & Pyramids)	score5, score3, score2&1, woman*2	5
video/image quality	about the online tour image	image, quality, TV, screen, camera	score4, score2&1*2	3
communication environment	about communication environment	electric wave,rough , cause, images, bad	score3, score2&1	2
You Tube	about You Tube	You Tube, comments, outside [relay] broadcasting, video	score3	1

4 Conclusion

4.1 General Discussion

The weak negative correlation between the number of online tours, distance, and time difference can explain the implementation of online tours in accordance with the first law of geography: “everything is related to everything else, but near things are more related than distant things” [22]. This law translates into the concept of “distance decay” where demand peaks near the source and decreases with increasing distance [14]. The linear distance between the capital and the number of online tours, and the time difference between the capital and the number of online tours showed weak negative correlations, whereas the time difference showed a stronger correlation than the distance. Therefore, the time difference was considered more important than the linear distance for online tours using RTC technology. The comparison with the target destinations of online tours did not show a different trend towards the target destinations of real trips, and the number of online tours had a weak negative correlation with

distance and time difference. The number of online tours was negatively correlated with the distance and time difference. However, in the topic model, five topics related to world tours, including multiple countries, were identified. This phenomenon might suggest that a reduction in travel costs is also important.

According to the topic model, the guide was considered to be the most important component of the online tour because the topic was most frequently mentioned. In the same way as the study on the development of an English tour guide project in the context of cultural tourism in Taiwan [24] pointed out, the quality of the guide is important for the success of tourism as well as online tours.

In terms of the impact of VR on impulsive desire to visit a destination, higher telepresence reduced participants' virtual distance by 45%, enhanced affection by 62%, and increased impulsive desire by 75% through emotional processes [12]. Therefore, although the online tour was not VR, if it could provide telepresence, it was expected to increase the users' impulsive desire for the destination.

The topics of communication environment, filming, and YouTube were seen in Score3, and video/image quality and communication environment were seen in Score2&1. In the online tour, the image quality was lower than that of YouTube or TV because of the specification of the application. In addition, because this is a real-time communication, the image quality changes depending on the communication situation and the performance of the device; therefore, the image quality may not meet the participants' expectations.

4.2 Contribution, Limitation and Recommendations for Future Research

As online tours are relatively new business models, they are constantly changing. This study analyzed only one company and we just dealt with the temporary information on that website. In addition, under the influence of COVID19, online tours are not always prepared to cater to the expectations of travelers. For example, on the day of the first data acquisition, the lockdown was still in effect in Germany [6], and there were no online tours available. Whether online tours will be truly established in the tourism industry as a new travel style and marketing tool for tourists can only be determined after the pandemic is over. To keep track of the implementation of online tours in the future, research on e-tourism will be important, because it will record the new marketing and profit-making business in the tourism industry, just as guidebooks and social media marketing appeared in the past.

The biggest challenge of this study was the discrepancy between the characteristics of the Japanese language and the method of analysis. Morphological analysis divides the negative phrase of "not good" into "good" and "not" in the review. As a result, the negative word "not good" is counted as a positive word "good" and a negative word "not" in the process. Therefore, the words "good" and "fun" appeared in score2&1 as words with high probability. In addition to these words, the word "no" also appeared as a high probability word. Having read and confirmed the reviews in advance, the researcher could tell the true message of the comments as "the signal is not good", "the picture quality is not good" or "[the travel was] not fun". Therefore, the research should take into account the words "not good" and "not bad" in advance.

Fortune-telling and shopping (Live Commerce), which were excluded from the research, are expected to become established as online tourism experiences in the future. The evaluation of the differences between in-person visits and online experiences should be explored. This study focused on group tours, but if online tours could be considered as a substitute for individual or actual travel, it would be necessary to conduct a survey including customized tours according to the wishes of users.

Since guide and telepresence were mentioned among the topics representing online tours, it is conceivable that tours that include communication with a guide will appear in the future in virtually constructed sightseeing areas such as VR Chat and Second Life. The use of HMDs in such tours may provide a higher sense of realism than the current flat display tours and enable physical access through somatic senses. This will create a new market, which, in turn, will affect the existing market; hence, keeping a close watch on them is necessary.

The main contribution of this study is that the possible characteristics of online tours the host guide goes to the site and takes RTC by using a web conference application were estimated from the text mining approach. Furthermore, the weaknesses of the text mining approach due to its linguistic characteristics of Japanese were suggested.

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Users Versus Non-users: The Impact of Experience on Hotel Guests' Attitudes Towards Service Robots in Hotels

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Abstract. The use of robotics and artificial intelligence have created a shift in the ways the service-based hospitality and tourism industry can fulfill the needs and wants of consumers that were earlier fulfilled only by humans. Robots have added the automation and self-service experience that play a vital role in the improvements of efficiency, speed, and the overall experience for the guests using technology. While there are many benefits of using robots in the industry, there are also risks associated with the excessive usage of robots on guest experience. As a result of the pros and cons on the topic, it is very important to gather data and analyze the results to further investigate and understand what the outcomes will be for the industry, its employees, and its customers. The purpose of this study is to examine the perceptions of the use of robots in the hotels as perceived by hotel guests who used a service robot and who did not. A self-administered survey was developed, and 939 usable responses were collected from hotel guests. Factor analysis showed that five factors emerged in the study: Advantages, Attitudes, Disadvantages, Pandemic Related, and Fear. Guests recognize the opportunities that service robots are bringing to their experience while voicing their concerns and fears about the use of them. Findings also showed that there are significant differences between users and non-users.

Keywords: Service robots · Guest experience · Artificial intelligence · Customer service

1 Introduction

Service robots have been introduced to healthcare, manufacturing, business, and hospitality that are shifting how services are performed. According to Robotics Tomorrow, an online robotics trade magazine, by 2021 the professional service robotic market is predicted to reach \$37 billion as industries are automating many processes for efficiency and productivity. The purpose of adding these kinds of robots to the hospitality industry is to automate time-consuming and repetitive tasks to accomplish more intellectual functions. The current and future adoption of technological innovations on service automation in hotels, restaurants, airports etc. is being used today yet, there are

many factors still to be discovered about their use and guest attitudes (Ivanov et al. 2017). The purpose of this study is to examine the attitudes of the hotel guests the use of service robots in the hotels. The second purpose is to determine if the perceptions differ between the guests who have experienced a service robot versus not. The overall objective of this study was to gain knowledge of how customers of the hospitality industry feel about service robots and to further understand their attitudes towards service robots in hotels. In addition, the study aims to suggest a scale for the dimensions for guests' attitudes for service robots in hotels.

2 Review of Literature

The newest and most advanced out of all is the addition of service robot usage in the hospitality and tourism industry. Service robots' use ranges from the basic artificially intelligent chatting robots to assist with the service process to complex robot assistants to improve guests' experience. As the number of businesses using service robots grow, it is important to understand what they will bring to the business in relation to the business itself and its customers (Belanche et al. 2020). Robotic automation's rapid growth emerges as software systems use automation, easy process of routine tasks, structured data, and analysis of internal systems that are directly compared with human activities (Aguirre and Rodriguez 2017). The impacts of robotics on businesses and the economy have created tremendous and unstoppable changes with the new way of taking on business opportunities and challenges with using service robots (Dirican 2015). Service robots are automating and changing the current hospitality industry with their advanced technological innovations (Tuomi et al. 2020). The use of robots in hospitality facilities creates a competitive advantage for the companies in the future due to its changing consumer markets and technology growth (Ivanov and Webster 2017). Robots are comprised of different complexity functions and ranges of service which are significant to this service-based industry as the interactions and essential activities of robots differ (Murphy et al. n.d.). For service organizations, it is important to recognize and understand what role robots will play and how it will affect the business, its and customers to ensure satisfaction for all during this emerging trend (Lukanova and Ilieva 2019). Hospitality consumers' acceptance on artificial intelligence provides a more user-friendly system with interactive technology and applicability to the hospitality industry business model (Go et al. 2020). The concept of service robots has been applied into hotel, food and beverage, and meeting and convention segments impacting the corporations, workforce, and customers with its current applications and future trends (Yang et al. 2020). The growing implementation of service robots in hotels provides a unique customer experience like nowhere else by combining human contact and artificial intelligence into one element (Fuentes-Moraleda et al. 2020). Service robots' usage in hotels is reviewed on their performance, process, purpose, trust, and intention with the highest importance for high service performance (Park 2020). Service robots serve as a tool to improve the quality of service offered to travelers as they give an extra reason to comeback to visit for the usage of the advanced technology systems in this fast pace growing technology era (Çakar and Aykol 2020). Similarly, Lee et al. (2021) determined that hotel guests expect high level of technical

performance and facilitation conditions. Furthermore, the analysis of innovativeness and optimism of technology readiness serve as critical factors in smart hotels as guests enjoy the performance of the robots, their services, and how this technology creates a positive experience for them during their stay (Kim et al. 2020). With the COVID-19 pandemic strategies to flatten the curve many drastic and quick changes have been introduced such as lockdowns, social distancing, stay-at-home orders, travel restrictions which impacted the hospitality industry as a whole. However, the usage of service robots in the hospitality industry serves as a critical factor to both physical and psychological factors of acceptance of the device and its service delivery (Gursoy and Chi 2020). During the COVID-19 pandemic, the service robot usage in hotels has created a positive attitude and responsiveness from customers in comparison to results prior to the pandemic as the fear of human contact and social distancing grew (Kim et al. 2021; Wu et al. 2021). With the increased presence to help manage the spread of COVID-19 and reducing the spread, service robots are able to perform tasks of delivery, sanitization, safety, and security by using their artificial intelligence programming and functions (Zeng et al. 2020).

2.1 Users Versus Non-users

The attitudes of customers that used a technology versus customers that did not is a subject of many studies (Chakiso 2019; Izquierdo-Yusta et al. 2015; Seo and Bernsen 2016; Sohail and Al-Jabri 2014; Verkasalo et al. 2010). Sohail and Al-Jabri (2014) investigated the attitudes towards mobile banking between users and non-users. The study found that six out of the seven factors were significantly different between users and non-users. Chakiso (2019) also determined that four out of the five factors that affect attitudes towards mobile banking were significantly different between users and non-users. On the other hand, Verkasalo et al. (2010) investigated how attitudes differ towards smartphone applications between users and non-users. They determined that users have more positive attitudes. Based on the review of literature, we propose the following hypothesis: H: There is a significant difference in hotel guests' attitudes towards service robots between users and non-users.

3 Methodology

3.1 Sample and Data

The data for this study was collected with a self-administered online survey using Amazon mTurk, with the total of 1152 responses from hotel guests. The use of mTurk is common in hospitality and tourism technology research (Ali et al. 2021, 2018; Birinci et al. 2018; Esfahani and Ozturk 2019; Nanu et al. 2020; Neto et al. 2020). Researchers should use several techniques to ensure that the responses from MTurk are valid (Cobanoglu et al. 2021). These include asking the same question in the survey twice and comparing the results (i. e. asking the age of the respondent in the beginning of the survey and the date of birth at the end of the survey) and removing the ones that do not match. Out of 1152 responses, 939 usable data was analyzed.

3.2 Factor Analysis

The respondents were asked to evaluate the statements about service robots on a 5-point scale (1 = Strongly disagree, 5 = Strongly agree). Before applying the factor analysis, reverse coding was applied when necessary. The statements in the survey were adopted from different academic studies (Bowen and Morosan 2018; Chan and Tung 2019; Chun-Min et al. 2017; Ivanov et al. 2018; Kabadayi et al. 2019; Kattara and El-Said 2013; Papathanassis 2017; Solnet et al. 2019; Sun Tung and Au 2018; Chen et al. 2019; Tussyadiah et al. 2020; Van Pinxteren et al. 2019) except for statements related coronavirus pandemic. Five statements about service robots in pandemic era were created from industrial articles (Frankel 2020; Hultgren 2020; Kahn 2020; Murphy et al. 2020; Reddick 2020; Simon 2020). Reliability measures for the items are presented in Table 1. Overall reliability for 35 items was found as 0.912.

Exploratory factor analysis results are presented in Table 2. Varimax rotation with Kaiser Normalization was applied and two items that have factor loadings lower than 0.40 have been removed. 34 items out of 35 divided into five factors that explains 55.230% of the total variance.

Table 1. Reliability measures

	Scale mean if item deleted	Scale variance if Item deleted	Corrected item-total correlation	Cronbach's alpha if item deleted
Robots may learn similarly to humans allowing better contact	133.97	261.956	0.623	0.907
Robots may be functional	133.56	267.732	0.563	0.908
Robots may be reliable	133.67	267.370	0.567	0.908
Robots may answer basic questions	133.63	267.150	0.546	0.908
Robots may be convenient	133.56	268.145	0.567	0.908
Robots may be a resource of knowledge and information	133.63	266.373	0.614	0.908
Human-robot interactions may be more efficient	133.97	264.708	0.585	0.908
Robots may communicate with guests on basic services	133.58	268.206	0.570	0.908
Robots may track guest data for specialized information	133.66	267.734	0.571	0.908
Robots may reduce any miscommunication	134.14	262.146	0.579	0.908
Robots may reduce the time and resources for basic services and requests	133.74	266.308	0.585	0.908

(continued)

Table 1. (continued)

	Scale mean if item deleted	Scale variance if Item deleted	Corrected item-total correlation	Cronbach's alpha if item deleted
Robots may save money while working non-stop	133.66	266.46	0.576	0.908
Robots may have skills of advanced recognition and communication	133.88	264.753	0.599	0.908
Robots may prevent customer language barrier	133.71	266.367	0.553	0.908
Robots may fulfill front line job functions	133.85	265.931	0.578	0.908
Robots may sell and upsell services and products to customers at the facility	133.91	265.331	0.559	0.908
Robot innovations may drive technology and business-based customers	133.72	265.667	0.619	0.908
Being served by a robot may create a safe and healthy environment	133.91	266.178	0.594	0.908
Robots may reduce the spread of the virus	133.74	265.206	0.572	0.908
Robots may perform the basic functions in facilities	133.69	266.824	0.615	0.908
Robots may be safe for our environment	133.74	265.794	0.575	0.908
Robots may allow for multiple language features	133.48	269.365	0.504	0.909
Robots may not need to be managed by men-power	134.05	265.550	0.497	0.909
Robots may be both automated and efficient	133.73	269.479	0.559	0.909
Robots may express emotions and gestures similarly to humans	134.36	262.579	0.504	0.909
Robots may replace human interactions	134.24	263.526	0.581	0.909
Robots may be easy to clean and maintain	133.77	267.354	0.522	0.909
Being served by a robot may be a scary experience	134.78	262.207	0.408	0.910

(continued)

Table 1. (continued)

	Scale mean if item deleted	Scale variance if Item deleted	Corrected item-total correlation	Cronbach's alpha if item deleted
Robots may be limited to what they can do	134.57	267.210	0.393	0.910
Robots may not be helpful	133.42	272.810	0.388	0.911
Robots may show concern of too much technology usage	133.73	274.391	0.351	0.911
Robots may not have emotions or fear about the pandemic	133.51	273.274	0.340	0.911
Robots may replace human jobs	133.89	272.143	0.222	0.912
It may be risky to delegate responsibility to machines	133.55	275.369	0.231	0.912
Robots may be an expensive machine	133.57	276.263	0.237	0.912

Table 2. Exploratory factor analysis

Advantages	% of variance = 31.631			
Service robots may communicate with guests on basic services	0.736			
Service robots may allow for multiple language features	0.714			
Service robots may be functional	0.698			
Service robots may answer basic questions	0.685			
Service robots may be both automated and efficient	0.642			
Service robots may track guest data for specialized information	0.637			
Service robots may perform the basic functions in facilities	0.631			
Service robots may be convenient	0.613			
Service robots may save money while working non-stop	0.609			
Service robots may prevent customer language barrier	0.598			
Service robots may be a resource of knowledge and information	0.587			
Service robots may be reliable	0.564			
Service robots may reduce the time and resources for basic services and requests	0.486			
Service robot innovations may drive technology and business-based customers	0.447			

(continued)

Table 2. (continued)

Advantages	% of variance = 31.631			
Attitudes	% of variance = 10.083			
Service robots may express emotions and gestures similarly to humans	0.753			
Service robots may learn similarly to humans allowing better contact	0.689			
Human-robot interactions may be more efficient	0.635			
Service robots may sell and upsell services and products to customers at the facility	0.621			
Service robots may reduce any miscommunication	0.620			
Service robots may have skills of advanced recognition and communication	0.582			
Service robots may fulfill front line job functions	0.494			
Service robots may not need to be managed by men-power	0.437			
Disadvantages	% of variance = 6.506			
It may be risky to delegate responsibility to machines		0.789		
Service robots may not be helpful		0.772		
Being served by a service robot may be a scary experience		0.743		
Service robots may show concern of too much technology usage		0.692		
Service robots may be limited to what they can do		0.548		
Service robots may be an expensive machine		0.445		
Pandemic related	% of variance = 3.053			
Service robots may be easy to clean and maintain			0.668	
Service robots may be safe for our environment			0.630	
Service robots may reduce the spread of the virus			0.581	
Being served by a service robot may create a safe and healthy environment			0.484	
Fear	% of variance = 2.957			
Service robots may replace human jobs				0.818
Service robots may replace human interactions				0.717
KMO 0.948				

The first factor was named as *Advantages* that contains 14 statements related to possible advantages of service robots. The second factor was named as *Attitudes* that includes eight statements about respondents' attitudes towards service robots. The third factor was named as *Disadvantages* that contains six statements related to possible disadvantages of service robots. The fourth factor was named as *Pandemic Related* that has four statements related to service robots' usage during coronavirus pandemic. The last factor was named as *Fear* that contains two statements about fear towards service robots.

3.3 Hypothesis Testing: The Impact of Utilization of Service Robots on Guests' Attitudes.

An independent t test was conducted on the factor obtained in the study between the guests who have used or seen a service robot in a hotel versus not. Table 3 shows except for advantages of services robots, all other factors differ between these two groups.

Table 3. Independent sample t test

	Experience with service robot	n	Mean	sd	t	F	p
Advantages	Yes	593	4.17	0.630	1.550	9.778	0.122
	No	346	4.11	0.502			
Attitudes	Yes	593	3.63	0.771	-8.992	33.914	0.000
	No	346	4.02	0.560			
Disadvantages	Yes	593	3.36	0.787	-13.830	30.441	0.000
	No	346	3.98	0.588			
Pandemic Related	Yes	593	3.91	0.768	-5.512	34.977	0.000
	No	346	4.15	0.539			
Fear	Yes	593	3.62	1.004	-7.983	46.498	0.000
	No	346	4.07	0.714			

Table 3 shows that guests who have experience with a service robot or have seen one, have lower level of fear (mean = 3.62) versus guests who have zero experience (mean = 4.07). On the other hand, guests who have not used or seen a service robot have more positive attitudes towards service robots (mean = 4.02) and think more positively about service robots' advantages in the pandemic era (mean = 4.15). Additionally, the guests who have used or seen a service robot think more positively about robots' disadvantages (mean = 3.36). Finally, there is no difference between two groups regarding the advantages of the service robots.

4 Conclusion

With the purpose of this study being to identify and examine perceptions of the use of robots in hotels as perceived by hotel guests, the conclusion has resulted in positive attitudes and perceptions towards the use of robots in the hospitality industry. The data gathered and analyzed was separated into 5 categories on a scale from one strongly disagree to five strongly agree. The five categories included: advantages, attitudes, disadvantages, pandemic related, and fear. As the data and results show, the advantages of using robots for a reliable and functional addition to guest experience scored the highest along with the pandemic use of robots for safety and cleanliness which has

created a new impact on the industry. The attitudes on robots were positive with a few negative aspects of unknowingness of what robots can do and how that will sift the industry. The disadvantages of robots exemplified the worry of the limited functions and services robots can perform and that worry of too much technology usage. Following the disadvantages of robots, fear of job replacement and lack of human interactions were a negative aspect as well. According to the independent sample t test results, the guests who have direct or indirect experience with a service robot more negative attitudes and more negative opinions about usage a robot in pandemic era but think more positively about service robots' disadvantages. Choi et al. (2020) also argued why the hotel guests continually show strong resistance to receive service from a robot. The hotel guests defense the core of the hospitality industry which is human touch. The results also show that using or seeing a service robot in a hotel environment help to reduce fear towards them. Similarly, Zhong et al. (2020) found that the people who watched a video about service robot working in a hotel, showed higher intention to book a room in the hotel. Interestingly, no difference was determined between two groups when it came to the advantages of the robots. This study has several limitations like many others. The first limitation is the sample size. Even though the sample size is suitable to conduct the analyses, larger sample group may provide more generalizable results. The second limitation is the question about the service robot existence in the hotels where the respondent stayed. The authors did not ask whether there was a service robot in the hotel. The third limitation is the ignorance of the respondents who have not experience with a service robot. The authors assumed that the respondents who had zero experience with a service robot might have enough knowledge about it to complete the questionnaire. Despite some negative aspects of robots in the industry, many positive aspects and advantages arise from the study exemplifying the unique and innovative technological advancements robots can bring to the industry. The efficiency, convenience, information, experiences, features, and interactions will all create a robotic experience like no other for the industry and its guests. The perceptions of the use of robots in hotels as perceived by hotel guests is very positive with exciting innovative experiences. Previous studies mainly focused to answer the similar questions, but sample of the studies mostly have not used or seen a service robot before. More research in the hospitality context is needed with the participants who have experienced with a service robot to obtain more detailed insights. The results showed that there are significant differences between users and non-users of service robots in hotels. There is more research needed in this area to understand how the use of a service robot influences the attitudes and behaviors of customers.

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Video Games as a Media for Tourism Experience

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Abstract. Virtual reality technology in recent year has been a hot topic in tourism and hospitality field, both for research and practical purposes. Virtual technology has some limitation, such as costs and time, which can be addressed by a different form of virtual technology, which is video games. The purpose of this study is to analyze the effects of mental imagery, sense of presence and addition of storytelling towards tourism experience by using video games as a medium. Previous studies have analyzed effects of mental imagery and presence towards the tourism experience, but there is lack of research in using storytelling or narratives to add to the tourism experience. Storytelling has been studied in marketing field, and has been found to be a great marketing tool, because people love to hear stories. Video games can be a better tool for delivering storytelling, while providing solid mental imagery and a sense of presence to the location. The methodology proposed for this study is a quantitative approach, using survey questionnaire as a tool. Two sampling method is proposed. The first is to use players of location-based games as the population, and randomly take the sample. The second method is to uses tourists or potential tourists of a destination, have the respondents try out the game, and answer the questionnaire. The proposed research could provide the importance of storytelling to be added for virtual reality and video games usage in tourism and hospitality field.

Keywords: Video games · Tourism experience · Storytelling

1 Introduction

Virtual reality technology has been growing in recent years, and brought in new frontier for destination marketers to interact with tourists. With the ongoing COVID-19 pandemic, virtual reality technologies are considered as an alternative to traditional travel, reduce risk of diseases and foreign diseases from spreading, hence increasing its sustainability in the long-term (Schiopu et al. 2021). Virtual reality technologies also showed its usefulness in as a way to provide information (Huang et al. 2016), as a tool or method for research (Fox et al. 2009), substitute for traditional tourism (Guttentag 2010; Schiopu et al. 2021), entertainment, planning, and education purpose (Guttentag 2010).

Despite of the various uses of virtual reality technology, the technology itself has a few limitations that prohibits its widespread adaptation. The awareness of the technology is still low within the general public, the limited availability and high cost of the

technology, the time commitment needed for learning to use the technology, and the willingness of people to substitute “real” experience with virtual experiences are obstacles faced by virtual reality technology application in tourism field (Yung and Khoo-Lattimore 2019). The challenges of virtual reality technology can be answered by another alternative technology, which is video games. Video games has 2.7 billion users worldwide in 2020 (Warman et al. 2019), which means people are aware of the technology. Video games is available everywhere, whether its in mobile phones, tablets, computer, or specialized console for gaming. As long as the game is not difficult, users are willing to continue learning and playing video games (Orvis et al. 2008).

Previous research has shown that interaction and information provided in a virtual environment can lead to people feeling as if they are present in the environment, bringing an unique tourism experience compared to other media, such as media or 360 degree picture (Bogicevic et al. 2019). There is little research regarding about this by using video games as a media. Previous research also did not include how storytelling can affect tourism experience in a virtual environment, although previous research shows that storytelling helps in making tourism experience more memorable (Tung and Ritchie 2011). Thus, the purpose of this research is to analyze the effect of mental imagery, sense of presence, and storytelling towards tourism experience with video games as a medium.

2 Literature Review

2.1 Mental Imagery

Mental imagery is the act of visioning an image without a sensory stimuli (Bogicevic et al. 2019; Kosslyn et al. 2006). The purpose of a mental imagery is to identify properties of an image, and recall related information from memory, and runs a parallel comparison of perception and imagery (Kosslyn et al. 2006). Mental imagery is important for tourism destination because it affects tourists’ expected experience before arriving in a destination. Virtual environment in virtual reality or video games provide images, and moving images which requires cognitive function of the brain to understand the environment and helps in shaping a mental image of the environment (Bogicevic et al. 2019). Previous study by Bogicevic et al. (2019) has found that mental imagery influences the sense of presence felt by the user using virtual reality. This research proposes the following hypothesis with video games as a medium.

H1: Mental imagery has a significant effect towards sense of presence,

2.2 Telepresence

Telepresence is the feeling of being present within a remote or virtual site (Draper et al. 1998). In this case, the remote site is a virtual environment created by video games or virtual reality. The experience is felt by the user where they are displaced by their own perception into a simulated one (Draper et al. 1998; Steuer 1992). To achieve this effect, different sensory cues (e.g. visual, audio, etc.) from the virtual environment can

be use to trigger the response. Previous study by Bogicevic et al. (2019) found that sense of presence enhance tourism experience when using virtual reality technology. This research proposes the following hypothesis based on previous study, but uses video games as a medium.

H2: Telepresence or sense of presence has a significant effect on tourism experience.

2.3 Storytelling

Storytelling refers to the act of sharing traditions, norms, experience, and knowledge between listeners and speakers through words and action in a narrative format in order to make it more comprehensible, meaningful, and memorable (Kim et al. 2020). Storytelling is one of the earliest forms of communication and we, as humans, are instinctively to have our thoughts and memories arranged in a narrative format (Ferreira et al. 2014). Hence, storytelling has become a trend in the experience industry as businesses started to built themselves from a story (Gravili et al. 2017). Storytelling from a destination helps visitors consume an experience, and incites emotions, and effect their sense of belonging and identification of the place (Bassano et al. 2019). Previous study by Yang & Kang (2021) found that storytelling can positively affect the experience depending on the quality of the message (story) in invoking emotion and memory of the listeners, and how customer can relate their own experience with the story. Video games can provide different stories of characters and locations; hence the research proposes the following hypothesis:

H3: Storytelling has a significant effect on tourism experience.

2.4 Experience Economy Theory

This theory that is proposed by Pine and Gilmore (1998) explained that experience can be divided into 4 different realms. Previous research by Jung et al. shows that in a virtual environment, the users actively participate and are immersed with the experience. Due to some similarities and differences between video games and virtual environment, video games may give different kind of experience.

Experience felt by the tourist is vital because tourism experience can lead to higher attachment towards the destination by the tourists, and increased intention and retention to stay at the destination (Vada et al. 2019). Integral part of tourism experience is direct interaction (Bogicevic et al. 2019) and co-creation. Co-creation is seen as away to create unique and memorable experiences for visitors (Sugathan and Ranjan 2019). Video games or virtual environment can provide higher interactivity and engagement with its users in comparison to other traditional media, such as videos or printed media. Hence, the following research identifies from previous study how tourism experience can affect visitors' intention to travel.

H4: Tourism experience has a significant effect on intention to travel.

3 Proposed Methodology

The proposed methodology for this study is a quantitative study. Quantitative study approach tests objective theories by investigating connections between variables (Creswell 2014). To select the sample, this research proposes find people who have played video games that are based on physical locations recently, such as Assassin's Creed franchise. Survey with items based on Bogicevic et al. (2019) and Yang and Kang (2021) will be given out online through communities of users who played the game before. Sites chosen will be Reddit and Facebook.

4 Potential Implications

The potential implications of this paper would be expanding the telepresence theory towards video games context. The finding could also highlight the importance of storytelling towards tourism experience. For practical implications, the findings can push practitioners to see video games an alternative tool to promote destination, and as an alternative for traditional tourism. With the ongoing pandemic, video games can be an alternative and a tool to promote and incite people to travel when the lockdown ends.

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Online Travel Planning for Families with a Child with a Disability

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Abstract. Whereas the search for information when starting to plan a trip is generally perceived as enjoyable, families with a disabled child may associate this step with anxiety and stress. This is due to a lack of information and poor consideration of disabled children's needs in most tourist websites, making it difficult for such families to find answers to their questions. In this context, the present research attempts to understand the online travel planning process of families with a child with a disability in order to propose solutions adapted to these families' needs.

Keywords: Travel planning · Families with a disabled child · Accessibility

1 Introduction

According to the United Nations (UN) [13], 10% of the world's population lives with a disability, creating life's barriers. Among these barriers, difficulties in accessing cultural, recreational or leisure activities are seen as environmental barriers that prevent a person with a disability from enjoying full citizenship [11]. These difficulties are even more significant when the disability affects a child and when the activity to be done requires travel outside the child's home environment. In that context, the availability of online information becomes an important factor in the travel decision of such families, to the point where some parents may even decide to abandon the idea of taking a trip or engaging in a recreational activity altogether. With this in mind, we wanted to explore the online travel planning process of families with a disabled child as regards the following three questions: 1) What are the main sources of information that families consult when planning a trip or recreational activity?; 2) Which steps, do families follow when seeking to plan and book their trips and recreational activities online?; and 3) Which obstacles do they encounter, online, when doing so?

2 Research Background

The issue of web accessibility for people with disabilities is not a recent concern, dating back to the early days of the internet even. For example, from the end of the 1990s, the W3C consortium, launched a project whose mandate is to provide the community of

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J. L. Stienmetz et al. (Eds.): ENTER 2022, *Information and Communication Technologies in Tourism 2022*, pp. 72–77, 2022.

https://doi.org/10.1007/978-3-030-94751-4_7

web developers and users with a set of standards that allow web technologies to be adapted to the needs of people with disabilities [14]. Over time, these standards, — called WCAG—have become a worldwide reference, among others for the development of laws obliging public services to adapt their platforms to offer more accessibility to disabled people. Subsequently, many private companies followed suit and adapted their offer in terms of accessibility accordingly. Within the body of research on web accessibility for people with disabilities, numerous studies have focused on the field of e-commerce, showing that many companies have committed to more inclusive web strategies, as demonstrated by Buzzi et al. [3] and Gladstone et al. [7]. Another strand of this body of research has been focusing on tourism, showing that the information needs of people with disabilities are much greater than those of other categories of travelers [10]. According to Eichhorn and Buhalis [6], the lack of information on the different tourism products are an important barrier to the realization of a travel project. Despite such findings, European destination management organization (DMO) sites have been very slow to adapt their service offer to meet the needs of people with disabilities [9], as shown by a study carried out in 2004.

Despite the increasing amount of research on the accessibility of tourism websites, the issues studied are still quite limited. A search of Google Scholar, ScienceDirect and Erudit databases shows that the vast majority of studies are based on a normative approach, evaluating the degree of compliance of websites with international accessibility standards, particularly those of the WCAG [5]. While these works have certainly contributed to improving the accessibility of tourism websites to people with disabilities, they have paid little attention to the behavioral dimensions of information search on tourism websites. One of the most underexplored topics is online travel planning for people with disabilities. While authors such as Buhalis and Michopoulou [2] have highlighted good web accessibility practices of different tourism websites, none have examined the online search process for users with disabilities in detail. Even more overlooked, as a focus of research, has been the topic families with a child with a disability. Nevertheless, a study conducted by Shikako-Thomas et al. [12] on 87 Canadian families with a disabled child showed that most look to the internet when seeking information for planning leisure activities. When such families fail to find information that reassures them in their plans, many end up abandoning the intended activity altogether, with the risk that this entails for the mental health of all family members.

3 Theoretical Framework

Although a number of researchers [1, 4] have focused on the use of technology by people with disabilities, to our knowledge there is no research that models travel planning for families with a child with a disability. We thus resorted to, as a starting point, a generic model that describe online travel research and planning developed by Ho et al. [8]. This model identify four dimensions that structure any online tourism information search: 1) The online search for information, consists in analyzing the weight of previous travel experiences, digital platforms used, the keywords used to launch searches, the websites consulted, the comparison of search results and the

navigation through the different web pages, 2) the information selection process is concerned with the criteria for selecting certain information and not others, the techniques of data conservation and the barriers encountered in a search; 3) The conclusion of the search, concerns the analysis the motivations for ending a search process and the synthesis of the information collected and 4) The analysis of the offline information search, in particular, the exchange and sharing of information with other people and the search for additional information from other sources.

4 Methodology

Before explaining the techniques used to collect the data, our first step was to identify our sample by defining the concept of disability. For this, we used the same criteria as those used by the Régie des rentes du Québec (a government agency). The organization defines five types of disabilities (visual, hearing, motor, cognitive and other disabilities) and two levels of severity. In terms of sampling, we targeted 15 families living in two regions; since these two regions, together, account for 45% of the families receiving family allowances for children with disabilities. To recruit these families, we solicited all the associations that support parents with a child with a disability in Québec and that distributed the call for contributions to their members throughout the spring of 2021. Once the family was recruited, the data collection was carried out in three different stages. First, the selected participants were asked to complete a short survey about their family, tourism and digital profile. In the second stage, once participants completed the survey, they were asked to take part in a simulation exercise of searching for tourism information for a one-week trip to Paris, France, for the summer of 2021. Once the simulation was over, the participants took part in an interview lasting about 40 min, aimed at deepening their understanding of some of the actions undertaken during the simulation and at asking them about the fourth dimension of the Ho et al. [8] model concerning offline information searches.

5 Results

The results obtained so far confirm some of the findings already highlighted in the literature, particularly the complexity of the task of searching for tourism information online. Essentially, even though 67% of respondents consider the web to facilitate the research process, they consider this task to be tedious and complex, even though their level of computer literacy is quite good and they all have a university education. The second finding that emerged from the research conducted with families concerns the predominance of online booking platforms, regardless of the type of disability of the child. In fact, during the observation phase, 86% of the participants instinctively initiated their search using by a search engine (Google) and by directly entering the name of these platforms (e.g., Booking, Expedia, Trivago). Despite the fairly significant recourse to OTAs, respondents regret the lack of adapted information and/or travel packages for persons with disabilities. For example, they consider the filters proposed by the different booking platforms to be useful, but regret the fact that they are limited

only to the physical accessibility of the sites (e.g., shower, lift, ramps). Hence, people suffering from an autism spectrum disorder and/or intellectual disability consider themselves to be discriminatory against. Faced with this situation, some parents of children with such disabilities, after having explored the various options on the OTA sites, will turn to traditional travel agencies to take care of the reservation,

Beyond the usefulness or not of the filters, 83% of respondents will contact, either before or after booking, the tourism service provider (especially hotels) to get more information about the services offered to people with disabilities. For the participants of our study, the fact of having to contact the hotel, for example, is not to be equated with a lack of trust in the information displayed on the OTA's website but merely as the desire to explain the family's needs properly to avoid misunderstandings.

Finally, the absence of adapted information, which is often the case for tourism activities operated by small businesses, parents will browse the comments left by other users, whether on the OTA site or on sites dedicated to user-generated content, such as Tripadvisor or travel blogs. For the 67% of people who consult these sites, the purpose of the process is to read the comments of other customers, particularly those with the same limitations. This situation is consistent with the literature that has focused on modelling the planning process for a tourism activity, confirming the importance of peer-to-peer exchange in the decision-making process.

6 Conclusion and Discussion

On a theoretical and conceptual level, the results of the research conducted indicate that the online travel planning process of families with a disabled child corresponds with the four dimensions described in the model of Ho et al. [8]. That said, there is one element that appears to be particular among these families, and that is the quality control of the information provided on the websites. In fact, given the low number of comments from users who have the same needs as these families, the latter will contact the providers of tourism services, either before or after booking, to find out more about the service offer in question, or to specify their needs in more detail. On a practical level, we also note that websites' compliance with WACG standards is helpful for people with disabilities who are capable of planning their own travel, but does not meet the needs of people with cognitive impairments. The latter are more discriminated against than other disabled people, as the filters on the vast majority of websites only take into account barriers to mobility. Thus, the results of this kind of study could serve to make tourism companies more aware of these needs, especially considering the evolution of the definition of disability.

For the next steps, we intend to complete the research with the families participating in this study and, at the same time, conduct interviews with producers of tourism information such as OTAs, specialized travel sites, bloggers and organizations that help people with disabilities travel. The objective of this second step is to explore the possibilities of improving the information production process, so as to make it more adapted to families with a disabled child.

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Leveraging Blockchain in Medical Tourism Value Chain

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Abstract. There are significant challenges facing the medical tourism industry: privacy and transparency concerns, lack of access to centralized medical records, fraudulent practices, opportunistic behavior of intermediaries, foreign currency risks, and contractual/legal issues. While blockchain technology has immense potential to address the industry's inherent challenges and inefficiencies, the current understanding of blockchain application in medical tourism is fragmented. Through a pragmatic review of the literature, this study explores the blockchain applications and benefits for medical tourists across the stages of the medical tourism value chain, and in the process, proposes a meaningful and managerially relevant blockchain framework for medical tourism. The findings and the proposed novel framework to guide policy interventions and support mechanisms to take advantage of the full opportunities of blockchain in medical tourism.

Keywords: Health tourism · Conceptual framework · Blockchain technology

1 Introduction

Medical tourism refers to the mobility of individuals to another country in order to receive some form of medical treatment. It has witnessed significant growth over the last two decades, with an estimated 20 million patients crossing borders each year to receive medical treatments [1]. Blockchain or distributed ledger technology appears to be a natural fit for the industry as it offers immutable, transparent, secure, trustworthy, and interoperable solutions [2]. Using blockchain, the healthcare providers could enhance aspects that medical tourists value the most, such a quality, accessibility, affordability, transparency, and security [3]. In addition, blockchain could help overcome the problems and inefficiencies inherent to the medical tourism industry. However, the current literature on blockchain in medical tourism is largely limited and fragmented. Hence, practitioners are mostly unaware of the full potential of blockchain in medical tourism, which in turn could hamper its large-scale acceptability and implementation. This formed the motivation of this study, which aims to develop an enabling 'Blockchain Framework for Medical Tourism' that captures the various blockchain applications and their benefits for patient-tourists across the medical tourism value chain.

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J. L. Stienmetz et al. (Eds.): ENTER 2022, *Information and Communication Technologies in Tourism 2022*, pp. 78–83, 2022.

https://doi.org/10.1007/978-3-030-94751-4_8

2 Research Methodology

A pragmatic approach involving an exploratory review of scattered academic literature and industry sources, including magazines, reports, and news articles from leading consulting firms, governments, and global organizations were undertaken (Fig. 1).

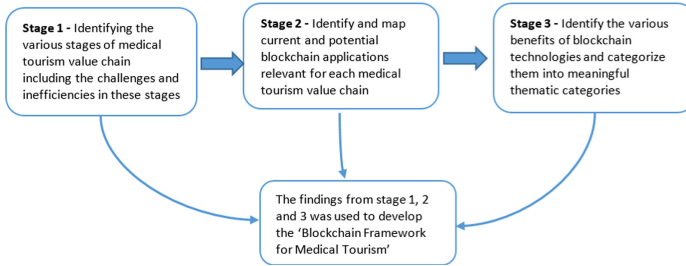


Fig. 1. Research stages

3 Findings and Discussions

3.1 Pre-procedural Phase

In this phase, the tourist must take several decisions, including the choice of medical travel facilitator, medical providers like hospitals or doctors, and the destination country [1]. In most cases, patients may not have the opportunity to visit the destination country and healthcare provider before making the final treatment decision. Hence, they rely heavily on online search information, reviews and ratings. Unfortunately, the inability to distinguish between genuine and fake reviews and ratings is a critical issue for medical tourists. The blockchain platforms ensure authentic customer reviews from fake ones with traceable identities. The immutability nature of blockchain ensures that any review posted in the blockchain cannot be deleted, and updates are only possible with a traceable history. Further, blockchain enables the verification of qualifications and credentials of healthcare providers by linking with the certification bodies [3]. The other concern is the medical tourists' heavy reliance on intermediaries such as agents to organize the trip [1]. Often, such intermediaries exhibit opportunistic behavior, including fraudulent practices that may adversely affect patients' health and well-being [3]. The peer-to-peer nature of the blockchain network enables potential medical tourists to engage in direct, interactive communication with the healthcare service provider [3]. This disintermediation shifts the balance of power from a healthcare provider (institution-centric) to medical tourists (patient-centric). Disintermediation also minimizes the privacy and security concerns, including data theft, identity theft, and credit card theft that patients may have about sharing their sensitive medical history and financial details with travel agencies or other intermediaries [4, 5]. This is because blockchain is a 'privacy-by-design solution [5] and will give data access only to authorized actors after verification of the identity, such as by using a digital signature or

by means of a certificate [6]. It also provides more control and ownership for patients on the personal data they share with service providers [5]. The other benefit of blockchain is that it provides a digital paper-free environment and hence eliminates the need for manual or paper-based transactions, which is prone to human errors, and double bookings. Moreover, medical tourists no longer need to carry medical records during travel since the data stored in the blockchain can be accessed from anywhere. Finally, blockchain-enabled digital payment platforms facilitate secure, faster, and direct payments by cryptocurrencies, decreasing the hassles associated with bank intermediation, currency fluctuations, and transaction delays [4] (Fig. 2).

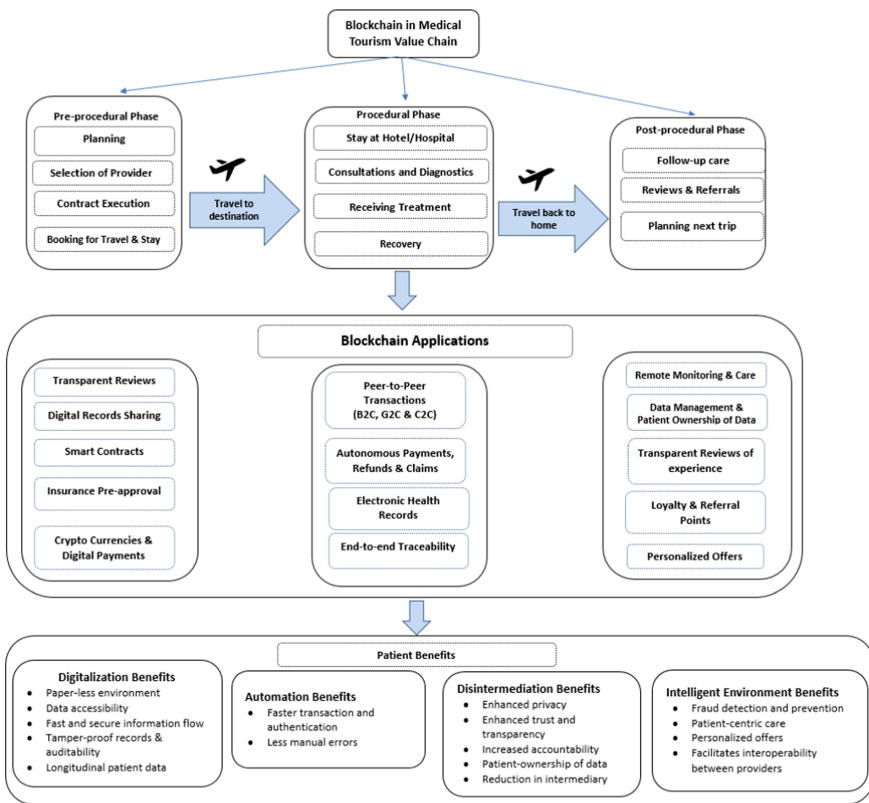


Fig. 2. Blockchain framework for medical tourism

3.2 Procedural Phase

In this phase, the patient arrives in the destination country, visits the hospital, undertakes required tests and consultations, and undergoes treatment or procedure. This phase also includes the post-operative care segment when the tourist is still in the destination country. This includes follow-up doctors’ visits, additional procedures if required, recuperation in a medical institution or hotels/resorts, medical supplies,

meals, and relaxation package [1, 7]. Ideally, the healthcare provider requires access to medical tourists' past health records to enable them to make better choices while providing the treatment. Unfortunately, in most cases, the patients may not have a medical history with them and may not fully recall all the treatments or medications they had taken in the past. The patient electronic health records (EHR) build on a blockchain platform enables tamper-free medical patient history data. It hence eliminates the need for redundant diagnostic tests and consultations for the patient. Also, access to reliable patient data is critical in an emergency during the procedure or during their stay in the destination country [8]. In addition, blockchain facilitates linking family health data with patient data to understand patterns and vulnerabilities in their family health histories, enabling better diagnosis and treatment [2].

The other problem facing medical tourists is the counterfeit, fake, substandard, or degraded drugs and medical supplies [9]. Blockchain solutions enable end-to-end supply chain traceability of medical products from its origin until it reaches the end customer [2] allowing the tourists to determine whether the product is authentic and reliable. Further, for medical tourists seeking new or experimental treatment, detailed information regarding the clinical trials stored in the blockchain increases patient trust and confidence in the treatment [10]. The other concern for medical tourists, especially in countries with weak laws, is the relatively fewer options to fight for their rights in case of fraud or are subject to medical malpractice. Blockchain can address these concerns through smart contracts, which are self-executing and self-enforcing in nature with pre-defined rules, procedures, and penalties [5]. It can automate a range of business transactions between tourists and service providers without the need for intermediaries and human intervention from a legal perspective [11]. For example, smart contracts can instantly and automatically process medical insurance claims after it detects the completion of treatment, eliminating the need for cumbersome paperwork [11].

3.3 Post-procedural Phase

In this phase, the patient leaves the destination country for the home country after recovery but will continue to receive remote treatment, monitoring, and care from the destination country or a different provider in the home country [1, 7]. Blockchain can facilitate remote patient care from the destination country [2]. Also, the patients will have tamper-free records of the procedures they underwent and the medications they received, and contact information of the health care professionals who treated the patient in the destination country. The interoperable blockchain environment enables patients, especially those who need extensive follow-up care or for those who develop complications when they return home, to switch to a local healthcare provider [8]. Several blockchain-based platforms provide rewards for medical tourists for transparent sharing of their experience in the form of ratings, reviews, or blogs [12]. All entries are signed with a unique private key which confirms that a specific review comes from a particular user. As a result, reviews are trustworthy since users would be unable to create duplicate reviews with the same identity or manipulate reviews because of the immutability feature of blockchain. Further, medical tourists are rewarded for sharing or authorizing their medical data with service providers in exchange for tokens as

rewards. Also, they could receive tokens for referring other patients to the destination country or provider [12]. Finally, tourists may receive personalized recommendations, offers, and discounts for their next trip based on the shared data.

4 Conclusion

The study provides a systemic overview of the full potential of blockchain applications and their benefits for medical tourism. The study is timely given that the medical tourism industry is trying to recover from the COVID-19 pandemic and that blockchain would help support the recovery process. However, the study has some limitations. Although the framework was developed from an extensive review, it may not cover every blockchain application in medical tourism. Moreover, the framework is not empirically tested in a real-world setting. Despite these limitations, the findings and the framework are useful for practitioners and policymakers looking to take advantage of this technology. Also, researchers could adapt and apply the framework in their respective contexts.

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Social Media and User Generated Content



“Better Not Let Me Know”: The Mediating Role of Regret on the Relation Between Social Comparison Discrepancy in Online Hotel Review and Revisit Intention

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Abstract. Online review is powerful in influencing tourists’ travel decision. However, understanding of how online reviews affect tourist emotion and decision at the post-trip stage is limited. The present study examines whether encountering travel experiences shared on social media by other users with disparity in the cost of same accommodation after a trip will cause regret and alter the intention to revisit from a retrospective point of view. Drawing from the experimental study, the result showed that regret mediates the negative effect of comparison discrepancy (in the case of differences in the paid room rate) on intention to stay in the hotel again. The current study of the effects of social comparison on revisit intention adds to the literature and establishes the groundwork for future scholarly work on post-trip online review management. Meaningful implications and strategies are recommended to online review platform and hotel marketing management.

Keywords: Social comparison · Online review · Regret · Revisit intention

1 Introduction

The prevalence of Internet usage has changed the usual pattern for tourists to search, acquire and exchange tourism information. Consumer-generated contents in the form of blogs, photos, videos, and reviews, play a critical role in influencing consumer decision making [1, 2]. Contrary to contents supplied by official hotel booking sites and online travel agencies, consumer-generated content is created, initiated, circulated, and used by consumers [3].

With ever-growing activities on the Internet, the way in which individuals treat information from the Internet has shifted from passively searching and consuming information to actively sharing content and interacting with others. Online review platform contains huge data that supply the most convenient and accessible channel for individuals to compare the self to others.

While the literature about using the online review as references in travel planning is developing swiftly, the understanding of how online reviews influence tourist emotion and decision at the post-trip stage is limited. Most previous hotel marketing studies

about online review focused on how information affects consumer decisions and behavior at the pre-trip stage. Yet, whether viewing other individual's experiences after the hotel stay will affect revisit intention has not been investigated. Without the scholarship that recognizes review processing by tourists at the post-trip stage, hotel and tourism management studies cannot sufficiently comprehend the optimized approach to utilize electronic word-of-mouth (eWOM) for marketing purposes. Considering the potential social consequences and influence that accrue to consumer-generated content on online review platform, a study exploring online review's effect on people who have finished the hotel stay is highly expedient. To this end, this study examines whether encountering travel experiences shared on online review platform by other users with disparity in the cost of same accommodation after a trip will cause regret and alter the intention to revisit from a retrospective point of view based on social comparison theory? The results of this study could be beneficial to the hotelier and media platform operator in utilizing social media marketing more wisely (e.g., how to manage their past review on online review platform, different contents to display to a user who has used the booked hotel room).

2 Literature Review and Hypothesis

2.1 Feeling Regret and Intention to Visit a Hotel Again

Hotel rooms as a sporadically purchased service can be intervened by the choice of tourist destination besides the close relationship with variety seeking. Thus, when an individual is dissatisfied with a hotel, the chances of returning to the same hotel is small even if he or she visits the same destination, in contrast with restaurants (i.e., a frequently purchased service) that usually will be given a second chance when there is a dissatisfactory experience [4]. Since the hotel normally only has "one-shot" to impress the customer, avoiding any regret feeling to occur during the whole experience seems particularly important.

Regret arises when an individual compares the decision outcome with a counterfactual outcome [4], and the person realized the situation could have been better if different actions were taken [5]. Having information about the forgone outcome serves as the source to regret, and with knowing the better option is available, consumers will encounter even greater regrets [6]. Research has found that regret links with switching behavior and negative word-of-mouth directly [4, 5, 7, 8], as individual will abandon the choice that they remembered as being successful/satisfied due to regret. Therefore, we hypothesize that when facing the decision of choosing a hotel to stay, individual will be likely to switch away from the previous hotel that has caused them into feeling regret.

H1: Regret is negatively associated with intention to stay in a hotel again.

2.2 Social Comparison and Online Review Viewing

Comparison is proved to be a basic human motive, with substantial theories of social psychology concerning comparison in previous literature [9]. In social comparison

theory, people often use others as a referent to obtain information about their performance [10]. Festinger’s original theory applied first to the evaluation of abilities and opinions, where many empirical studies have found the influence of comparison behavior in other individual aspects [11]. The perceptions of relative standing after comparing to others can produce many outcomes, for instance, a person’s feelings of well-being (i.e., subjective well-being), self-concept, and level of aspiration [12]. Under some circumstances, the social comparison may induce threatening information to the self and such a situation is hardly avoidable.

According to the well-proved homophily and similarity-attraction theories [13], many studies have suggested that when prospective consumer are viewing online review for making accommodation decision, they tend to take the reviewers’ characteristics (e.g., demographic information and personal preferences) into account other than the review content and give more value to those reviews written by surrogates who share either demographic or preference similarities with the individual [14, 15]. Furthermore, this consideration is powerful enough to influence the hotel selection process [14]. Unfortunately, previous research only focuses on the comparison that happens prior to the initiation of actual travel.

In day-to-day life, one would look at others as a reference point, seeking for information to lessen the uncertainty about one’s ability or the utility of goods so that dislike and punishment can be refrained from [16]. In consumer behavior studies, as Calder and Bumkrant [17] stated, the major source of value is not coming from the product itself but the consumer’s belief about other’s perception of him/her.

In Argo and colleague’s research [18], they identified five relevant factors of comparison in a social environment, containing the comparison target (i.e., the importance of comparison referent), comparison discrepancy (i.e., performance differences), comparison direction (i.e., upward or downward), nature of compare information (i.e., subjective or objective) and the perceived attainability (i.e., likelihood to reach the compared level). Apply this framework in hotel context, following five questions might occur to a hotel guest when viewing review from others after staying in a hotel: (1) is the comparison target on the online review platform relevant or irrelevant; (2) how significant are the cost and quality discrepancy between other’s experience and one’s own; (3) whether the individual spent more (upward comparison) or less (downward comparison) than others during their stay; (4) whether the nature of comparison information is coming from subjective (podcasting from an individual user) or objective source (video posted by the hotel official account), and (5) whether oneself can obtain the same level of enjoyment from staying in the same hotel next time?

The current study chooses comparison discrepancy to be investigated in an upward comparison direction, thus the effect of regret can be investigated, with an important comparison target (i.e., a friend), to see if the degree of discrepancy (i.e., large or small) would lead to distinct hotel booking intention. The form of discrepancy chosen to be tested was the amount that customer paid for the hotel room, by reason of the difference in monetary amount is easy for experiment participants to interpret and distinguish

between upward or downward comparison. Argo and colleagues [18] came to the conclusion based on the experimental evidence that when participants were given more (rather than less) harsh upward social comparison information, they were more depressed. Being outperformed by a large (rather than small) degree appears to be more threatening. Since larger comparison discrepancy have larger implications on people’s emotion and self-evaluation, we predict that:

H2: Compare with a small comparison discrepancy, a large comparison discrepancy results in stronger regret.

Taken the above-mentioned rationales together with the relationship between regret and intention, the following conditional hypothesis is formulated:

H3: Regret mediates the negative effect of comparison discrepancy on intention to stay in the hotel again.

Figure 1 illustrates the hypotheses in this study.

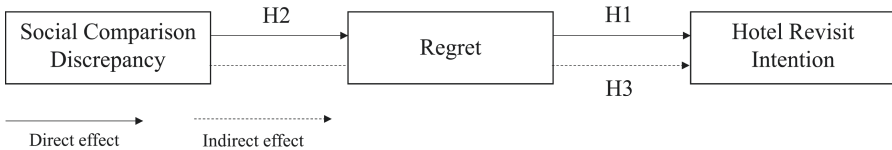


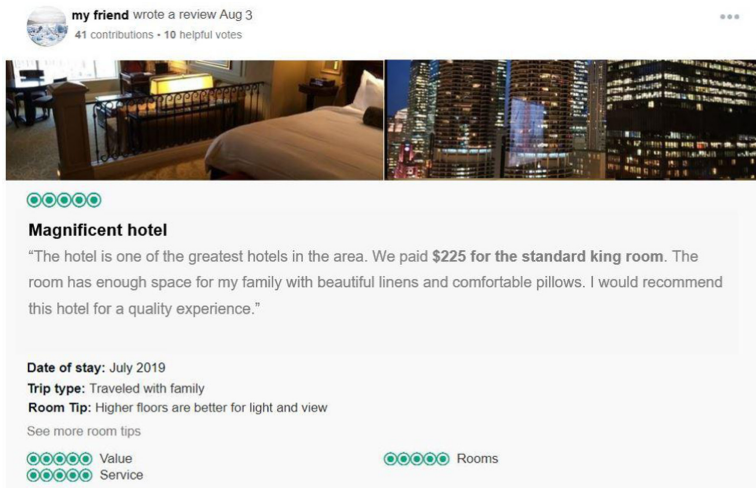
Fig. 1. Conceptual model

3 Methodology

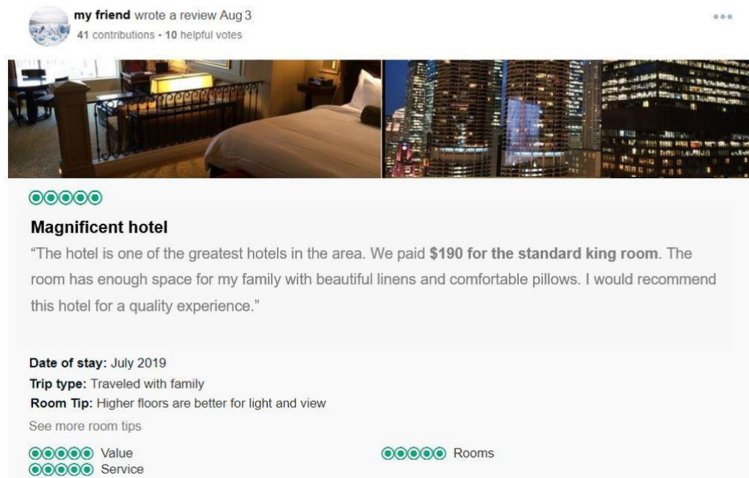
Eighty participants were recruited through Amazon Mechanical Turk (MTurk), a crowdsourcing platform. The experiment in this study used a between-subjects design, where participants were randomly assigned to one of the two scenarios (two conditions) which were with high social comparison discrepancy and low social comparison discrepancy in online review reading experience. The questionnaire used in the experiment was pilot tested and passed in terms of design and language use.

A scenario-based experiment was designed. The participants were first asked to imagine they finished their stay in a hotel standard king room. They paid \$240 for the hotel room. The hotel has matched their expectation and they felt satisfied with the room quality and hospitality. They have given the hotel a 5-star rating out of 5 and wrote down some positive comments on the online hotel booking website. When they went back and checked their review, they saw a friend's review for the same hotel and same room type. The participant was then presented with an online review post in the review community interface, incorporate the experience of the same kind of room in the hotel, similar experience but was paid with a lower price. In that review, the friend stated they only paid \$225 (in the low social comparison discrepancy condition)/\$190 (in the high social comparison discrepancy condition) (see Figs. 2a and 2b). To be

noted, participants in both conditions were engaged in an upward social comparison, only with differences in the degree of comparison discrepancy (i.e., price differences of the hotel room paid).



(a)



(b)

Fig. 2. a. Low social discrepancy condition in the experiment. b. High social discrepancy condition in the experiment

After reading the review in a specified condition, the participants were asked to complete the questionnaire with items listed in Table 1.

Table 1. Questionnaire items

Variables and items	No. of items	Scale	Source
Social comparison discrepancy (Manipulation check) - Compared with the amount paid by the person who wrote the review, how much more was the purchase price of their hotel room - Compared with the amount paid by the person who wrote the review, did they pay a significant amount more for the hotel room - How important was the purchase price of their room?	3	1: not very big; 7: very big 1: not at all; 7: very so much 1: not very important; 7: very important	[18]
Regret - I regret giving the 5-star rating to the hotel - I feel sorry for giving the 5-star rating to the hotel - I should have given a lower rating to the hotel - I am disappointed with giving the 5-star rating to the hotel	4	1: strongly disagree; 7: strongly agree	[6]
Hotel revisit intention - It is likely that I will stay at this hotel next time I visit the same area - If I were to book a hotel in the same area in the near future, it is likely that I would book a room at this hotel	2	1: strongly disagree; 7: strongly agree	[14]
Believability of review In your opinion, the reviews made in the scenario were in general: - believable - true - acceptable - credible - trustworthy	5	1: not at all believable; 7: highly believable 1: not at all true; 7: absolutely true 1: not at all acceptable; 7: totally acceptable 1: not at all credible; 7: very credible 1: not at all trustworthy; 7: completely trustworthy	[14]

4 Analyses and Results

Among the 80 participants, 63.8% were male and 58.8% were under 30 years old. The low social comparison condition had 38 participants while the high social comparison condition had 42 participants.

The manipulation was successful as the perceived price differences is significantly higher in the high comparison discrepancy condition than the low comparison discrepancy condition ($M_{\text{low-discrepancy}} = 4.421$ vs. $M_{\text{high-discrepancy}} = 5.071$; $t(78) = -2.571$, $p < 0.05$, 95% C.I. -1.144 to -0.159). The review used in the scenario reached good believability as the mean score of believability is 5.463 compared to the value of 4 as the neutral perspective ($SD = 1.080$; $t(79) = 12.113$, $p < 0.001$, 95% C.I. 1.223 to 1.690).

Hayes’ [20] PROCESS Model 4 with 10,000 bootstrapped samples was used to test the hypotheses. Table 2 shows the results. Hypothesis 1 is supported as regret is negatively associated with intention to revisit the hotel ($b = -0.205$, $SE = 0.079$, $p < 0.05$). Hypothesis 2 is also supported as social comparison discrepancy has positive effect on regret ($a = 0.862$, $SE = 0.408$, $p < 0.05$). In hypothesis 3, we hypothesized that regret mediates the effect of social comparison discrepancy on intention. This mediation is confirmed as the bias-corrected bootstrap confidence interval (C.I.) for the indirect effect of social comparison discrepancy on intention ($ab = -0.177$) does not include zero (-0.440 to -0.003). There was no direct effect of social comparison discrepancy on intention ($c' = 0.346$, $p = 0.244$) and thus it is a full-mediation. In a nutshell, all hypotheses are confirmed.

Table 2. Results of PROCESS Model 4

Antecedent	Consequent							
	Regret			Intention				
	<i>Coeff.</i>	<i>SE</i>	<i>p</i>	<i>Coeff.</i>	<i>SE</i>	<i>p</i>		
Social comparison discrepancy	<i>a</i>	0.862	0.408	0.038	<i>c'</i>	0.346	0.295	0.244
Regret		-	-	-	<i>b</i>	-0.205	0.079	0.012
Constant	<i>i₁</i>	3.635	0.204	0.000	<i>i₂</i>	5.805	0.322	0.000
		$R^2 = 0.232$				$R^2 = 0.289$		
		$F(1, 78) = 4.449$, $p = 0.038$				$F(2, 77) = 3.515$, $p = 0.035$		

5 Discussion and Implications

Many previous studies tried to solve the puzzle of hotel online review used in hotel booking and trip planning, whereas this study looks at hotel review management from an after-stay angle. The current study of social comparison’s impact on intention to revisit adds to the literature and lays the ground for future scholarly effort on online review management at the post-trip stage. To the best understanding of us, this research is the first to consider and test the hypotheses of regret’s mediating role in the social comparison process, specifically towards the effect comparison discrepancy has on the intention to stay in the hotel again.

Findings from this study provide implications not only to hotel marketing strategy on how to manage their past review but also for online review platform to better designing the algorithm of what content to display in the review interface, differentiating a new customer and a customer who has stayed in the hotel. For instance, it is possible for a guest who changed their intention to revisit the hotel after viewing someone else's review to describe a better experience and engaging in an upward comparison. The result of the positive effect social comparison discrepancy has on regret is consistent with previous findings. This relationship testifies that when the actual outcome of individual choice was compared to the counterfactual outcome and the counterfactual outcome was known to be a better option (upward comparison), the individual will regret their original decision [4–6]. Correspond with the hypothesis, the result from the experiment confirmed that regret mediates the negative effect of comparison discrepancy on intention to stay in the hotel again. Without the mediating effect of regret, there was a lack of direct effect of social comparison discrepancy on the intention to stay in the hotel again, indicating the role of regret in the model was paramount.

Online review platforms and hotel management should consider applying better strategy on the review webpage to identify new and old hotel customer hinge on their booking record. Once a review website user is identified as the previous guest of a specific hotel, the display of review should be carefully arranged based on the user's review and rating, no to bring about a huge contrast (e.g., the difference in room rate paid, welcoming gift, etc.). For instance, reviews and ratings that demonstrated a similar experience should be ranked at the top to strengthen user's perception, and reviews that showed a distinctly better experience than this user's experience should be ranked at last. Moreover, if the review revealed the hotel room price, the platform manager should consider concealing this kind of content. Thereby, while this particular customer is viewing others' reviews, the hotel could minimize the opportunity to stir up the guest's feeling of regret, and the idea of change his/her review and rating or never visit the hotel again. A successful online review/post management will magnify reviews' influence and possibly increase retention and positive word of mouth.

6 Limitations and Future Research

This study's results should be viewed in light of certain constraints. First, the prices of the hotel room in the condition were set to be \$240, \$225, and \$190, we do not know if the conclusions were robust against different hotel room rate levels. Future research should examine additional room rate levels and control participants' income or employment status, to test if the conclusion can apply to all populations without economical consideration. Second, 80 participants recruited in this study are a relatively small number for representing a population as large as the accommodation guests who use online review platform. Moreover, the age distribution of the data was not normal, 58.8% of the respondents were under 30 years old, representing a relatively young population. Therefore, generalizing the findings to the general population needs to be conducted with special caution.

Additional directions of future studies are many and varied. Argo and colleagues [18] identified five relevant factors of comparison in a social environment, namely comparison target, comparison discrepancy, comparison direction, nature of compare information, and the perceived attainability [18]. This exploratory research only looked at one of the factors of social comparison. Future research is needed to investigate the other elements of comparison (e.g., comparison target: friend versus stranger) in the online review context as well as their relationships with hotel consumer’s emotions and perception towards their hotel experience. In addition, Wu and Wang [21] pointed out in their study that consumers who experience other-blame regret would produce more negative word-of-mouth than those who experience self-blame regret. Moreover, consumer’s decisions are subject to social influence. Individual’s expectation of how others would evaluate their decisions possibly depends on whether the context of regret is private (i.e., the negative chosen outcome is found by herself/himself) or public (i.e., the negative chosen outcome is found by others) [21, 22]. It would be interesting to control the nature and the context of regret in the future study looking at regret’s role in affecting review reading emotion and subsequent actions. Multiple experiments featuring different contexts should be conducted to examine the robustness of findings.

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Analysis of Instagram Users' Movement Pattern by Cluster Analysis and Association Rule Mining

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Abstract. Understanding the characteristics of tourists' movements is essential for tourism destination management. With advances in information and communication technology, more and more people are willing to upload photos and videos to various social media platforms while traveling. These openly available media data is gaining increasing attention in the field of movement pattern mining as a new data source. In this study, uploaded images and their geographic information within Lake Constance region, Germany were collected and through clustering analysis, a state-of-the-art k-means with noise removal algorithm was compared with the commonly used DBCSCAN on Instagram dataset. Finally, association rules between popular attractions at region-level and city-level were mined respectively. Results show that social media data like Instagram constitute a valuable input to analyse tourists' movement patterns as input to decision support and destination management.

Keywords: Movement pattern · Big data · Instagram · Crawling · DBCSCAN · NK-MEANS · Association rule mining

1 Introduction

Movement pattern analysis as a systematic approach is widely used in decision making processes in many fields, especially in the tourism industry. Understanding the tourists' movements between Points of Interest (POIs) plays a fundamental role for destination management activities and is directly applicable to advance the restaurant and hotel industry in the local area [1].

Accurate and valuable analysis of movement patterns requires a large amount of high-quality data. Most previous research obtained people's travel data by surveying individuals' location history or by using automatic location-sensing devices [2], which were neither scalable nor cost-effective to cover numerous individuals [3]. Due to the development of Internet technologies, social media platforms are becoming increasingly popular, in which an enormous number of photos and videos are voluntarily generated and also contain geographic information.

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J. L. Stienmetz et al. (Eds.): ENTER 2022, *Information and Communication Technologies in Tourism 2022*, pp. 97–109, 2022.

https://doi.org/10.1007/978-3-030-94751-4_10

Among social media platforms, Instagram, with over 5 million daily active users, contains a large amount of potentially valuable information, i.e. user-generated content which is geographically tagged, to be mined for the tourism industry. However, sophisticated procedures are necessary to systematically retrieve and store this data, especially since the huge amount of data and access restrictions of the Instagram platform make ordinary data retrieval processes difficult.

Facing massive data volume, new approaches and novel learning techniques are needed to fully make sense of them. Machine learning as a rapidly developing technology over the past decade provides potential solutions to mine information and knowledge hidden in the data [4]. The goal of this paper is twofold. One is to introduce an efficient crawling framework for collecting geo-tagged photos from Instagram. The other is, with the help of two different clustering algorithms to group photo-upload locations into different popular POIs and to explore association rules between clusters from different geographical scales to obtain the movement patterns from Instagram users. Compared to previous research, the main contributions of this work are the following:

1. Develop an efficient high-performance crawling algorithm which extracts geographically tagged social media posts and activities from Instagram.
2. Analyze the movement patterns of users in the Lake Constance area using uploaded geographic information from Instagram photos.
3. Recurrent a state-of-the-art clustering algorithm Noise Removal for k-means (NK-MEANS) and compare with the commonly used Density Based Spatial Clustering of Applications with Noise (DBSCAN).

The rest of this paper is organized as follows: in Sect. 2, the up-to-date development of movement pattern research is reviewed; Sect. 3 briefly introduces the methodology involved in this study; Clustering results and association rules obtained from the dataset are presented in Sect. 4; Sect. 5 draws the conclusions about this study and outlines some possible lines of future work.

2 Literature Review

The research of spatial movement patterns of tourists between destinations has been discussed as early as the 1990s [5]. However, the limitations of data volume, research methods, and computing power at that time led to the understanding of the tourist mobility problem as a black-box problem, which was difficult to explore and express [6]. Since movement within a destination played a fundamental role in understanding tourist behaviour, research on tourist's movement patterns received increasing attention. However, these studies with traditional survey-based approaches were always limited by issues of cost, scalability, data volume, and privacy.

With the development of web technologies, more and more people can upload photos and videos to photo sharing platforms to share their journey with others.

Thanks to various social media platforms, a large amount of openly available data with geographic information proves to be available through crawling and scraping mechanisms. Nevertheless, collecting social media data is challenging because of the mix of structured and semi-structured data. Erlandsson et al. [7] crawled Facebook data by using the API (Application Programming Interface) and defined major requirements regarding the crawling results; Jalal et al. [8] scraped Instagram data by using a keyword and location-based approach, which were both utilized in this paper as well. While many studies, like Chu et al. [9] used the Python scraping framework *Scrapy*, an own framework was created in this study due to lack of functionality of existing ones as later described.

Huge amount of data with geographic information provides alternative data sources for many geospatial and social media applications. However, utilizing these data for analysis poses a new challenge. Facing this problem, Arefieva et al. [10] used images from Instagram to cluster tourist's destination; Mukhina et al. [11] analyzed tourists' attraction points using Instagram profiles. However, Instagram, the largest photo-video sharing platform, has a wealth of information about movement patterns in tourist attraction areas, which have not been deeply explored. To bridge this gap, this paper investigated tourists' movement patterns at and between POIs in the Lake Constance region using data crawled from Instagram, based on the framework from Höpken et al.'s study [12] and compares the performance of NK-MEANS with DBSCAN with regard to the geographic information clustering problem.

3 Methodology

3.1 Data Extraction and Preparation

The ETL (extract, transform, load) process forms the first step of this study. It describes how data is retrieved, transformed and stored in a data warehouse in preparation for social media data of the geographical region of Lake Constance [13].

Extract. Extraction of public social media data can be achieved by using web scrapers [8] or an API (Application Programming Interface) provided by the platform [7]. Both techniques were used in this study to obtain the best coverage and depth of data. Instagram provides an overview page for each city in Germany, which was iterated by an ordinal city identifier, in order to collect locations for the respective region. The crawling procedure first collected all published posts connected to a location by iterating through the paginated Instagram API, and second gathered deeper information such as comments or an accessibility caption by crawling each post one-by-one. Since this study is non-commercial and the crawled user information is non-inclusive of any personal private information, there are no ethical and legal issues involved.

Transform. The transformation step focuses on aggregating semi-structured JSON data which was retrieved by using the Instagram API, complemented by unstructured browser-based scraping data as well as image media.

Load. Several hundred parallel crawlers were used to retrieve the data performatly and write them synchronously to the database by using the object-relational mapping software *SQLAlchemy*. To realize this immense crawling volume, rotating IPs, deployment of crawlers in a container infrastructure and multiple concurrent VPN connections, as well as redundancy on multiple server systems were introduced.

Since the data preprocessing is essential to reduce computation time, a geo-based filtering approach was used to limit the dataset to the relevant POIs and a threshold was set for the minimum number of posts whose location was classified as relevant. To ensure that the crawled information is tourism relevant, the posts from local residents and commercial accounts can be distinguished and discarded by taking advantage of the high frequency of tourists' uploading behavior in a short time period and mostly occurring on weekends and holidays.

3.2 Clustering

Clustering plays an important role in the realm of unsupervised learning [14]. The clustering of uploaded photos from Instagram by geographic information is prominent for further analysis. POI information predefined by the platform, i.e. city and location names, can be directly used as input for the cluster analysis. However, for roughly 30% of the photos the city name of the uploaded locations is missing, and the same POI can have different name variants which also causes difficulties when trying to group photos uploaded from the same location into the same cluster. Therefore, in this study, the precise geographic information from uploaded photos, i.e. latitude and longitude, was used for accurately identifying POIs by a cluster analysis.

For the problem of clustering uploaded photos to corresponding POIs, two clustering algorithms based on different principles, namely DBSCAN and NK-MEANS, were implemented and compared for their suitability in identifying meaningful clusters. A brief description of these two algorithms follows:

DBSCAN. DBSCAN is the first density-based clustering algorithm which was proposed by Ester et al. in 1996. It was designed to cluster data of arbitrary shapes in the presence of noise, both for data in 2D or 3D Euclidean space and for data in some high-dimensional feature space [15]. Since DBSCAN has the advantage of identifying arbitrary shaped clusters and automatically removing outliers, this property is perfect for grouping uploaded photos into relevant POIs. However, DBSCAN has some drawbacks that cannot be ignored when dealing with data from Instagram. More specifically, the algorithm requires a priori knowledge to obtain satisfying clustering results, i.e. *Eps*, the radius of a neighborhood with respect to a core point and *MinPts*, a minimum number of neighboring points, which a core point within *Eps* has. But for Instagram datasets, this a priori knowledge is usually unknown. Secondly, the distribution of uploaded photos on the map is non-uniform. Dealing with datasets with varying densities, DBSCAN could be prone to dilemma in deciding meaningful clusters [16]. Finally, DBSCAN has a time complexity $O(n \log n)$ [14], which

incurs a relatively higher computational complexity than some other clustering algorithms. Therefore, for comparison, a partition-based algorithm with fast noise removal, namely NK-MEANS, was also employed in this study to group the uploaded photos in this study.

NK-MEANS. NK-MEANS is an improved k-means clustering algorithm with automatic noise removal. K-means is one of the most well-known clustering algorithms, whose core idea is to iteratively build and improve clusters by assigning each data point to its nearest cluster centroid (central point of the cluster) and recompute the cluster centroid, until some criteria for convergence is met. Not all uploaded photos from Instagram are related to nearby POIs. Therefore, they can be defined as noise in the dataset. However, the k-means algorithm is highly sensitive to noise, and if k-means algorithm is directly used for clustering, neither satisfying results nor a precise comparison with the results from DBSCAN can be obtained. Therefore, this study uses a method proposed by Im et al. in 2020 [17], which extends the k-means algorithm by a preprocessing step removing outliers in a way suitable for the k-means algorithm.

To quantify the improvement of clustering results after noise removal, this study employed the Hopkins statistic H to measure the clustering tendency of a dataset. A value close to 1 tends to indicate the data is perfectly clustered [18].

Regarding the parameters of NK-MEANS, the appropriate number of clusters k and the proportion of outliers z found by DBSCAN will be used for NK-MEANS to ensure the comparability of the two approaches.

Although the results obtained after the clustering are already meaningful at the geographical level, they are not sufficient for the following association rule analysis. Some clusters contain so few locations or locations have so few uploaded photos that valuable motion patterns cannot be mined. They seem to appear randomly and, thus, cannot be considered as a POI. Therefore, the popularity of clusters and locations was investigated. When a cluster or a location contains less than a certain percentage of uploads, it was discarded as noise as well.

3.3 Association Rule Mining

After popular POIs are identified by the clustering algorithm, mining the user's movement patterns among POIs is the final task in this study. Association rule mining is one of the most popular pattern discovery methods in Knowledge Discovery in Databases (KDD), since its introduction in 1993 [19]. In this study, all uploads by one user were considered as transaction and the visitation of a popular POI as an item (multiple visits to the same popular POIs were counted as one item).

Based on a transaction matrix, spanned by transactions in the one dimension and items (i.e. popular POIs) in the other dimension, frequent itemsets (i.e. combinations of POIs often visited together by the same user) were generated by the FP-Growth algorithm, and based on these frequent itemsets the association rule mining was implemented. Some criterions involved are briefly explained next:

If the set of all user-based transactions is given as $\mathcal{T} = t_1, \dots, t_n$, then the frequency of itemset X , which is a combination of popular POIs, is defined as: $\sigma(X) = |\{t_i | X \subseteq t_i, t_i \in \mathcal{T}\}|$. Let X, Y be an antecedent and consequent itemset ($X \cap Y = \phi$), $rule(X \rightarrow Y)$ denotes an association rule from X to Y . Accordingly, Support $s(X \rightarrow Y)$, which indicates how frequently the itemsets appears together; Confidence $c(X \rightarrow Y)$, which indicates how often the rule has been found to be true; Lift $lift(X \rightarrow Y)$, which indicates the ratio of the observed support to that expected if itemsets were independent, can be defined [20]. Notably, the size of the Instagram database in this study is relatively large, even a valuable association rule would not have a significantly large Support. Therefore, Lift is used to filter valuable association rules. The larger the lift of a rule is, the more is the rule potentially useful for predicting the consequent in future data sets.

To ensure that the mined association rules are indeed valuable, the p -value of each rule was calculated in this study as well. Suppose X and Y are two itemsets that are independently and identically distributed. Assuming this null hypothesis is correct, the p -value of $rule(X \rightarrow Y)$ indicates the probability of obtaining test results, i.e. frequencies at least as high as the results actually observed. A very small p -value means that the observed frequency of an itemset would be quite unlikely, if there is no association between X and Y .

4 Results and Discussion

4.1 Data Extraction and Visualization

The data extraction process is proved to be able to capture several million posts published in the Lake Constance region. It extracted all Instagram posts tagged by a location within the analyzed region. The database consists of 9.6 GB of textual data and 146.6 GB of media files, which contain 46,658 locations, 1,215,063 users and 2,490,640 posts during the period from May 2013 to September 2020. These objects represent highly interesting information such as geographic coordinates or image classification tags added by Instagram’s computer vision algorithm.

When looking in detail at the time distribution of the established Instagram database in Fig. 1, an exponential growth of Instagram usage in the analyzed region can clearly be observed. While less than 500 posts were published each week in early 2014, that number grew exponentially to over 65,000 by the end of 2019. Notably, more posts are published in summer than in winter by a steep slope in the middle of each year. This result also confirms that the Lake Constance region is especially popular as a summer vacation spot.

When plotting all locations in Fig. 2 as a heat map weighted by the number of media uploaded at each location, a distribution with a rough trend of clustering can be observed. The results of the heat map clearly demonstrate that the data as is does not constitute an appropriate input to association rule analysis due to a large amount of noise. As indicated above, this data was utilized for knowledge mining at two different geographical scales.



Fig. 1. Temporal distribution of posts amount in the years 2014 to 2019

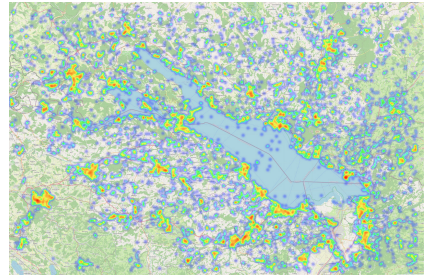


Fig. 2. Heat map of raw data spatial distribution weighted by post amount

4.2 Region-Level Association Rule Analysis

Based on the data obtained from Instagram, outliers were processed as a first step. Then, the retained data in the whole Lake Constance area were clustered, so that the users' movement patterns can be analyzed on a large geographic scale. Two methods introduced in Subsect. 3.2 were implemented to remove noise from raw data and cluster single uploads to POIs. The comparison before and after noise removal is shown in Table 1. To ensure comparability of clustering results, approximately the same amount of data is removed as noise. Clustering results are shown in Fig. 3, which presents 53 popular POIs (color-coded) from upload locations distributed in the Lake Constance region.

Table 1. Data information comparison before and after noise removal

	H	Amount of locations	Amount of photos	Avg. locations per cluster	Avg. photos per cluster
Raw data	0.936	28,186	4,392,525	–	–
DBSCAN	0.989 (+5.36%)	18,211 (–35.39%)	1,501,478 (–65.82%)	344	28,330
NK-MEANS	0.987 (+5.17%)	18,270 (–35.18%)	1,511,688 (–65.58%)	345	28,522

To quantitatively compare the results from the two clustering algorithms, the Silhouette Coefficient, Calinski-Harabasz Index and Davies-Bouldin Index were used to evaluate the clustering performance without ground truth. Results in Table 2 demonstrate that, except the Calinski-Harabasz Index, for all criteria DBSCAN performs better than NK-MEANS. This is probably the case because Calinski-Harabasz Index is generally higher for convex clusters like those produced by k-means clustering than other concepts of clusters, such as density-based clusters like those obtained from DBSCAN. By observing the distribution

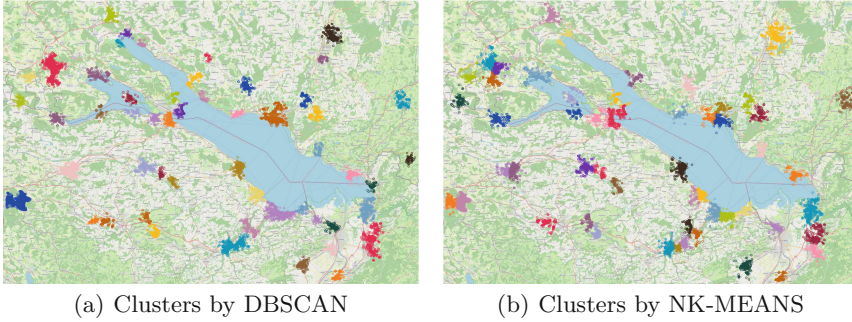


Fig. 3. Distribution of 53 popular POIs in the Lake Constance region

of clusters in Fig. 3, DBSCAN achieves better clustering results compared to NK-Means without over-clustering (e.g. Friedrichshafen region) or under-clustering (e.g. Ravensburg and Weingarten region) problems. Thus, in terms of the region-level dataset from Instagram, DBSCAN outperforms NK-MEANS for clustering of 2D geographic information, and therefore the clustering results from DBSCAN were used in the consecutive association rule mining.

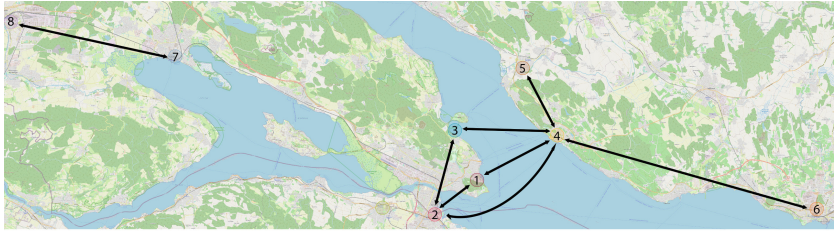
Table 2. Comparison of clustering performance by DBSCAN and NK-MEANS

	Silhouette coefficient	Calinski-Harabasz index	Davies-Bouldin index
Optimum value	1	$+\infty$	0
DBSCAN	0.741	2.250×10^5	0.359
NK-MEANS	0.649	3.213×10^5	0.516

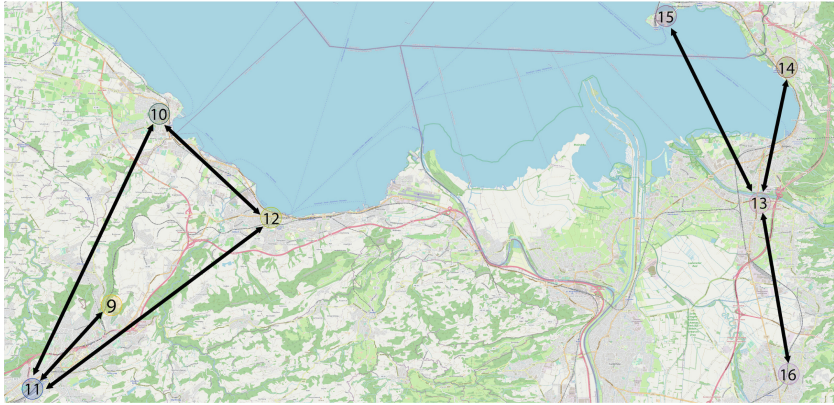
Based on the 53 popular POIs derived from DBSCAN, association rule mining was performed for the frequent items filtered by $s(X \rightarrow Y) = 0.004$ as a threshold. Meaningful association rules ($lift(X \rightarrow Y) > 1$) between 16 region-level POIs are shown in Fig. 4. Since the association rules for the same POIs often appear in both directions, Table 3 only presents the rule that has higher Support, Confidence or Lift between two POIs. Moreover, it is verified that the p-value of each underlying frequent itemset indicates significance (i.e. p-value $< 10^{-5}$). In conclusion, the retained clusters basically match the actual range of popular tourist cities in the Lake Constance region, and the mined association rules reflect the movement patterns of users between cities around Lake Constance.

4.3 City-Level Association Rule Analysis

To explore the movement patterns of users at a smaller geographical scale, this study selected data within the city of Friedrichshafen to mine the association



(a) Association rules centered on Kreuzlingen (2) and Meersburg (4)



(b) Association rules centered on St. Gallen (11) and Bregenz (13)

Fig. 4. Illustration of bi-directional movement patterns within the Lake Constance region

Table 3. Association rules in the Lake Constance region based on Lift descending order

Antecedents	Concequents	Support	Confidence	Lift
Lochau (14)	Bregenz (13)	0.00511	0.35124	3.94735
Radolfzell (7)	Singen (8)	0.00707	0.18854	3.68051
Meersburg (4)	Uhdlingen-Mühlhofen (5)	0.00444	0.20264	3.62238
Konstanz (1)	Konstanz-Altstadt (2)	0.00559	0.19807	3.47863
Mörschwil (9)	St. Gallen (11)	0.00454	0.37551	3.21520
Konstanz (1)	Meersburg (4)	0.00431	0.15272	2.72999
Arbon (10)	Rorschach (12)	0.00609	0.15192	2.71288
Dornbirn (16)	Bregenz (13)	0.01364	0.18563	2.08614
Mainau (3)	Meersburg (4)	0.00548	0.11122	1.98812
Rorschach (12)	St. Gallen (11)	0.01247	0.22264	1.90627
Arbon (10)	St. Gallen (11)	0.00879	0.21923	1.87711
Mainau (3)	Konstanz-Altstadt (2)	0.00503	0.10201	1.79164
Meersburg (4)	Konstanz-Altstadt (2)	0.00473	0.08463	1.48641
Meersburg (4)	Friedrichshafen (6)	0.00666	0.11907	1.17481
Bregenz (13)	Lindau (15)	0.01335	0.15000	1.08449

rules between POIs. Due to the relatively small amount of data, there is little difference between different clustering algorithms. DBSCAN, that performs better in Subject. 4.2, was used for clustering at city-level as well. Eventually, 499 locations were grouped into 28 clusters after noise removal. It contains a total of 21,755 geo-tagged photos and their distributions are shown in Fig. 5.



Fig. 5. Distribution of 28 popular POIs within Friedrichshafen

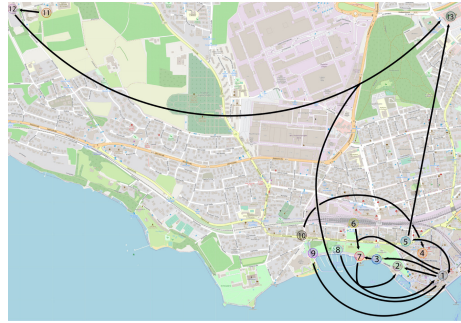


Fig. 6. Illustration of movement patterns within Friedrichshafen

These 28 popular POIs, which are mainly located near the lakeshore, basically cover the tourist attractions in Friedrichshafen. Based on these clusters, a threshold of $s(X \rightarrow Y) = 0.001$ was set to filter frequent items and then meaningful association rules were identified, which are listed in Table 4.

Table 4. Association rules within Friedrichshafen based on Lift descending order

Antecedents	Concequents	Support	Confidence	Lift	p-value
Mini-golf Course (8) Beach (7)	Promenade (1) Boat Rental (2)	0.00131	0.43750	9.19008	$<10^{-5}$
Promenade (1) Club House (12)	Shopping Center (13)	0.00103	0.18033	5.37066	$<10^{-5}$
Promenade (1) Railway Station (6)	Beach (7)	0.00103	0.23404	3.85575	$<10^{-5}$
Restaurant Area (5)	Shopping Center (13)	0.00131	0.11667	3.47465	$<10^{-5}$
Restaurant Area (5)	Promenade (1) Boat Rental (2)	0.00159	0.14167	2.97583	$<10^{-5}$
Promenade (1) City Garden (3)	Beach (7)	0.00131	0.15730	2.59151	0.00025
Yacht Club (9)	Promenade (1) Boat Rental (2)	0.00103	0.11957	2.51157	0.00172
School Museum (10)	Old Town (4)	0.00122	0.05285	2.26917	0.00233
University Campus (11)	Club House (12)	0.00159	0.08095	2.02230	0.00261

The mined association rules are distributed between 13 popular POIs shown in Fig. 6, which are centered on lakeside promenade (1) and spanning over railway station (6), club house (12) and shopping center (13). This results impressively reflect the user's movement trajectories among tourist attractions within Friedrichshafen.

5 Conclusion and Outlook

Nowadays, with the increasing popularity of social media, this study is the first to collect media containing geographic information from Instagram through an efficient crawler framework and to use this data to mine movement patterns of users within the scenic area of Lake Constance. It can be concluded that big data from social media contains valuable knowledge for the local tourism industry and should, therefore, be given more attention in the future.

When association rules were mined, it has been found that the volume of data plays a significant role in determining the reliability of association rules. The movement patterns at the city-level are less reliable than those at the region-level because of the relatively small amount of data. This means that future research on movement patterns may heavily depend on the availability of big data from various social media platforms.

However, it is worth noting that the data crawled from Instagram also contains plenty of noise, which must be cleaned before analysis, e.g. to remove geographic outliers or to manually label location-names which are useless or incorrect for the study of movement patterns.

Based on the database built from the social media data of Instagram, there is still a great potential for future research. Considering the temporal order of each user's photo upload, the sequential patterns of tourists can be explored in combination with geographic information, which can lead to a more precise recommendation for local tourism. Furthermore, in addition to geographical information, the content of users' uploaded photos, related comments and account profiles can be analysed with Natural Language Processing (NLP) or Computer Vision (CV) techniques to discover more feedback-based knowledge and, thus, to propose highly individualized travel advice.

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Beyond Influencer Credibility: The Power of Content and Parasocial Relationship on Processing Social Media Influencer Destination Marketing Campaigns

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Abstract. The power of social media influencers (SMIs) as effective endorsers for destinations and tourism products have been widely acknowledged. Despite being characterised as content generators by prior research, little has been done to examine how consumers perceive content produced by SMI, a key component of destination marketing campaigns. Moreover, parasocial relationship between SMI and the follower has been proven to enhance the persuasive impact of SMIs. Hence, this study aims to shed light on how consumers would assess the SMI and the content the SMI produced, as well as the effect of parasocial relationship on processing SMI destination marketing campaigns. Findings (N = 501) have highlighted that argument quality of SMI content has a stronger direct impact on campaign attitude, destination image and travel intention, as compared to source credibility. With the application of the Elaboration Likelihood Model (ELM) as a framework, this study illuminates consumers' interaction with the SMI destination marketing campaign and extends prior studies in understanding the importance of SMI content and parasocial relationship as a significant tool for future destination marketing.

Keywords: Social medial influencer · Destination marketing · Parasocial relationship · Elaboration Likelihood Model

1 Introduction

Social media provided users with a convenient and instantaneous platform to share their content in various forms – text, images and videos [1]. Along with the rise of social media, the emergence of social media influencers (SMIs), and its use in marketing across various industries have been in the spotlight in both theory and practice. Studies have suggested the efficacy of SMI marketing in achieving various marketing outcomes such as enhancing brand awareness and purchase intention [2, 3].

This potential has been recognised by marketers and practitioners in the tourism industry, to leverage the power of SMIs for destinations and related products [4, 5]. Existing SMI literature in tourism has examined the effectiveness of SMI marketing on

destination image and travel intention with the application of various concepts such as self-congruity and source credibility [6, 7]. Unlike celebrity endorsers, SMIs produce entertaining and informative content woven with their personalities and preferences, building a strong parasocial relationship with their followers, which exert an influence on their audience's decision making [3, 6, 8]. Yet, most studies on influencer marketing have focused on the attributes of the SMI based on source credibility [3, 6, 8], or evaluated the campaign as a whole [7, 9]. There is a research gap with regards to the content (i.e. argument quality) the SMIs have produced [10]. Since existing studies have suggested that trust for the SMIs and their content informativeness have a positive impact on consumers' travel decision journey [11, 12], and a positive effect on destination marketing [13], it is vital to investigate how parasocial relationship between the SMI and the follower would affect consumers' processing (based on source credibility and argument quality) of the SMI destination marketing campaign.

Considering the above, this study constructs a research mechanism that aims to (i) examine how self-congruity and parasocial relationship associate with perceptions of SMIs' argument quality and source credibility, and in turn (ii) how SMIs' argument quality and source credibility shape tourists' attitudes, destination image, and travel intention. The findings illuminate consumers' interaction with the SMI destination marketing campaign and extend prior studies in understanding the importance of SMI content as a significant tool for destination marketing amid the pandemic and beyond.

2 Literature Review

2.1 Social Media Influencers in Tourism and Destination Marketing

In recent years, there has been a rise in research on SMI marketing in tourism and hospitality. Gretzel [4] led the study of influencer marketing in tourism, highlighting the importance of SMIs as travel information sources and played a significant role in tourists' decision-making process. Empirical studies on SMI destination marketing campaigns such as Xu and Pratt [7], illustrated that SMI-destination congruence and SMI-consumer congruence positively affect consumers' attitudes toward the advertisement, which subsequently positively affects their attitude toward the destination and travel intention. Ong and Ito [9] elucidated the significance of SMI marketing campaign experience in forming consumers' attitude toward the campaign and destination image, which impact consumers' travel intention to the destination endorsed.

The latest studies investigating the impacts of SMIs on travel consumer behaviour have focused on the source credibility of the SMI based on the source credibility model. Jang et al. [6] illustrated source characteristics of SMI, such as the number of followers and engagement rate of SMI, as respective indicators of SMI's expertise and attractiveness which consequently positively impacts the effectiveness of the SMI campaign. Despite various studies having discussed that content of SMI is effective in forming consumers' image toward the marketed destination [12, 13], or positively affecting travel decision-making [14], little has been done to investigate the effects of the content produced by SMIs. Thus, this study would like to introduce a framework to

expound on how attributes of the SMI and content produced by the SMI would impact the travel decision-making process of consumers.

2.2 Hypothesis Development

Elaboration Likelihood Model (ELM). Prior literature has used dual-route processes such as the ELM to explain consumers' information processing of an advertisement [15, 16]. The ELM posits a two-route processing model, the central and the peripheral routes, in predicting persuasive messages [17]. The central route of persuasion occurs via one's cognitive effort of processing argument quality of the messages, undergoing thorough consideration of the relevant information [18]. Alternatively, the peripheral route takes place under processing affective features of messages, such as source credibility [15, 18]. Unlike the source credibility model which has been employed by previous works to assess the impact of SMI on destination marketing, the organization of information processing into two distinct routes of persuasion by the ELM allows us to understand how consumers assess the SMI content, or the SMI respectively.

Self-Congruity. Defined as "the match between consumers' self-concept and the user's image of a given product, brand, store, etc." [19, p. 955], the self-congruity theory postulates that consumers are driven by their psychological motivation to express themselves by purchasing a product or service that is a match between their self-image with the product-user image of a product or service [20]. Looking at self-congruity as a form of motivation of human behaviour [21], consumers may seek a match in the way they process information before elaborating the campaign based on either the argument quality of the campaign or the source characteristics of the SMI.

Based on the ELM, argument quality is defined as how one sees the persuasive strength of the persuasive argument or content embedded in the message [17, 22, 23]. Interestingly, there are very few researches that made use of argument quality to investigate the consumers' perception of SMI marketing advertisements. Since argument quality is a measurement of the persuasive strength of the content produced by the SMI, it should be used as a means of evaluating the SMI destination marketing campaign. With prior studies having illustrated the relationship between self-congruity and source credibility based on the congruence of self-SMI image [24], it is possible to deduce that consumers who preferred to make use of more cognitive effort, and are more involved in scrutinizing the information, would have formed a congruence between self and the SMI content and undergo the central route of information elaboration, focusing on the quality of the information provided [17, 25].

On the other hand, in the framework of ELM, individuals tend to take the peripheral route when they have less motivation, making use of lesser cognitive effort to evaluate the information [17, 26]. By undertaking the peripheral route, consumers tend to evaluate based on peripheral cues, such as the brand image or source credibility [17]. Extant studies have approached SMIs' source credibility by considering attractiveness, expertise, and trustworthiness [27–29]. Of these, Yoon and Kim [27] have pointed out that self-congruity at an early phase of advertisement perception is able to influence consumers' perception of SMI credibility. If the consumer seeks self-consistency as

someone who travels to a destination marketed by a SMI based on the source cues of the SMI, it is likely to provide a shortcut for the consumer's information elaboration process, taking the peripheral route.

Therefore, with the above, this study would like to hypothesise that:

H1a: Self-Congruity positively affects perceived argument quality.

H1b: Self-congruity positively affects perceived source credibility.

Parasocial Relationship between SMI and Followers. Defined as a unilateral relationship that a media audience developed for a media character [30–32], the parasocial relationship between the SMI and the follower is developed through their everyday online interactions, culminating trust for the SMI and reliance on the SMI as a credible information source that influences followers' consumption decision-making [11, 13, 31]. Recently, the concept of parasocial relationship on social media between the SMI and their followers have been examined [3, 8, 29, 33]. Shan et al. [33] have suggested that perceived image congruence between the SMI and the consumer as the initiation of the parasocial relationship. The study further proved that self-SMI congruence is a strong indicator of the strength of parasocial relationship [33]. Thus,

H1c: Self-congruity positively affects Parasocial Relationship.

Existing studies such as Breves et al., [8, 24] have illuminated that parasocial relationship is equivalent to the halo effect, enhancing source credibility, especially on trustworthiness, which in turn positively affects brand credibility and purchase intention. Similarly, Yuan and Lou [29] also illustrated that parasocial relationship positively mediates source credibility on consumers' interest in SMI-marketed products. That is, followers are more likely to form a stronger parasocial relationship with SMI whom they consider attractive and similar to themselves and this parasocial relationship, in turn, leads to greater interest in the products promoted by the influencers. Hence, it can be inferred that a stronger parasocial relationship with the influencer, followers would tend to perceive the SMI as attractive, an expert, and trustworthy.

Yet, little has been done to understand how followers' parasocial relationship with the SMI would affect the argument quality of the SMI marketing campaign. While extant studies have highlighted that parasocial relationship is likely to enhance the source credibility of the SMI, parasocial relationship can also enhance argument quality [3, 11]. Based on the ELM, when elaboration involvement with the product or service, or in this case, the parasocial relationship with the SMI, followers may also undertake the central route of processing via argument quality. Hence, we propose:

H2a: Parasocial Relationship positively affects perceived argument quality.

H2b: Parasocial Relationship positively affects perceived source credibility.

Additionally, previous studies also indicated that processing peripheral cues can generate increased motivation, ability, or even consistency to consumers' actual self-concept, leading to more comprehensive information processing via the central route [18, 34]. Recent studies have also investigated the possibility of a two-step processing, where that peripheral route-persuasion is undergone first for consumers who are more likely to look out at source cues of the SMI in the campaign, followed by a central route-persuasion for in-depth scrutiny of the campaign content [17, 25, 35]. This is evident in current works where source credibility of the SMI would positively affect how consumers process the content of the SMI [3, 8]. As such, we propose:

H3: Perceived source credibility positively affects perceived argument quality.

Affective Evaluation and Behavioural Intention. With a higher argument quality perceived by the consumer, it would mean that the information is persuasive and informative, generating positive attitudinal dispositions toward the SMI campaign [23]. Similarly, consumers would tend to perceive the marketing campaign as positive if it comes from a source that is perceived as credible, knowledgeable, and attractive [27, 28]. In the current study, the audience of the SMI destination marketing will evaluate the campaign based on argument quality and/or source credibility, which forms an attitude toward the campaign. Prior studies also revealed that after the exposure of the campaign, the consumers would form an attitude toward the campaign, which thereby affects the brand attitude and purchase intention [7, 9].

The appropriate use of SMI as endorsers of destination marketing, or having a good SMI-destination congruity is influential to the forming destination image [7]. As evident from previous studies, SMIs are significant in enhancing the campaign experience of destination marketing, which result in forming a positive attitude toward the campaign and positive attitude and/or image formed of the destination marketed, becoming important predictors for travel intention [7, 9]. Looking at the current state of a global pandemic, there is no sight of when international leisure travel will happen, with even the possibility of travel fear [36]. Therefore, this study would like to understand how consumers, while still amid the COVID-19 pandemic, would travel after the pandemic is over. Based on prior literature, it can be hypothesised that:

H4: Perceived argument quality positively affects the (a) attitude toward the SMI campaign, (b) destination image, and (c) post-COVID-19 travel intention.

H5: Perceived source credibility positively affects the (a) attitude toward the SMI campaign, (b) destination image, and (c) post-COVID-19 travel intention.

H6: Campaign attitude positively affects consumers' destination image of the marketed destination.

H7: Consumers' destination image of the marketed destination positively affects the post-COVID-19 travel intention of the marketed destination.

Therefore, this study would like to propose the hypothesised model (Fig. 1), to test the causal and dynamic paths in processing and perceptions toward the SMI destination marketing campaign.

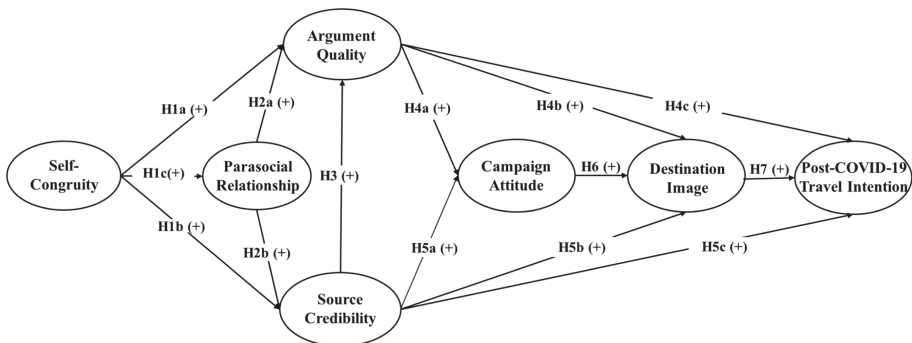


Fig. 1. Research model.

3 Methodology

3.1 Data Collection and Analysis

A web-based questionnaire was distributed in May 2021 to followers of SMIs with the help of a local market research firm in Singapore. Singapore was chosen as it is one of the world's top outbound tourist source nations, [37], as well as one of the key markets that Japan has been actively marketing through SMIs to attract inbound tourists to second-tier destinations within the country [38, 39]. SMI destination marketing campaign usually involves various contents produced by the SMI, targeting consumers aged 18 to 35 [7, 10]. Recently, Instagram has been the social media platform where DMOs leveraged SMIs as it allowed imagery and textual content to reach out to the target audience of SMIs. Thus, a stimulus of a SMI destination marketing campaign promoting Japan on Instagram was adapted, featuring Singapore's top travel SMI, Xin Lin Khaw (@xinlinn).

Instruments were developed from existing literature with the use of a seven-point Likert scale (1 = strongly disagree; 7 = strongly agree). Items measuring self-congruity and perceived source credibility of SMI were adapted from Yoon and Kim [27], while items for perceived argument quality were derived from Filieri and McLeay [26]. The affective evaluation scale and measures for behavioral intention were adapted from Ong and Ito [9], and Xu and Pratt [7]. Measurement item for parasocial relationship were developed from existing literature [29, 31, 32].

SPSS was first used for descriptive analysis, then partial least squares structural equation modelling (PLS-SEM) was applied to test the measurement model and structural model. PLS-SEM is appropriate for predictive research and has flexible abilities in handling complex models, small sample sizes, and non-normal data [40]. Given this study is predictive, PLS-SEM was selected. Utilizing SmartPLS (version 3.2.9), the measurement model and structural model were assessed with the PLS algorithm and bootstrapping (5000 subsamples), respectively.

4 Results

4.1 Descriptive Statistics

A total of 501 valid responses were obtained after a month of data collection. Out of 501 respondents, 255 are female, 243 are male, and three respondents identified as non-binary. The sample is also representative of Singapore's multiracial composition, with 78.2% Chinese, 11.8% Malay, 6.6% Indian, and 3.4% Eurasian/Others. 7.6% of the respondents are aged 18–19, 41.9% aged 20–25, 16.6% within the 26–30 age range, 17.0% who are 30–35, and 17.0% who are 35 and above.

4.2 Measurement Model

The measurement model was evaluated by internal consistency reliability, convergent validity, and discriminant validity of the constructs. As presented in Table 1, the indicator loadings ranged from 0.765 to 0.958, greater than the threshold value of 0.708

Table 1. Measurement model for constructs.

Construct and item	Mean	SD	Loading
<i>Self-congruity (SCO)</i> (Cronbach's $\alpha = 0.950$, CR = 0.964, AVE = 0.869)			
Travelling to a destination recommended by an SMI is			
(1) consistent with how I see myself	3.986	1.547	0.922
(2) consistent with how I like to see myself	4.142	1.589	0.933
(3) consistent with how I believe others see me	3.804	1.562	0.934
(4) consistent with how I would like others to see me	3.904	1.629	0.939
<i>Parasocial Relationship (PSR)</i> (Cronbach's $\alpha = 0.938$, CR = 0.956, AVE = 0.843)			
(1) If there is a content related to the SMI on any media, I would read it	4.561	1.543	0.917
(2) When the SMI shows me how he/she feels about the destination, it helps me make up my own mind about the destination	4.579	1.527	0.924
(3) I can rely on information I get from my favourite SMI	4.565	1.472	0.904
(4) The SMI makes me feel comfortable, as if I am with a friend	4.503	1.529	0.928
<i>Source Credibility (SC)</i> (Cronbach's $\alpha = 0.959$, CR = 0.965, AVE = 0.778)			
This SMI appears to			
(1) be attractive	4.956	1.430	0.765
(2) be reliable	4.585	1.331	0.917
(3) be sincere	4.579	1.400	0.897
(4) be knowledgeable	4.465	1.465	0.914
(5) be experienced	4.423	1.459	0.913
(6) be expert	4.178	1.473	0.89
(7) reflect my own interests	4.343	1.473	0.887
(8) have common interests with me	4.439	1.475	0.862
<i>Argument Quality (AQ)</i> (Cronbach's $\alpha = 0.950$, CR = 0.995, AVE = 0.751)			
The information I get through the SMI campaign			
(1) is relevant as it matches my needs	4.407	1.506	0.907
(2) is appropriate for satisfying my needs	4.443	1.469	0.827
(3) is easy to read	4.938	1.362	0.828
(4) is easy to understand	5.004	1.374	0.859
(5) is correct	4.605	1.349	0.844
(6) enables me to objectively understand the destination	4.305	1.550	0.889
(7) provides me with information that I couldn't get elsewhere	4.212	1.592	0.907
<i>Campaign Attitude (CA)</i> (Cronbach's $\alpha = 0.950$, CR = 0.968, AVE = 0.909)			
This campaign is			
(1) interesting	4.747	1.436	0.950
(2) good	4.683	1.356	0.958
(3) likable	4.860	1.346	0.952

(continued)

Table 1. (continued)

Construct and item	Mean	SD	Loading
<i>Destination Image (DI)</i> (Cronbach's $\alpha = 0.944$, CR = 0.964, AVE = 0.899)			
The destination is			
(1) Favourable vs Unfavourable	4.936	1.312	0.950
(2) Positive vs Negative	5.022	1.289	0.956
(3) Interesting vs Boring	4.904	1.391	0.940
<i>Post-COVID Travel Intention (PCTI)</i> (Cronbach's $\alpha = 0.950$, CR = 0.964, AVE = 0.869)			
(1) I am very likely to visit the destination recommended in the influencer campaign when international travel resumes	4.645	1.552	0.938
(2) I definitely will visit the destination recommended in the influencer campaign in the near future	4.487	1.538	0.944
(3) I plan to visit the destination recommended in the influencer campaign in my next trip	4.441	1.516	0.936
(4) The influencer campaign makes me want to travel to the destination in post-COVID situation	4.559	1.597	0.912

[40]. The values of Cronbach's alpha and composite reliability (CR) all exceeded 0.70, indicating sufficient construct reliability [40]. The values of average variance extracted (AVE) are between 0.751 to 0.909, surpassing the threshold of 0.50 and building up the convergent validity. The heterotrait-monotrait ratio of correlations (HTMT) was applied to appraise the discriminant validity. Results have shown that the highest value of the HTMT score is 0.790, below the recommended value of 0.85 [41]. Thus, satisfactory discriminant validity was achieved.

4.3 Structural Model and Hypothesis Testing

The structural model was assessed with a series of statistic indexes. The standardised root mean residual (SRMR) was 0.062, lower than the stipulated criterion of 0.08, suggesting a good model fit [41]. The inner and outer values of variance inflation factor (VIF) were less than 10, excluding the issues of multicollinearity [42]. The effect sizes (f^2) of most paths exceeded 0.15, demonstrating medium to large effects [43]. R^2 values of 0.19, 0.33 or 0.67 for endogenous constructs are described as weak, moderate or substantial [44]. The proposed research model manifested relatively moderate to substantial explanatory power (PSR: 28.1%, AQ: 70.9%, SC: 53.5%, CA: 57.9%, DI: 68.5%, PCTI: 61.8%). Values of Stone-Gaiser's Q^2 for endogenous constructs were calculated using the Blindfolding test; with Q^2 values exceeding the minimum requirement of zero (0.234 ~ 0.610), implying good predictive relevance [43].

Table 2 shows the results of hypothesis testing. 12 out of 14 proposed paths were attested to be significant and supported. Only H1a and H5b were not supported. Post-hoc analysis was executed to uncover any mediating effects on the non-significant hypotheses. Firstly, the association between SCO and AQ was found to be significant when mediated by PSR ($\beta = 0.205$, $t = 4.200$, 95% C.I. = 0.115–0.304), and SC

($\beta = 0.173$, $t = 4.261$, 95% C.I. = 0.040–0.111). Similarly, AQ ($\beta = 0.214$, $t = 4.463$, 95% C.I. = 0.131–0.315) and CA ($\beta = 0.077$, $t = 2.130$, 95% C.I. = 0.015–0.157) were also proved to significantly mediate the relationship between SC and DI.

Table 2. Results of hypothesis testing.

Hypothesis	Path	β	t Value	f^2	Result
H1a	SCO \rightarrow AQ	0.021	0.593 ^{ns}	0.001	No
H1b	SCO \rightarrow SC	0.335	5.370 ^{***}	0.174	Yes
H1c	SCO \rightarrow PSR	0.530	12.158 ^{***}	0.391	Yes
H2a	PSR \rightarrow AQ	0.387	4.495 ^{***}	0.267	Yes
H2b	PSR \rightarrow SC	0.497	7.406 ^{***}	0.382	Yes
H3	SC \rightarrow AQ	0.517	6.578 ^{***}	0.428	Yes
H4a	AQ \rightarrow CA	0.632	8.499 ^{***}	0.355	Yes
H4b	AQ \rightarrow DI	0.413	5.119 ^{***}	0.150	Yes
H4c	AQ \rightarrow PCTI	0.271	3.261 ^{***}	0.048	Yes
H5a	SC \rightarrow CA	0.156	2.071 [*]	0.022	Yes
H5b	SC \rightarrow DI	-0.029	0.565 ^{ns}	0.001	No
H5c	SC \rightarrow PCTI	0.174	2.522 [*]	0.030	Yes
H6	CA \rightarrow DI	0.493	7.597 ^{***}	0.324	Yes
H7	DI \rightarrow PCTI	0.419	6.345 ^{***}	0.192	Yes

Note. * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$. β = Standardised regression weight. f^2 = Effect sizes. SCO = Self-congruity, AQ = Argument quality, PSR = Parasocial relationship, SC = Source credibility; CA = Campaign attitude, DI = Destination image, PCTI = Post-COVID travel intention. Yes = Supported, No = Unsupported

5 Discussion

5.1 Theoretical and Practical Implications

The Power of Parasocial Relationship between SMI and Followers. Findings have elucidated that the influences of PSR between SMI and followers are two-fold. Firstly, the current study has extended research by uncovering that PSR not only positively affects SC but also directly enhances the persuasive impact of the SMI content through AQ. Secondly, the non-significant direct effect of SCO on AQ has led to the discovery of two mediating effects by PSR and SC. The direct and mediating effect of PSR on AQ also show that PSR between SMI and the follower acts as a positive halo effect that not only enhances SC of SMI, but also AQ of SMI content. This illustrates the PSR between SMI and followers enhances involvement, which heightens motivation and confidence in evaluating the content, before proceeding to the next step of their decision-making [25, 35]. The influence of PSR on AQ encourages consumers to undertake the central route of persuasion, resulting in more positive effects on affective

evaluation and behavioural intentions. Similarly, the mediating effect of SC on AQ proposed the integral role SC plays in cognitive processing: as a filter for consumers, enhancing the persuasion impact in SMI content [8], before continuing on with the central route of persuasion. Considering the importance of PSR, destinations should continue to engage consumers despite the lack of travelling. SMIs could still engage followers with entertaining content to maintain strong PSR [12, 13, 45]. Destination marketers could still partner with SMIs by leveraging technology through virtual tours, online Zoom meetings to share expert tips, and keep followers engaged during COVID-19, building awareness and loyalty for destinations.

More than Just Influencer Credibility. Findings have illustrated the importance of AQ with stronger direct effects on tourists' CA, DI, and PCTI as compared to that of SC. Similarly, AQ has also been uncovered to be a significant mediator in the relationship between SC and DI. Both findings highlight the importance of the content quality of the SMI. Unlike existing studies that have evaluated impacts of SMI based on the source credibility model, the current study has used the ELM as a framework that gives us insights into how consumers assess the content and the SMI based on AQ and SC, respectively. Especially when SMIs are no longer just an endorser, but also a content creator who is proactive in the co-creation of the storytelling [3, 5, 45], the visual and textual presentation of the destination in the SMI's content could elicit engagement with the campaign more effectively, inducing a positive image of the marketed destination, as compared to attributes of SC of the SMI [46]. Findings of the current study also corroborated with Asan's [13] suggestion that "engaging and aesthetic experiences" (p.12) shared through SMI content have a positive effect on destination marketing. Content has become crucial for both content creators (SMIs) and marketers. Particularly with the increase in the amount of time spent on social media during the pandemic, consumers would tend to scrutinise more on the quality of content. Therefore, future studies should expound further on evaluating the marketing content of SMIs or even new measures to study the effectiveness of content. With the above, we propose that practitioners should not just focus on indicators of SC (e.g. the number of followers, attractiveness of SMI) as criteria for selecting the right SMI for their marketing campaigns [45]. Content quality should be held as an important criterion for choosing the appropriate SMI since good content would develop positive campaign attitudes, destination image and travel intention to the marketed destination. Nevertheless, SC is still an essential criterion in evaluating the impacts of SMI destination marketing, as well as a requirement in SMI selection, as SC directly influences campaign attitude, travel intention, and enhances persuasion impact of their content.

5.2 Limitations and Future Studies

This study collected its data during COVID-19, which may showcase how the consumers perceive SMI destination marketing in the state of the pandemic. Future studies could compare the effects of SC and AQ of SMI destination marketing pre-COVID, during COVID-19, and post-COVID. Moreover, travel intention was tested in this study on the assumption that international travel has recovered; future research could explore the role of SMI may play in alleviating tourists' perceived travel risk.

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Management Response to Online Review: The Case of Hong Kong Luxury Hotels

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Abstract. Electronic word-of-mouth (eWOM) is regarded as crucial in business development. Given the intangible nature of tourism and hospitality products, potential customers find it hard to assess them before making purchase. Accordingly, online customer reviews and management responses have influential roles in their decision-making process. While a plethora of previous research focused on customer reviews, scholarly attention on how luxury hotels respond to the reviews was scant. Using content analysis, this study examines the management response characteristics of 35 luxury hotels and response style of 7 luxury chain hotels in Hong Kong. Their response characteristics including response frequency, responder's job position, and timeliness of response were generally similar. The response style and tone (professional and conversational tones) vary with hotels even they are in the same hotel group. Implications on practice of management responses are offered for luxury hotel operators.

Keywords: Communication style · Hotel · Online review · eWOM

1 Introduction

The Internet is an essential platform for industry practitioners to communicate with customers and enables the practitioners to expand the market segment as well as to retain the customers [1]. As experiencing a service before making purchase is difficult for customers, they would be more concerned about the recommendation from various online sources, such as other customers, experts, and key opinion leaders; however, the impacts of online recommendation sources on consumer decision making vary [2]. This situation is particularly relevant to tourism and hospitality products because of their intangible nature and the boom of tourism and hospitality online review platforms, for examples, TripAdvisor, Ctrip, and others. These platforms power the spread of word-of-mouth among consumers and have become a crucial factor for making purchase decision [3].

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J. L. Stienmetz et al. (Eds.): ENTER 2022, *Information and Communication Technologies in Tourism 2022*, pp. 123–133, 2022.

https://doi.org/10.1007/978-3-030-94751-4_12

The usual reasons for customers to write reviews revolve around customer satisfaction in consequence of performance-expectation comparison, desirability for service recovery, and seeking social support. From the organizational perspective, a positive review reinforces online reputation and consequently enhances hotel occupancy rate and financial performance [4]. As online reviews can influence hotel reputation and consumer decisions, hotels need to effectively manage the online reviews through their online responses which are publicly available on the review platforms. Management response is mandatory if the review is negative, emotional, and characterized by customer expectation of improvement [5]. In management response, the responder's job position and timeliness of response are the major factors for assessing hotel performance. Apart from these characteristics, the response contents and tone are also considered. Therefore, hotels need to deliberate their responses in terms of suitability [6]. Scholars have provided recommendations on the structure of responses (i.e., what should be mentioned), and the responder's tone (i.e., how to present responses) [7–9]. Practitioners also put emphasis on management responses. TripAdvisor provides response guidelines for hoteliers and encourages them to respond to each review [10].

Prior research has provided significant implications on effective ways to respond to customer reviews in hospitality [6, 11]. However, the implications may not be applicable to all types of hotels as their customers' expectations vary. Empirical evidence drawn from specific types of hotels will extend knowledge in the existing literature and equip relevant practitioners with accurate implications. While expectation for luxury hotels is generally higher than that for hotels of lower class, management response is a mandatory practice. It should be important for luxury hotel operators to understand what their peers are doing and how they can improve in responding to their customers. Therefore, focusing on Hong Kong which is a popular destination in the world, this study collected luxury hotels' management responses from TripAdvisor, content-analyzed the data, synthesized the response characteristics and style, and provided implications for the practitioners.

2 Literature Review

Electronic word-of-mouth (eWOM) is currently considered as the most important source of information which helps customers make purchase decisions. In hospitality and tourism, interpersonal influence is essential because the products are intangible and inaccessible before consumption. Rapid development of the Internet facilitates people to share and exchange information using different types of electronic media, such as email, blogs, websites, chatrooms, and newsgroups. In hospitality and tourism, managing eWOM is an indispensable marketing strategy to achieve two purposes: (1) information generation and (2) revenue generation. Collected information can be used for product improvement, reputation reinforcement, and customer relationship management. Financial performance would eventually be enhanced [3]. Suppliers' unethical practice of employing fake review writers reflects the importance of online reviews in determining their business performance [12].

Numerous websites allow users to share their hotel experience after consumption. Intuitively speaking, positive reviews motivate users to make bookings, whereas

negative reviews discourage bookings. In addition to the review contents, the person who writes the review influences users' evaluation of the service providers. Chan, Lam, Chow, Fong, and Law [13] revealed that demographic and preference similarities between readers and reviewers affect the influence of the review valence on hotel booking intention. Readers tend to deeply consider reviews provided by people with a similar background, such as age, occupation, country of origin, and username, because they seem to share common judgment. As such, information source is an important factor that potential customers would consider [14]. Following this rationale, when they read the management responses, users would pay attention to the person who writes the response, especially the responder's job level.

Apart from job level, users would also consider other characteristics of management response such as responding time, response contents, style, and tone [6]. As timely response to customers' comments is important [15], reviewers expect hoteliers to give a speedy response related to the service failure they described in the reviews. Responding time would affect customer satisfaction and repurchase intention [16]. In addition, speedy response to negative online review effectively improves customer trustworthiness with the hotels [8]. Trust will eventually be translated into better financial performance of the hotels [6]. Regarding response content, some elements are necessary and important. Cook [17] indicated that in handling complaints, an effective resolution letter should express appreciation for the customer's opinion, apologize for inconvenience, acknowledge the problems, explain findings from investigation, offer compensation, and present a resolution plan.

Organizations should ensure that a message is presented properly and with a suitable tone. From the customers' perspective, acknowledging a problem is a rapport-enhancing move which is frequently applied in effective responses, whereas denying a problem is a rapport-damaging move [18]. When facing an unfair review, a defensive managerial response strategy is needed to protect the reputation of service providers. However, the defensive message should also be communicated in a professional tone [19].

Based on our literature review, response characteristics and style of luxury hotels are under-researched. This gap is filled by the current study using the method which is articulated in the next section.

3 Method

Using a qualitative approach which has been widely adopted in previous hospitality and tourism research [20], this study content-analyzed the management responses made by luxury hotels in Hong Kong. Data were collected from TripAdvisor.com which is a highly popular online review website that allows customers to share their tourism and hotel experiences. As our targets are luxury hotels, all Hong Kong hotels which were classified as 5-star by TripAdvisor were selected – 35 hotels. Data collection and analysis were separated into two parts. The first part analyzed response characteristics (presence of response, responder's job level, and responding time) based on a large volume of data. The second part which concerns the response style and tone requires a

deeper analysis was conducted manually and seven hotels were included. To rule out any possible bias caused by the language, this study only focused on English reviews.

In the first part, TripAdvisor reviews, regardless of their valence, posted in the recent three years (2018–2020) were retrieved. Recent reviews allow the reveal of latest practices in the industry. Although this period featured the non-existence and existence of COVID-19, the impact of pandemic is unlikely to be a concern as this study does not focus on specific issues (e.g., safety of operation), but rather focuses on fundamental components including responder's job position and responding time. A total of 109,903 reviews were analyzed in this study. First, we recorded if the reviews have any management response. Second, if there was a response, two response characteristics including responder's job position and responding time were recorded.

The second part of this research focused on the response style and tone. As noted earlier, selected hotels are included in this part. Our selection was based on whether a hotel is a chain hotel. Compared with independent hotels, chain hotels are supposed to possess richer experience and more resources in dealing with customers. The system and procedures in chain hotels are generally more well-established, enabling them to better satisfy their customers [21]. Because of their operation in different cities and countries, chain hotels may also be more capable in responding to customers with different cultural backgrounds. Therefore, chain hotels practice should have high reference value for luxury hotel operators. Furthermore, while chain hotels belong to the same group, they may need to maintain a certain level of consistency in their operations. Then, their response style and tone may be similar to their peers in the same group. This conjecture, however, had not been examined in previous studies yet and was examined in this study.

This study selected seven hotels from three hotel chains, including (1) Hyatt Regency Hong Kong Sha Tin and (2) Grand Hyatt Hong Kong from the Hyatt Group; (3) Kowloon Shangri-La Hong Kong, (4) Island Shangri-La Hong Kong, and (5) Kerry Hotel Hong Kong from the Shangri-la Group; and (6) Regal Hong Kong Hotel and (7) Regal Airport Hotel from the Regal Group. Given the large scale of available data, only responses written in 2020 were extracted. A total of 1,264 managerial responses were collected. The comments and feedback were read word-by-word to ensure accurate interpretation of the content. Any inconsistent interpretations of the investigators were resolved by discussion until consensus was achieved. Review valence including positive, neutral, and negative were also recorded.

4 Findings and Discussion

4.1 Characteristics of Management Responses

Among the 35 luxury hotels, 19 responded to every review regardless of valence. Although other hotels did not respond to all reviews, they generally addressed most of the reviews. The findings are consistent with a previous study which interviewed 13 managers [22] and found that most managers openly responded to online positive and negative reviews. A few of them privately contact the customers who posted negative reviews. Only one manager did not respond to customer comments, and that manager

believed that problems should be fixed before the customer leaves the hotel and that post-service recovery is useless in enhancing customer satisfaction. While all hotels in this study were luxury hotels, people would have a high expectation on the service. Responding to all reviews gives an impression that the hotels value and care every customer. Responding to negative reviews is essential as any ignorance will trigger people's doubt on the hotel's service standard. While potential customers make decision based on the reviews and responses [14], a well-written management response may help transform readers to customers. On the other hand, responding to positive reviews is a kind of appreciation which is a practice in line with the spirit of hospitality. Therefore, responding to all reviews should be the best practice for luxury hotels. Despite this, the responses should be carefully written because inappropriate responses to an online review can be disastrous [22].

By observing the responder's job titles, all feedback was endorsed by staff at the management level. Some examples were general manager, director of rooms, and director of guest relations. Responder's organizational position can have an influence on customer satisfaction [7]. Response from someone at management level shows respect to the customers. This practice is especially important in dealing with negative online reviews because the complainants may want the management to be aware of the service failure they had encountered in the hotel. Prior research reported that changing customer attitude should be handled by a credible person [8]. In this regard, compared with operational staff, management staff should have advantage. However, whether the responses should be made by the general manager is controversial. While the job title in the response implies it is that person who responds to the review, customers and users would question if it is really the general manager who is supposed to deal with strategic issues to write the response. In this case, credibility of the hotel will be threatened. Then, the job title effect will backfire.

The analysis shows that most hotels (26 out of 35) responded to reviews within a week. According to the findings about response time to complaints [16], customers deem a response made within 7.9 days as acceptable. In this sense, the hotels in this study generally performed well in timeliness. Timely response should be expected by most (if not all) customers, especially those who raised complaints in the reviews. This expectation should be exceptionally high for luxury hotels as they are supposed to outperform the low-class counterparts in all service aspects. A delayed reaction or service recovery would threaten the reputation of service provider [23]. Complainants would consider timely response as something which a service provider should prioritize because their feeling of uncertainty and negative emotion need to be promptly addressed [24]. Therefore, it was even argued that additional compensation is not necessarily more important than timely response in addressing a complaint [25].

4.2 Response Style and Tone

Our perusal of management responses made by the seven chain hotels revealed that repetition of contents in customer review was salient in positive reviews but not in negative reviews. The hotels might not want to reinforce the incidence or service failure in their response to negative reviews. They generally acknowledged the problems and expressed apologies. In contrast, when responding to compliments in positive reviews,

the hotels might want users to pay attention to their good deeds. It may also be due to the fact that not much can be written to address compliments. It is worth-noting that lengthy responses demonstrate hotel's serious attitudes toward consumer feedback and enhances customer satisfaction [6]. Therefore, repetition of the compliments is a viable approach. Furthermore, we found that repetition of contents is frequent if hotel staff is praised. This is important as hotel is a service industry where staff is the most valuable capital.

Regarding the contents in responses to positive review, responders generally included structural components suggested in previous studies which are greeting, expressing feelings, thanking reviewers, and continuing relationships, with some of them also recognizing the reviewer's value [9, 18, 26]. However, when facing customer complaints, their response style exhibited some variations. This approach is important as personalized responses help regain customers' trustworthiness [27]. The personalized messages signal the hotel's concerns about the customer's opinions and the high level of hotel engagement [28]. Therefore, in the case of service recovery, management response should not be standardized [29].

Response tone can generally be categorized into conversational tone and professional tone. A conversational tone refers to an engaging and natural style of organizational communication as perceived by consumers [30]. Conversely, professional tone means a relatively standard response which is more respectful, formal, and facts-oriented [8]. An example of response consistent with professional tone is shown below:

"Thank you for taking your precious time to share your experience at Grand Hyatt Hong Kong.

We are most delighted to hear that you enjoyed your stay in a room with stunning view of the harbor, and the exceptional service provided by Osman, Grace, and our Guest Experience Team has enhanced the experience. We will definitely pass on your kind words of praise to the team to recognize their efforts. Your compliments on our scrumptious breakfast spread is also much appreciated.

Thank you for your perfect rating and we look forward to welcoming you back in the nearest future". [31]

In this example, it can be observed that the writing is formal and contains respectful words such as "thank you" and "much appreciated". The response also emphasizes on the facts which the customer appreciated, for examples, "stunning view", "exceptional service", and "scrumptious breakfast spread".

The following shows an example of response featuring conversational tone:

"Firstly, thank you for staying at Kowloon Shangri-La, Hong Kong for having taken the time to share your feedback with us.

Please accept my sincerest apologies for the inconveniences that you have experienced regarding your room reservation. I have personally reviewed the whole situation as described with my Reservations Manager. I concurred with you that you should expect nothing but a good experience throughout the reservation process, especially being our loyal guests. Please rest assured that we are able to make necessary improvements to enhance our guest's booking experience.

Despite of this matter, I am very thrilled to know that we provided you with an enjoyable stay with us.

Indeed, it's always our pleasure to take care of you. Thank you very much for your compliments about the Hotel and our friendly services. We are looking forward to welcoming you back at the Hotel again real soon" [32].

In this example, the tone is relatively less formal, such as the phrases “firstly”, “I am very thrilled”, and “it’s”. The third and fourth paragraphs of this response sound natural as if s/he was talking to the guest. This communication style was recommended when customer reviews are negative because it is beneficial for organizational reputation [33]. The natural style of communication helps shorten the psychological distance between the hotel and guest, which will in turn increase the effectiveness of service recovery [34].

As this study also investigates whether chain hotels within the group had different response styles and tones, we observed if variations exist during our analysis of the data. We found that the tone used by hotels in Hyatt group and Regal group was consistent. They commonly used a professional tone in responding to positive or negative customer reviews. However, hotels in Shangri-la group adopted both professional and conversational tone approaches. The adopted approaches seem varying with the responders. We found that two managers were assigned to respond to online customer reviews. The resident manager preferred using a conversational tone in responding to all types of reviews. In contrast, the general manager preferred using a professional tone, especially in responding to positive and neutral reviews. The findings echo the argument that communication styles vary with the socio-demographic background of responders [35]. While general manager is at the executive level of the organization, a professional (formal) tone should be coherent with his/her status. Responder at the middle management level (e.g., resident manager) should be more suitable to use conversational tone.

Regarding response contents, hotels in the same group generally adopted similar structure components including greeting, expressing feelings, thanking reviewers, and continuing relationships, in responses to positive reviews. However, there were also exceptions. Regal Hong Kong Hotel preferred to use similar sentences to respond to every positive reviews. However, Regal Airport Hotel managers employed varied words to respond. On the other hand, more variations between chain hotels in the same group were observed in responses to negative reviews. Grand Hyatt Hong Kong preferred to explain the cause of the problem and was self-justifying in responding to problems that were not caused by the hotel. Conversely, Hyatt Regency Hong Kong Sha Tin would not mention problems in detail or offer explanations but instead directly apologizes for any inconvenience caused.

According to Ho [18], acknowledging problems helps maintain relationships with customers and is the most effective way to reduce customer dissatisfaction. Denying a problem should be avoided in the situation of service failure. Surprisingly, we found that these practices were not consistently pursued. Kowloon Shangri-la Hong Kong tended to respond to negative reviews by acknowledging the problems, whereas Island Shangri-la Hong Kong tended not to mention the problems stated in the customer review while neither acknowledged nor denied the problems. Additionally, they

typically used similar content to respond to negative reviews. Kerry Hotel Hong Kong made relatively brief responses. Although it was willing to admit the problems, it seldom expressed apologies. The findings show that the chain hotels in the same group did not use a consistent approach.

5 Contributions and Managerial Implications

Online reviews and management responses are both important in influencing customer decision making and hotel performance, therefore hotels should devote effort to manage eWOM. In view of the high service standard of luxury hotels, useful insights can plausibly be drawn from their responses. While scholarly attention on luxury hotel management response was scarce, the current research fills the gap by unveiling the response characteristics, style, and tone of this hotel class, so that a comprehensive theoretical framework can be developed in the future.

Findings of this study show that most hotels responded to all review regardless of the review valence. This practice should be strictly followed by other luxury hotels as response hints that the hotels value and care their customers. In general, the responses were made within a week which can be a benchmark for luxury hotels in determining the performance indicators of the team responsible for managing customer reviews. As customers generally expect a prompt response, hotels should strive to respond even quicker but without sacrificing any accuracy. The findings show that responders' job positions were primarily at the management level. This industry norm signals that luxury hotels should not assign an operational staff to respond to the customers. Otherwise, customers might feel disrespectful.

Regarding the response style, professional and conversational tones were used. However, if the review was negative, a conversational tone was salient while message was personalized. These practices appear reasonable as a conversational tone helps shorten the psychological distance between the guest and hotel, while personalized message demonstrates hotel's sincerity in addressing the customers' problems. This approach is worthwhile for other luxury hotels to follow. On the other hand, the findings generally conclude that chain hotels in the same group adopted different response styles and tones. The appropriateness of inconsistency approach is controversial. Customers may expect consistent service from hotels in the same group. This expectation may be more salient for frequent customers and those who have joined the membership of the hotel group. The group may need to provide guidelines for its hotels in their response to online reviews.

6 Limitations and Future Research

This study has some limitations. First, while a qualitative approach was adopted, we have to ensure a manageable data size. So, only recent reviews of a small number of hotels were analyzed. Robustness of the findings was threatened. Future research is recommended to adopt a quantitative approach such as big data analytics. Given the findings of this exploratory study, hypotheses can be developed and validated in the

future, for instance, the impact of a response on subsequent reviews and the impact of review topics (e.g., safety issues) on management responses. Second, to reduce any language bias, only English reviews and responses were analyzed. We do not know if language would make a difference on the findings. Third, this study only considered hotels in Hong Kong. Findings may be different if the case was from other places. Given these limitations, future research is recommended to enlarge the sample size, incorporate non-English reviews, and focus on hotels in other regions and countries. Comparisons can also be made between English and non-English reviews (and responses), and responses made by chain hotels located in different regions and countries, as well as responses made by chain hotels versus independent 5-star hotels. Succeeding studies can examine if and how the socio-demographic background of responder influences the responses, especially if the responses are personalized. Another interesting future study would be whether responders' names (Chinese versus non-Chinese) would affect user's evaluation of responses. Although the findings and implications were drawn from the practices of luxury hotels, it does not mean that their practices are the best. Future research should evaluate the responses using primary research approach, for example, survey, experiment, and even mixed-method approach so that broader and deeper insights can be drawn.

Acknowledgement. This project was partly supported by a research grant funded by the University of Macau (Ref.: CPG2021-00036-APAEM).

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The Usage of Emoji in Tourism-Related Instagram Posts: Suggestions from a Marketing Perspective

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Abstract. The relevance of emoji in social media marketing has attracted tremendous interest from academics and marketing professionals alike ever since emoji became a fixed component in user-to-user and business-to-user communication on online platforms such as Instagram and Facebook. Using a quantitative research approach in the form of a self-administered online survey in an experimental setting, the purpose of this study is to investigate what type of emoji positively impacts consumer behaviour, purchase intention, and user interaction in tourism-related Instagram posts. This research is novel in that it bridges the usage of emoji in the context of social media and tourism. The findings support tourism managers in the practical use of emoji for social media marketing campaigns on Instagram and show that (positive) face emoji evoke more positive emotions than non-face emoji.

Keywords: Emoji · Instagram · Social media advertising · Tourism marketing

1 Introduction

With the rise of digital communication, social media platforms such as Facebook, Twitter, and Instagram have transformed into powerful communicational mediums as they allow users to express feelings, share everyday life moments, and connect with others [1]. In particular, Instagram, initially launched as a photo-sharing platform, has become one of the world's most popular channels, with over one billion active users. Beyond its visual-centred nature, Instagram acts as a network for several industries such as services, marketing, and tourism to grow their business. Increasingly, the potentials of Instagram have also been recognised by tourism service providers and destination marketing organisations (DMOs) for the creation of effective marketing strategies [2].

In addition to using videos and images for marketing purposes, emojis offer brands the opportunity to connect with the target market [3] on Instagram using an emotional touch. Essentially, emojis are facial expressions that allow users to express their feelings, moods, or emotions. As graphic symbols that show vehicles, food and

beverages, weather, flags, animals, and so on [4], two main types of emoji can be identified; namely, face emoji (expressing human emotion and feelings, e.g., 😊) and non-face emoji (which do not involve human faces, e.g., ❤️ 📍) [5]. Emoji can emphasise written text language as they are the most evolved form of available punctuation [6].

Seeing that emojis and emoticons are highly pervasive in our daily lives [7], recent studies have focused on customer purchase intentions relating to the appearance of emoji in advertising [8, 9]. For instance, scholars suggested that experimental purchases such as tourism products and services can stimulate emotions that positively increase emotional behaviour [10]. That is, travel-related products tend to influence emotions, whereby emoji can play a crucial role since they express an emotional mood as well. However, while emoji usage in tourism enterprise communications has been highlighted [11], the linkage between emoji and their significance in tourism advertising remains fragmented.

Meanwhile, although earlier literature has discussed Instagram advertising of DMOs [1, 12] and highlighted the vital role of user-generated content (UGC) on destination image formation [2, 13], the relation of user-generated content and the usage of emoji in tourism-related posts on Instagram is still an underexplored area. Likewise, while some scholars have looked into emoji and their meaning in regard to customer attention [14, 15], there are limited studies that focus on emoji and their impacts on the efficiency of tourism-related advertisements, especially on Instagram [16].

Owing to the rising interest in emoji around various research streams [16], this study aims to contribute to tourism research by examining what type of emoji attracts the most attention on tourism-related Instagram posts as well as what type of emoji creates more positive emotions in such advertisements. Additionally, this study assesses the type of emoji that creates the most user interaction. The specific research questions are as follows:

- (1) How does the usage of specific types of emoji (face emoji and non-face emoji) in tourism-related Instagram posts influence an individual's attention to the post?
- (2) What type of emoji help to raise positive emotions in tourism-related Instagram posts?
- (3) How can emoji be useful for tourism managers in managing tourism marketing activities?
- (4) What type of emoji help to create more interactions with the post?

From a practical point of view, this study's findings can support destination management and tourism marketers in optimising their social media advertising and effective involvement of emoji in Instagram posts.

2 Literature Review and Hypothesis Development

2.1 Emoji and Social Media

As part of computer-mediated communication, emoji are widely used, and some emoji have nearly achieved universal understanding [17]. Emoji have been used in different ways and contexts on social media platforms including Instagram, Facebook, Twitter, and WhatsApp. They allow people with different cultural backgrounds to communicate more effectively and initiate interactions when necessary. It is believed that emoji can solve potential misunderstandings experienced in intercultural communication [18]. According to theory in social semiotics, emoji serves as a means of promoting shared values and affiliation between users [11]. This concept is expressed via a semiotic that establishes interpersonal meaning within the attitude system and a semiotic establishing experiential meaning.

When emoji were used, readers found a higher level of positive emotion than when no emoji were presented [17]. For non-face emoji, even though they do not show facial expressions, they still bring positive meanings to a message. Furthermore, emoji help to convey the meaning of a message more efficiently [19]; they can significantly reduce the ambiguity of a sentence and are able to change one's interpretation in terms of affection [5]. Hence, emoji can help to catch the attention of readers in a shorter period of time [15] and help to create a digital message with nuances and depth, resembling a face-to-face conversation more closely [14]. Other scholars suggested that a message is also considered to be more personalised when that message includes emoji [15]. They also point to the elaboration likelihood model, which explains the influence of emoji on the reader's attention. The model implies that information may persuade people with positive cues when they can be processed without much thinking, and personalisation can positively affect information processing [20].

Facial emoji encourage users to express different emotions that may not be as easily portrayed in online communication. People select suitable emoji that fits their current emotion/mood from a predefined list of emotional expressions. While, during the process of exchanging information on social network sites, this may seem like an extraordinary action, this is in fact an exercise that fosters our emotional honesty because, often times, individuals may be unable to express their true feelings due to social barriers [14]. Moreover, notably, visual images deliver higher emotional effects than just words [19]. Using emoji in a non-judgmental setting thus helps to understand our emotional state and to communicate it more openly [14]. However, this depends on the specific context and the individual perception of the respective emoji. Regardless, emoji convey a particular emotion and reinforce a message [21], which support us in conveying our socially challenging emotions and, by that, in acknowledging and accepting that emotion as a part of ourselves [12]. Accordingly, the following hypothesis has been formulated:

H1: The appearance of positive face emoji in tourism related Instagram posts raises more positive emotions than non-face emoji do.

2.2 Emoji, Consumer Behaviour, and Purchase Intention

While many functions and facets of emoji in communication have been explored in social media research, the usage of emoji and their effect on consumer behaviour and purchase intention is another essential component that needs to be considered when aiming to gain insights on the precise usage of emoji. To date, emoji are widely prevalent in marketing campaigns [9]; in other words, companies pursue new ways of communication that may positively influence the emotions of potential consumers. Hence, emoji are well recognised as a tool for social media advertising [3]. Recent literature suggest that emoji in promotional materials encourage users to respond to the message [23] and, regarding hedonic products, increase the effect of purchase intention [8]. Other scholars report an increasing number of emoji in marketing campaigns and point out that emoji in advertisements can positively impact targeted consumers because users appreciate the service more and the level of their satisfaction increases [9].

Notably, stimulation of consumers' emotional behaviour is particularly relevant when it comes to experience-orientated products, such as tourism services [10]. This study assumes the purchase intention of potential consumers to be equivalent to travel intention since an advertisement from an official destination management organisation on Instagram aims to bring travellers to the promoted destination. This has led to the following hypothesis:

H2: The appearance of emoji in tourism-related Instagram advertisements influences users' travel intention.

2.3 Instagram and Emoji in Tourism

Instagram has become a popular platform that triggers creativeness and self-promotion of tourism destinations [12, 22]. When applied strategically, user-generated content (UGC) can be highly beneficial for tourism organisations [24] because it enhances the destination image [12, 24]. Seeing that travellers can be viewed as low-cost marketers and brand ambassadors, research has found that pictures taken by users and reposted by DMOs improve engagement on Instagram [25]. Other scholars emphasise UGC as a crucial factor for destination image because user-generated Instagram pictures tend to present more diverse attractions than traditional brochures and travel guides [26]. As such, more tourism operators use Instagram to promote destinations and consider Instagram to be an online travel album where all tourists have access [12].

In terms of emoji usage in the tourism industry, a transformation in company communications including emoji on social media platforms has appeared [27]. As a result, travel organisations use emoji when communicating with tourists, leading to an increased human touch in business communications. Tourism is an industry that should strongly rely on the usage of emoji when considering tourism enterprises and their social media strategies as the integration of emoji brings more fun and friendly interactions to the customer base, which eventually leads to better business development [28]. In particular, it has been recognised that non-face emoji enhance reader trust by reducing message ambiguity [5]. As such, this study tests for the types of emoji that help to create effective UGC with the following hypothesis:

H3: The appearance of non-face emoji in tourism related Instagram posts helps to promote more engagement (likes, shares, and comments) than face emoji posts do.

3 Methodology

This research adopted a quantitative method approach with an online questionnaire in an experimental setting. More specifically, a within-subjects research design was applied (see Fig. 1) in which participants were asked to randomly evaluate a set of two pictures with a caption with text and a face emoji, two pictures with a caption with text and a non-face emoji, and two pictures with a caption with text only. The images were selected in a way that they do not show landmarks or people and mix indoor and outdoor shots.

The emoji were selected based on “The Most Frequent Emoji” list in 2019 [29], with the chosen ones being 🤔 🤩 for face emoji and ❤️ 🗺️ 🏠 for non-face emoji. Under each Instagram post, a list of questions were asked to assess participants’ attitudes, travel intention, and feeling (e.g., joy, interest, and contentment) towards the post. They were also asked to rate their perception of the picture and reactions to the post (i.e., like, share, and comment) based on a 6-point Likert scale to avoid the central tendency bias.

Participants were recruited via email and personal Instagram accounts using a non-probability and purposive sampling technique. The inclusion criterion were adult participants over 18 years old as they are legally entitled to purchase tourism products and services on their own. To ensure that participants were familiar with the nature of Instagram, individuals without an active Instagram account were not considered. In this way, lurkers were excluded. Altogether, the sample ultimately consisted of 182 respondents.

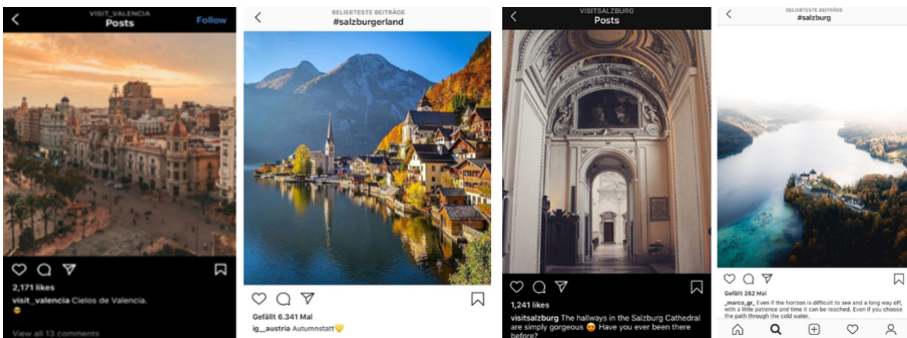


Fig. 1. Example of Instagram posts used in the survey.

4 Results

4.1 Demographic Profile of Respondents

Overall, as presented in Table 1, the majority of participants were female (75.3%) and skewed toward the younger population, aged between 18 and 29 (89%). In addition, 52.2% of participants agreed that they use Instagram to upload pictures and stories, while 47.8% only check the feed. The majority (61.5%) used Instagram several times a day.

Table 1. Demographic information (n = 182).

<i>Gender</i>		<i>Activeness</i>	
Male	24.7%	To upload pictures and stories	52.2%
Female	75.3%	To check the feed	47.8%
<i>Age</i>		<i>Frequency</i>	
18–23	46.7%	Multiple times per hour	16.5%
24–29	42.3%	Several times per day	61.5%
30–35	8.8%	One to two times per day	13.2%
36 or above	2.2%	Three to seven times per week	3.3%
		One to two times per week	5.5%

4.2 The Influence of Emoji on Emotion, Travel Intention, and Engagement

A non-parametric ANOVA Friedman test was chosen to determine the difference between participants' emotion when seeing Instagram posts with face emoji, non-face emoji, and no emoji at all. The result suggested a statistically significant difference between the levels of emotion. The Dunn-Bonferroni post hoc test (Table 2) showed that, even when comparing in pairs, the levels of emotion towards the three types of posts were all significantly different. To be more specific, the post with positive face emoji created the most positive emotions, while the post with non-face emoji provoked the least positive emotion. Hence, H1 can be accepted.

Likewise, the results indicated a statistically significant difference between the travel intention generated from the three types of posts (Table 2). Looking at the Dunn-Bonferroni test outcome, travel intention towards the posts with face emoji and no emoji was found to be statistically significant. Yet, there was no statistically significant difference when comparing travel intention towards the posts with non-face emoji and no emoji. Moreover, based on the mean ranks, the post with face emoji showed the highest mean value regarding travel intention. Thus, H2 is only partially supported since face emoji positively influenced travel intention while the appearance of non-face emoji showed no statistical difference regarding travel intention compared to Instagram posts with no emoji involved.

Concerning Instagram users' engagement, the Friedman test revealed a statistically significant difference for "like", "comment", and "share" when users saw posts with face emoji, non-face emoji, and no emoji at all. Turning to the results of the post-hoc

test, a statistically significant difference could be found between the intention to “like” a post with face-emoji and with non-face emoji; people were most likely to like a post with face emoji, followed by no emoji and non-face emoji in the caption. However, the post hoc test presented no significant difference when comparing participants’ commenting and sharing behaviour in pairs. The results indicated that the presence of face emoji and non-face emoji neither encouraged users to comment nor to share the post when compared to no emoji at all. Thus, hypothesis 3 must be rejected. Yet, based on the mean rank, it showed that people do indeed tend to comment and share posts with face-emoji the most, followed by posts with non-face emoji and no emoji at all.

Table 2. Result of Friedman and Dunn-Bonferroni tests.

Constructs	Friedman tests			Dunn-Bonferroni test	
	Chi-square	Asymp. Sig.	Mean rank	Pairs	Sig.
<i>Emotion</i>	63	.000			
Face emoji			1.58	Face emoji & Non-face emoji	.000
Non-face emoji			2.38	Face emoji & No emoji	.000
No emoji			2.04	No emoji & Non-face emoji	.005
<i>Travel intention</i>	34.8	.000			
Face emoji			1.67	Face emoji & Non-face emoji	.000
Non-face emoji			2.20	Face emoji & No emoji	.000
No emoji			2.13	No emoji & Non-face emoji	1.000
<i>Like</i>	41.6	.000			
Face emoji			1.66	Face emoji & Non-face emoji	.000
Non-face emoji			2.25	Face emoji & No emoji	.000
No emoji			2.09	No emoji & Non-face emoji	.406
<i>Comment</i>	11.9	.000			
Face emoji			1.86	Face emoji & Non-face emoji	.237
Non-face emoji			2.04	Face emoji & No emoji	.073
No emoji			2.10	No emoji & Non-face emoji	1.000
<i>Share</i>	11.4	0.003			
Face emoji			1.85	Face emoji & Non-face emoji	.101
Non-face emoji			2.07	Face emoji & No emoji	.083
No emoji			2.08	No emoji & Non-face emoji	1.000

4.3 Factors Influencing Travel Intention

Finally, in addition to the effect of emoji, Table 3 presents other external factors in a post that may influence one’s travel intention. On the whole, the findings concluded that bright colours and saturated chroma (“*the picture is beautiful*”) were the most compelling factor, followed by the caption of a post (“*the caption of the post is interesting*”). Similarly, when looking at posts with face emoji, brightness and chroma as well as the caption were also found to be influential factors.

Table 3. Instagram post factors influencing travel intention.

	Number of likes and comments	Brightness & chroma	Trust towards account	Caption of the post
Selected (times)	21	496	95	210
Face emoji		198		48
Non-face emoji		130		42
No emoji		165		43

5 Discussion

Essentially, emoji add a positive meaning to the message (caption) [5], which, in turn, positively influences one's perception and instills a positive impression [30]. This study supports the appearance of (positive) face emoji in tourism-related Instagram posts promoting more positive emotions than non-face emoji. However, the result regarding the levels of emotions between posts with non-face emoji and without any emoji is not coherent with earlier literature claiming that non-face emoji also adds positive emotion to a post [5].

Meanwhile, face emoji in an Instagram post was also found to trigger one's intention to travel to a destination. This finding is supported by recent literature, suggesting that the presence of emoji on social media contributes to business development since it brings about a more favourable impression for the brand [11]. Subsequently, an increase in customers' willingness to purchase due to the inclusion of emoji echoes the context of buying hedonic products [8]. Thus, it can be concluded that the influence of positive face emoji on purchase intention also applies to destination marketing on Instagram. Face emoji create positive emotions for Instagram users, leading to an increase of their desire to travel; however, it is worth mentioning that not all emoji have the same effect. For instance, using non-face emoji in tourism-related Instagram posts generates a non-significant or less positive result than when no emoji is used. With regards to user engagement, users' liking, commenting, and sharing behaviours on Instagram have been recognised as crucial factors in promoting a destination [2]. In the same vein, this study's findings disclose that posts with positive face emoji attract the most "likes". This is consistent with the aforementioned results in which using positive emoji tends to generate the most positive emotion (e.g., joy, interest, and contentment), thereby obtaining the highest number of "likes".

On the other hand, since commenting requires more effort than clicking the "like" button, the more comments a post receives responds to a more profound level of user engagement [2]. When it comes to sharing, it also takes more time to consider sharing a post from DMOs since it reveals one's interest(s) to their friends, family, and other account followers [31]. This content can, in turn, influence other people's decision about a particular destination at a later stage [32]. Thus, the lack of significant difference regarding the likelihood that participants would comment or share the three

types of posts shows that it is challenging to encourage Instagram users to comment or share Instagram posts posted by a DMO, despite the presence of emoji in the caption.

While the positive influence of positive face emoji on travel intention has already been examined, it is interesting to further investigate whether the desire to visit a destination is based solely on the effect of face emoji. First, in line with the literature, bright pictures with numerous colours activate a variety of senses, leading to higher popularity of a post [33]. That is, the findings suggest that the quality, colours, and brightness of pictures are also influential when it comes to travel intention. This result can also be explained through another recent study [34], stating that the brightness and colours of a picture affect viewers' emotion. Nevertheless, different from previous literature, where a post with a high number of likes and shares on Facebook can lead to higher purchase intention [35], our findings imply that the same notion may not be applicable to Instagram in the context of destination marketing. Regardless, all in all, the results support a compounding positive effect when face emoji is embedded in a caption along with "beautiful pictures" consisting of bright colours and chroma.

6 Conclusion

Until now, research on Instagram emoji has been limited and primarily focused on how emoji inserted in captions can influence post popularity [36]. Other researchers have mainly explored the impact of emoji in the context of promoting hedonic products [8, 9, 28]. This research thus adds knowledge to the existing body of literature related to semiotics and tourism. By connecting the effect of emoji to the domain of tourism marketing, this research reinforces that emoji may not only prompt a more positive impression towards a brand but also towards a place. Moreover, evidence revealed that, in the case of tourism marketing on Instagram, non-face emoji in captions may not bring about the same desired effect in generating positive marketing outcomes. This sheds light on a different perspective compared to existing research on how non-face emoji can also bring positive emotion when used in instant messaging [5]. In essence, this study contributes to the emerging field of marketing communications and semiotics in tourism research by identifying whether specific types of emoji (face emoji and non-face emoji) in tourism-related Instagram posts influence an individual's attention and behaviour.

The findings also offer numerous implications for destination marketers concerning emoji usage in digital marketing communications. Throughout this study, posts with positive emoji have performed better across all categories. Thus, marketers are advised to include emoji in their rhetoric strategy for social media marketing as it facilitates effective communication with potential travelers. Especially the usage of positive face emoji on Instagram can be beneficial for increasing positive impressions and feelings towards the promoted destination. However, destination marketers should also consider that different emoji serve different purposes. Since the findings show that the positive effect created by face emoji is associated with a higher intention of travel behaviour, it is advisable that for promotional posts aimed at increasing travel intention, preference should be given to positive face emoji over non-face emoji in order to guarantee more interactive and appealing content for DMOs and marketers. Furthermore, a picture's

quality, including brightness and chroma, is another essential factor that marketers should pay attention to [2]. To conclude, in order to make the best out of an Instagram post, it is advised to include positive face emoji in the caption and high-quality pictures with bright colours.

Nonetheless, there are several limitations to this study that should be highlighted. First, the sample of the participants was unbalanced, with the majority being females. The sampling technique also resulted in an age skew. Even though a selection of images was utilized for this study, the biggest limitation lies in the fact that it is hard to control other stimuli and post elements. Moreover, considering the number of social media platforms available to date, the findings of this study are limited due to the focus placed on Instagram users.

For future research, scholars are advised to look at other types of hedonic advertising products. It is also recommended to investigate how different settings, advertisements, placements, and number of emoji influence tourists' online behaviour. Similarly, exploring which type of information source is more powerful in eliciting travel intention could be of interest for future research. Furthermore, scholars could study whether emojis can influence interest in information intensification. Future research could also zoom in on other social media platforms to investigate whether the same effects hold true regarding consumer behaviour and advertisement perceptions. Another interesting perspective for future research would be the comparison of emoji usage across different social media platforms. Finally, adding more face emoji and non-face emoji would additionally be a valuable direction to offer deeper insights.

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Destinations



Navigation by Revealing Trade-offs for Content-Based Recommendations

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Abstract. Conversational recommender systems have been introduced to provide users the opportunity to give feedback on items in a turn-based dialog until a final recommendation is accepted. Tourism is a complex domain for recommender systems because of high cost of recommending a wrong item and often relatively few ratings to learn user preferences. In a scenario such as recommending a city to visit, conversational content-based recommendation may be advantageous, since users often struggle to specify their preferences without concrete examples. However, critiquing item features comes with challenges. Users might request item characteristics during recommendation that do not exist in reality, for example demanding very high item quality for a very low price. To tackle this problem, we present a novel conversational user interface which focuses on revealing the trade-offs of choosing one item over another. The recommendations are driven by a utility function that assesses the user's preference toward item features while learning the importance of the features to the user. This enables the system to guide the recommendation through the search space faster and accurately over prolonged interaction. We evaluated the system in an online study with 600 participants and find that our proposed paradigm leads to improved perceived accuracy and fewer conversational cycles compared to unit critiquing.

1 Introduction

Nowadays, the algorithmic side of (RSs) research has reached an impressive maturity, such that it has become virtually impossible to tell which algorithms are objectively the best [1]. However, this improvement primarily applies to traditional RSs domains, such as e-commerce, movies, and to some extent music. For recommendations in complex domains, such as tourism, the algorithmic advances of the earlier decades are of lesser value. This is because there are insufficient ratings available, the items are not so well defined in terms of their scope, and it has also been shown that users demonstrate different decision making behavior compared to purchasing physical products [2]. These challenges necessitate employing sophisticated preference elicitation strategies, and instead of collaborative filtering algorithms, recommendations are often computed with a content-based or knowledge-based paradigm. Given that traveling is a relatively rare, emotional, and high-stakes decision making scenario, RSs should provide users

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J. L. Stienmetz et al. (Eds.): ENTER 2022, *Information and Communication Technologies in Tourism 2022*, pp. 149–161, 2022.

https://doi.org/10.1007/978-3-030-94751-4_14

with the opportunity to familiarize themselves with the items in the domain and refine their initial preferences, since users often struggle to declare their true preferences [3]. For instance, recommending which city to travel, is a very good fit for the conversational, content-based recommendation paradigm, since there are no ratings available, despite the existence of several data sets [4, Table 2].

Conversational RSs allow a directed search through the item space using some kind of dialog between the system and user [5]. Early approaches, such as FindMe [6], allow users to critique certain aspects of suggested items, whereas more sophisticated approaches allow for compound critiques [7]. Based on the observation that critiques with concrete examples can be useful [8], we are astonished that not much attention has been paid to informing users about the trade-offs involved in their critiquing choices. For example, many users would love to do a dream vacation to a buzzing city with outstanding cultural attractions, great food, a buzzy nightlife scene, favorable climate, at an affordable price tag. In reality, the combination of such features might be an empty set, thus, requiring compromising between conflicting preferences.

In this paper, we present a novel concept to navigate the item space that we call “*Navigation by Revealing Trade-offs*.” The motivation for this combination of a novel user interface and a corresponding recommendation algorithm stems from the observation that conversational RSs tend to neglect informing their users about the trade-off involved in their critiquing choices.

After surveying the related work in Sect. 2, we present the user interface in Sect. 3, and describe the recommendation algorithms in Sect. 4. We choose the destination recommendation domain, as there are suitable data sets available and it inherently requires to make trade-offs between certain aspects of the trip. The experimental setup of a large-scale user study with 600 participants is described in Sect. 5 and we present the results in Sect. 6. Finally, we conclude our findings and point out future work in Sect. 7.

2 Related Work

In this work, our application domain is recommending cities for tourist destinations. As opposed to the recommendation of hotels or point of interests [9], cities as items have no meaningful ratings, thus, the user profile and items need to be matched based on elicited preferences and features of the items. To improve the user modeling, Neidhardt et al. [10] proposed a factor analysis for tourist roles and personality traits to reveal seven tourist behavioral patterns. The authors used a set of travel-related pictures, which were assigned to each of the seven factors by experts. Since the destinations were also characterized in the feature space of the Seven Factor model [11], they could perform content-based filtering for destination recommendation. Herzog and Wörndl [12] proposed another travel RS where travel plans of multiple destinations satisfy user constraints such as budget and duration. The user modeling was done by binary indications of interest, i.e., check boxes, and the items were characterized using expert opinions and literature. Such expert-driven models are quite costly, thus, automated

approaches are preferable to scale the item characterization. Prior approaches using mainly location-based social network (LBSN) data have been successfully employed in point-of interest recommendation [13] or to characterize cities [14]. The previously proposed city characterization approach [14] is based on the distribution of its venues, where a higher amount of venue relative to the city size leads to a higher scoring. The corresponding user study also suggested that unit critiquing is a fruitful approach in the destination recommendation domain. In this work, we re-use the prototype¹ and domain model of CityRec [14] to build a conversational RS.

Critiquing is a popular approach of eliciting and refining user preferences in a conversational manner. It is usually associated with content-based filtering, although there are some research incorporating collaborative approaches [15] or even unstructured item descriptions [16]. One of the early systems, FindMe [6] introduced the concept of unit critiquing that can be seen as the start of conversational exploration of the search space in RSs research. The static unit critiquing was quite successful in several domains [6, 17], but there is opportunity to perform a smarter exploration of the item space [18]. For example, McCarthy et al. [7] proposed dynamic critiquing, to show how compound critiques can be generated dynamically, cycle-by-cycle by mining the feature patterns of the remaining products.

The evolution of dynamic compound critiques is the multi-attribute utility theory (MAUT) [19], which introduced a utility function to rank a list of multi-attribute products. Once the user selects a critique, the corresponding product is set as the current preference product in the user model and a new set of critiques is generated using a utility function. The MAUT was successfully evaluated against dynamic critiquing [7] thereby reducing the number of critiquing cycles. Chen et al. extended the MAUT-based approach and called it “preference-based organization interfaces” [20]. In their approach, the authors organized all potential critiques in a trade-off vector showing whether the features were compromised or improved in comparison to the current recommendation. That enabled them to determine useful compound critiques and successfully evaluate it using a computer configuration data set. However, we feel that such an approach is more suited for products with clear specifications, since in tourism, relative differences between the features values of items are of higher importance.

One major issue with critiquing is the divergence of the intended direction of exploration. McGinty et al. [21] studied selection strategies for recommending items in critiquing. Their Adaptive Selection approach resulted in a reduction in critiquing cycles and they could prove that their critiquing-based approaches would converge faster than preference-based approaches. Another important insight of their work was that the user should not lose the progress, i.e., the previous recommendation should be included in the upcoming cycle.

Based on these observations, we introduce a paradigm to navigate the search space that we call “*Navigation by Revealing Trade-offs*.” We propose a user interface element that visualizes the trade-offs involved in choosing one item instead of

¹ <https://github.com/myftija/cityrec-prototype>.

another in a less technical way than the preference-based organization interfaces by Chen and Pu [20]. Distinctively, our proposed interface gives the user an indication of the search space, i.e., where the current item’s feature are located within the whole feature space, which was not given in the dynamic and compound critiquing approaches [7, 22]. Furthermore, we used a utility function that determines the proposed items, aimed to resolve the “*wishful-thinking problem*” of users requesting item characteristics from the RS that do not exist in reality.

3 A User Interface Concept for Revealing Trade-Offs

3.1 Domain Model

The pure content-based paradigm requires each item to be characterized along the same features to compute recommendations. In our case, we used an available data set of already characterized 180 cities all over the world [14]. This dataset comes with a score for each city in the categories of “Food”, “Nightlife”, “Arts & entertainment”, “Outdoor and recreation”, “Cost of living”, “Shops and services”, “Average temperature”, “Average precipitation”, and “Venue count”. The domain of traveling successfully motivates our approach, since these features are natural in competition, i.e., a larger city with abundant cultural scene usually has higher cost of living, or, conversely, the nightlife options might be limited in small cities.

3.2 User Interaction

The user interaction through a web browser² goes through three major steps:

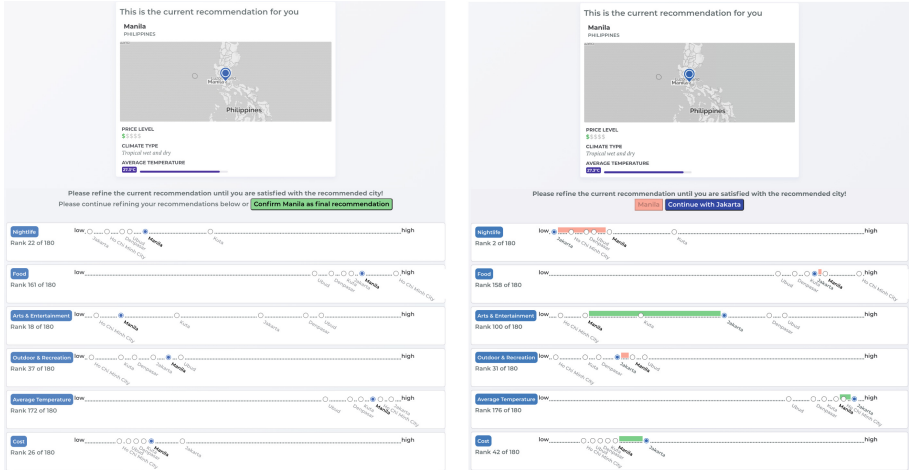
- Step (1): An initial user *Preference Elicitation Page*, where the system learns general user preferences,
- Step (2): *Conversational Refining* of the recommendations, where the user can refine preferences and learn about the trade-offs in choosing an alternative destination, and
- Step (3): *Final Recommendation Page*, where the user is shown the result.

The contribution of this paper focuses on Step (2), the *Conversational Refining*. However, this key step must be seen in the context of the whole interaction design, which we now present step-by-step.

Initial Preference Elicitation. Before the user can start refining, an initial item needs to be determined. Ideally, the system would already have an established user profile based, e.g., through previous interactions. As we have no prior information about the user, we used a previously proposed approach to present the user with an initial seed of destinations where the user can select 3–5 [14]. This seed comprises of randomly selected candidates of various clusters. By this,

² The system is available under <http://conversational-cityrec.cm.in.tum.de>.

the diversity of the sample is warranted, as the user is presented with a representative set of items to choose from. Also, this method is quite fitting for the domain and the initial set of selected cities can directly serve as input for the utility functions of Step (2). We do not aim to evaluate this method from literature [14], as we used it in the same way in all experimental conditions.



(a) Preference Refining Page. This is shown to the user at the beginning of each conversational cycle. The current city is marked bold, and five alternatives are displayed on the spectrum of each feature.

(b) Trade-off Visualization. The green and red shades indicate the trade-off involved should the user choose Jakarta instead of Manila. The user explores various alternatives before continuing.

Fig. 1. User interface of navigation by revealing trade-offs. (Color figure online)

Navigation by Revealing Trade-Offs. Figure 1 shows the interface element for our conversational “Navigation by Revealing Trade-offs” approach. At the top of the page, the currently recommended city is shown; below is the novel user interface. This component shows the current city along with five other cities recommended based on the utility function. For each feature the five candidate items are shown in an ordered list from low to high depending on the score. Users can select an item to see the feature value differences in all feature spaces compared to the currently recommended city. An increase in feature value is indicated using a green shade, a decrease is shown in red.

If the user is satisfied with the current recommendation, the user can choose not to continue with refining, but to confirm the current recommendation. In this case, the user is forwarded to the final recommendation page.

Final Recommendation Page. This page shows the final recommendation to the user along with a survey to measure the performance of the recommendation approaches. The final recommended city is shown with details such as the city name, country and feature values.

Baseline System. To evaluate our proposed approach, we used a modified version of the “CityRec” destination RS [14], where one could critique features of several destinations to refine them by buttons indicating “much lower”, “lower”, “just right”, “higher”, “much higher”. As the source code of this system was readily available, we used it as foundation for our experiments. We re-used the system architecture and the front-end for the initial Preference Elicitation page Step (1), and the Final Recommendation page in Step (3). However, notable differences in the user interface are that we did not use photos of cities to avoid bias due to the selection of images. Furthermore, we re-worked the unit critiquing algorithm to make it more comparable with our system. The critiques can be selected below using the same labels and logic for the adjustment as in the original approach [14], although, it is possible to adjust all features at once and the user is not limited in the number of critiquing cycles, thus, can refine the items until she is satisfied with the recommendation.

4 Algorithms

Having described the user interface elements, this section presents the machinery that computes the recommendation and, therefore, directs the path the user takes through the search space. To enable reproducibility, the system and the study data set are available under an open-source license as a Dockerized software project on Github.³

4.1 Cold-Start User Modeling

Recall that in Step (1) of the system the initial input comprises a set of 3–5 items that are characterized along the aforementioned eight features. This already allows us to compute an initial user model by simply representing the user model as an eight dimensional vector with the mean feature values of the initial cities. Nevertheless, this method is quite simple and could be interchanged with any other strategy if more information about the user’s preferences is available. Since this is not the case in our evaluation prototype, we used this simple method from literature.

4.2 Candidate Selection Strategy

The next step in the user interface requires finding candidates of which the user can choose one to progress the search for suitable recommendations. In typical content-based recommendation style, one could naively use any similarity metric, such as the Euclidean Distance on normalized feature values to compute some cities similar to the current user model. The top items can then be shown as alternatives to the user. One issue with this strategy is, that it does not consider the user preference variations during the refinement. Furthermore,

³ <https://github.com/LinusDietz/conversational-cityrec>.

the convergence of the algorithm will be poor, since it presents the user with similar items to the current recommendation, thus, the user will not have the option to select a city with a significantly different feature value. Instead, we propose the ‘‘Variance Bi-distribution’’ utility function (Eq. 3) whose value is defined by two normal distributions per feature, each representing an increase of decrease of feature value. The two normal distributions are given as $\sim N(\mu_1, \sigma^2)$ and $\sim N(\mu_2, \sigma^2)$, where μ_1 and μ_2 define the position of the bell curves on the normalized value range of the feature, and σ defines the shape of the curve.

The distance between the currently selected reference item, ref_k and the respective bell curves are computed by adding or subtracting an offset computed in Eq. 1. This offset is the standard deviation of each feature value f of all previous items in the conversational history H by the number of previous conversational iterations n . The numerator of the offset needs to be moderated by a constant C_m , which we empirically determine for the dataset in Sect. 5.1. To summarize, the mean of the normal distribution is farther from the current user model if the variance of a feature is higher.

$$\mu_1 = ref_k - \frac{\sqrt{Var(f \in H)} \cdot C_m}{n} \quad \mu_2 = ref_k + \frac{\sqrt{Var(f \in H)} \cdot C_m}{n} \quad (1)$$

The second parameter of the normal distributions, σ , is computed in a similar way (cf. Eq. 2). This has the effect that with a higher variance, we obtain a flatter distribution and, thus, a lower impact of this feature on the utility score.

$$\sigma = \frac{\sqrt{Var(f \in H)} \cdot C_s}{n} \quad (2)$$

The intuition behind this is that if the user has a strong preference regarding a feature having a certain value and consistently picks cities with a high temperature, the system is quite certain of this user’s preference toward temperature and, thus, should put high weight to this feature. Conversely, if a user has selected cities with another feature having both low and high values resulting in a high variance, it can be seen as a signal that the user has no specific preferences toward the feature as it is not of importance to the user. Thus, the impact of such a high-variance feature should be smaller than a low-variance feature. Over time, we increase this effect by dividing through the number of previous iterations n . This further helps the algorithm converge.

The maximum score of the two distribution functions for a given item feature is taken as the utility score of the respective feature. We then compute the overall utility of each item as the sum of all feature scores of the utility function.

$$utility = \sum_{f \in F} s(f) \quad (3)$$

Convergence Behavior. The effect of this utility function is that it balances exploration in the beginning and fine-tuning in later stages of the search. If

a feature variance is high and the number of iterations small model adjusts μ_1 and μ_2 further away from the reference point, with a higher σ resulting in a flatter distribution of the feature’s utility function. In this case, items far away in the feature space also would get higher utility scores, ensuring users are presented with cities more spread across the feature space. With a larger number of iterations, the user preferences for particular features are converging, i.e., the user will be presented with an increasingly narrower band of feature values to refine the preferences. As a result, μ_1 and μ_2 are closer to the feature value of the current recommended item, with a smaller σ , such that items with similar feature values have a substantially higher utility score than the cities with dissimilar feature values. However, if the variance of a feature is still high, the curve will stay quite flat giving this feature less weight, thus, recognizing that the user is rather indifferent toward this feature. This convergence behavior can be observed in Fig. 1. After some iterations, the algorithm determined that the user has a clear preference for high scores in the food and temperature aspects, and low scores in nightlife, outdoor & recreation, and cost. Thus, the refining candidates are quite close by each other, whereas they are spread along the spectrum in the arts & entertainment spectrum.

Elimination of Candidates. To further improve the convergence, we propose a variant that eliminates items whose feature values have been refined in a contrary way. The reasoning behind this elimination of candidates is that if a user refines a feature of an item, it becomes an explicit information that the value of the feature is unsatisfactory and should take only values toward the direction of the refinement. Thus, we can compute candidates just as before, however, items that have a lower (or higher) value than the original item ref_k are removed from the search space. For example, if the user refines the value of *Arts & Entertainment* of Manila in Fig. 1b in favor of Jakarta, the system will assume that all cities that have a lower value in *Arts & Entertainment* than Manila should be excluded from future suggestions.

5 User-Centric Evaluation

For the evaluation of the system, we chose a between-subject design to perform a large-scale online user study. First, we need to determine the constants of the Variance Bi-distribution Model for the current data set.

5.1 Instantiation for the Domain

During the development of the system, we noticed that using only the standard deviation divided by the number of iterations in Eq. 1 and 2, μ_1 and μ_2 would be too extreme, which will result in items recommended that are too far away from the current city. To moderate this effect, the constants C_m and C_s of Eqs. 1 and 2 were introduced for the Variance Bi-distribution Model. This step ensures an efficient navigation should be seen as an adjustment of the algorithmic properties to the data set at hand, as different domains can have different characteristics, i.e., a different number of items.

Determining Constants. The values of C_m and C_s can be determined in an offline setting using a simulation. This is because by systematically altering the values of C_m and C_s , we can see how quickly the algorithms converge from an initial setting after Step (1) to a desired item while making *consistent decisions*. In the context of the simulation, we define consistent decisions by choosing the item that is nearest to the target item using the distance metric of the RS. Thus, the simulator chooses candidates toward the target recommendation, just as a real user would, until that recommendation is part of the set of candidate items. For the cities, we used user interaction data to perform a realistic simulation [14]. The data set of 63 user sessions contained the initial city selections by the user and the final recommendation the user had selected. Having historic data for the simulation, we can now train the parameters using relevant scenarios, as opposed to the randomized or exhaustive simulation strategies.

Result. Regarding parameters of the simulation, we varied C_m from 2 to 6, and C_s from 4 to 20, both in 0.5 intervals. For each these parameters' configuration, we recorded the session length of the 63 user sessions of the data set. The result of the simulation reveals a global optimum at $C_m = 3$ and $C_s = 8$.

5.2 Online User Study

We conducted the user study using the online experimentation platform Prolific.⁴ We used a between-subject design and invited participants of the platform who had indicated “Traveling” as one of their hobbies. Only one independent variable was randomly assigned to the users, i.e., the critiquing system in Step (2). The three options⁵ were the baseline unit critiquing system and the trade-offs UI using the Variance Bi-distribution Model without and with the elimination variant. As dependent variables, we used metrics about the user interaction and a subset of the ResQue Questionnaire (cf. Table 1), which is a validated, user-centric evaluation framework for RSs [23], where users indicate their agreement with each statement on a Five-point Likert Scale.

6 Results

The user study was conducted in December 2020 with 600 participants. Out of the 600 participants, we excluded 181 responses, which failed an attention check, showed very low interaction with the system, i.e., an interaction of less than 35s, and did not use a desktop browser as instructed. This left us with 419 valid submissions (59.9% female, 39.1% male, 1% other) from 42 different countries. The users predominantly came from Europe, due to the time zone when the survey was initiated. The age distribution was 20.8% of below 21 year olds, 55.6% were 21–30, 13.1% were 31–40, 6.2% were 41–50, 3.1% were 51–60,

⁴ <https://prolific.co/>.

⁵ The variants can be tested under <http://conversational-cityrec.cm.in.tum.de>.

Table 1. Hypothesis testing of the dependent variables between the baseline unit critiquing and the two variants of the Trade-off refinement. The mean values of the survey items coded as integers from 1 to 5 are for informative purposes only.

Variable	Baseline	Trade-offs			Trade-offs w. Elim.		
	Mean	Mean	p	w	Mean	p	w
(Q1) Interest match	3.81	4.12	0.002	7378	4.07	0.005	8727.5
(Q2) Better than friend	3.26	3.25	0.939	9053.5	3.26	0.749	10212.5
(Q3) Cities are familiar	4.09	4.14	0.605	8794.5	4.22	0.187	9572
(Q4) Rec. cities are attractive	4.06	4.18	0.314	8524	4.05	0.538	10816.5
(Q5) Discover new Cities	3.66	3.76	0.42	8608	3.71	0.711	10179
(Q6) Adequate layout	3.78	3.45	0.003	10917.5	3.56	0.044	11765
(Q7) Easy to modify preferences	4.14	3.59	<0.001	11846.5	3.66	<0.001	13235
(Q8) Became familiar quickly	4.19	3.67	<0.001	11681	3.60	<0.001	14125
(Q9) Influenced selection	3.44	3.64	0.043	9104.5	3.63	0.044	9104.5
(Q10) Overall satisfaction	3.82	3.84	0.743	8910.5	3.77	0.534	10824.5
Number of conversational cycles	4.44	2.38	<0.001	–	2.46	<0.001	–

and 1.2% were 61 years or older. With respect to the independent variables, 140 were assigned to the baseline unit critiquing, 130 to the Trade-off Refinement, and 149 to the Elimination Variant.

Quantitative Analysis. Regarding the number of conversational cycles, we observed that all sessions using the Trade-off interface were finished by the users within 6 cycles, with a mean value of 2.38/2.46, whereas the baseline unit critiquing interface needed more cycles with a mean value of 4.44 cycles. Thus, the Trade-off UI reduced the iterations by of 46.4% (44.6% in the elimination variant), which is a significant reduction when testing the hypothesis using a t-test (cf. last row of Table 1). Note that the user interface was set up in a way, so that at least one interaction cycle had to be performed, before the users could accept the current recommendation as final result.

For the survey items, we computed cross-wise Wilcoxon rank sum tests for independent populations using the three independent variables. The null hypotheses were that there is no difference in the median of the responses. Since we could not find significant differences between the Trade-off refining and Trade-off refining with the Elimination variant, we only tabulated the outcomes in Table 1 with respect to the baseline unit critiquing. Besides the analysis of the number of conversational cycles, we could refute the null hypothesis in favor of the Trade-off Variants in (Q1) and (Q9), while the baseline received better responses in (Q6), (Q7), and (Q8). This mixed result can be summarized in a way, that the Trade-off interface had superior perceived recommendation accuracy at the expense of the users' perceived ease of use.

Discussion. The superior perceived accuracy measured by (Q1) at about 45% fewer conversational cycles, underlines the merit of our proposed user interface. However, the subjects rated the usability-related metrics of the unit critiquing system higher (Q6–Q8). We suspect that this is due to that unit critiquing has already been employed in various RSs, so it is quite possible that many users were already familiar with this concept. Dealing with a new refinement interface involving reasoning about trade-offs certainly involves more cognitive effort and, thus, might need more familiarization (Q8) than only one session. The study was designed in a way that users could only submit the survey once and we did not familiarize the users with the system before their session to avoid learning effects. The significant difference in (Q9) “This recommender system influenced my selection of cities.” in favor of the Trade-off interface is likely an artifact of the comparative lengthy search in the unit critiquing, since both values are in the center of the Likert Scale. Interestingly, there were no significant differences in any dependent variables between the Trade-off refinement and its Elimination variant. We attribute this to the low number of conversational cycles that were needed to come up with a satisfactory result. In the given data set of 180 cities, the elimination of candidates was probably not necessary, as the utility function was able to recommend attractive items after two or three cycles. Nevertheless, we are confident that the concept of elimination of parts of the search space based on the users’ choices could be useful and we plan to analyze the merit of the Elimination variant with larger item sets of over 1000 items.

7 Conclusions

The success of modern recommender systems depends on the seamless integration of algorithms and user interface elements. Given that existing critiquing systems have often neglected to explicitly inform users about the trade-offs of the critiquing actions, we developed the Navigation by Revealing Trade-offs system, which integrates a user interface concept with a utility function to compute refinement candidates. The evaluation shows that perceived accuracy is better than the unit critiquing baseline at similar reductions in the number of conversational cycles as other advanced critiquing approaches have demonstrated [19, 21].

Based on this promising result, further analyses of this refinement paradigm should follow with larger item sets to analyze the merits of the Elimination variant. Since our study followed a between-subject design, we also can not answer whether the higher ratings for the interface adequacy are due to that unit critiquing being conceptually easier to understand or users are more familiar with such a long-established paradigm. Therefore, the usability and learnability should be investigated in a usability analysis in a controlled laboratory setting.

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Multisensory VR Experiences in Destination Management

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Abstract. The rapid development of information and communication technologies (ICTs) and the high level of consumer acceptance have made it increasingly complex to retain loyal customers. Virtual Reality (VR) has become a solution that allows tourism providers to design technology-enhanced experiences along the entire customer journey. While most VR offers focus on pre-travel experiences, the potential of VR in the post-travel phase is still little explored. Considering that multisensory tourism experiences contribute to memory formation, the multisensory extension of VR (4D VR) in post-travel experiences is of interest. Thus, through a quantitative field experiment, this study aims to detect what effect the stimulation of different senses during the use of VR has on the overall experience and how this influences the brand relationship quality. The results revealed elevated levels of technology acceptance, which consequently enhances the traveler's overall VR experience. The multisensory component positively affects one realm of an experience in the area of escapism and thus correlates with the overall experience. However, there is no significant difference between 3D and 4D regarding the level of brand relationship quality. The study expands the literature on 4D VR experiences and supports tourism practitioners in the implementation to strengthen the relationship between a destination and its guests.

Keywords: Multisensory virtual reality · Brand relationship quality · Experience economy

1 Introduction

Attaining and maintaining loyal customers has become a progressively complex challenge in today's market. This can be attributed to the widespread adaptation and acceptance of various ICTs, which customers engage with the brand [1]. One developing sector of technology progression is VR [2]. VR is expected to revolutionize tourism experiences by providing extensive sensory information [3] representing a source of education, entertainment, information, planning, heritage preservation and accessibility [4] and thus, improving customer experiences along all phases of the customer journey [5, 6].

The evolution of VR is based on the desire of people to escape their physical space. This aspiration is to some extent related to travel motives, such as the urge to be

temporarily able to leave one's familiar surroundings [7]. In this regard, virtual tours of destinations are becoming an increasingly popular approach for tourism marketing [3] and alter how tourism services and products are promoted and consumed [8]. The number of organizations that incorporate VR activities in their marketing is growing, although the implementation of VR is still nascent [6, 9].

Fully immersive virtual touristic experiences that trigger the user's visual and potentially other senses are enabled by isolating the user from the real world into a virtual environment through 360-degree real-life or synthetic content within a non-, semi-, or fully immersive VR system [4]. For tourism businesses, it is suggested to integrate at least two more senses in the use of VR [3, 10]. Instead of 3D VR, which is reduced to auditory and visual sensory stimuli, multisensory VR (4D VR) provides DMOs with an opportunity to present their services in a more engaging way [3, 4]. The multisensory approach in the context of sight, hearing, touch, smell and taste intensifies emotions and influences the overall VR experience. It does not only better appeal to the customer, but the combination also enriches the perceived value, encourages the actual consumer behavior and decision-making process [10].

The growing field of VR demonstrates the need for further research in the context of tourism [4]. Towards this aim, previous studies focused on the effect of VR technologies on the pre-travel and on-site phases [4, 5]. Nevertheless, the investigation of the post-travel phase is lacking [4]. The post-travel phase is however of major interest, as tourism organizations aim for elevated Brand Relation Quality (BRQ) by triggering post-experience related memory and relationship formation. To achieve a higher level of BRQ, VR experiences need to be authentic, personalized and relevant.

This study thus takes an integrated approach, to examine not only VR in the post-travel phase, but also to assess the effect of technology acceptance and a multisensory VR experience on the levels of BRQ. The following research questions have been identified:

1. How does the user's technology acceptance influence the overall VR experience?
2. How does the olfactory and haptic component influence the overall VR experience?
3. How does a multisensory VR experience in the post-travel phase affect the levels of Brand Relationship Quality towards a destination?

2 Literature Review

2.1 Experiences as Value Propositions

Over the last years, less attention has been paid to products and services, due to the significant shift from service-based to experience-based value propositions in tourism and hospitality [11]. Creating positive emotions and long-term memories has become the main focus [12]. Consumers want to be engaged in an inherently personal way and want to have a good time while enjoying memorable experiences [13]. Additionally, ICTs are nowadays an integral part in the way tourism experiences are designed and consumed [14]. While experiences are multidimensional constructs, the factors of

entertainment, education, escapist and esthetics need to be considered when designing experiences. All four realms form the “sweet spot” [15].

2.2 Technology Acceptance

The consumer’s willingness to adopt new technologies and to deal with different systems and devices that have not been used before, is crucial for the success of new applications [16]. Factors that strongly influence the acceptance of technologies have been researched across multiple ICTs and user populations [17], whereas Davis’ [18] Technology Acceptance Model (TAM) has been widely validated because of its robustness, generalizability and explanatory power by various scholars in the past [19]. The variables perceived usefulness and the perceived ease of use of a certain application comprise the user’s technology acceptance [18]. Customers with a high degree of technology acceptance immediately adapt to new products and are to know their features [20]. This leads to the following hypothesis:

H1: Participants with a higher technology acceptance have a better overall VR experience.

2.3 Multisensory VR in Tourism

Latest research in the field of VR is grounded in the human desire to escape the boundaries of the real world and experience new places by embracing the cyber world [20]. Virtual tours of destinations are becoming an increasingly popular approach in tourism marketing [3] and have altered the ways in which tourism services and products are promoted and consumed [7]. VR is often labeled as the future of tourism marketing [21]. Tourism can benefit from VR in the areas of entertainment, education, management, planning, heritage preservation [2, 22] or accessibility before, during and after travel [4], enriching the customer experience along the customer journey [5, 6]. With the possibility to rotate 360-degree around a certain angle, VR enables tourists to experience a destination before the actual consumption [3]. To echo the travel experience and review the journey after the departure, travelers can share 360-degree-videos through VR with family and friends at home. This inspires other people during their pre-trip inspiration phase [4]. It is said that VR has a stronger influence on the desire to visit a destination as other promotional materials [23], which contradicts Tussyadiah et al. [8] who emphasize that fully immersive VR experiences are less powerful than traditional travel guides.

One of the main recent developments has been the shift from 3D to 4D multisensory VR [3]. The nature of a tourism experience is intangible, yet physical and multisensory [24]. To allow an experience that is close to the real one, it is suggested to engage all five human senses [25]. It does not only better appeal to the customer, but the combination also enriches the level of immersion, perceived value, and encourages consumer behavior and decision making [10]. Multisensory VR provides DMOs with the opportunity to present their services and products in a more engaging way [3], as the multisensory approach in the context of sight, hearing, touch, smell and taste intensifies emotions linked to the overall experience [10]. Offering the user unexpected

sensory input, such as audio or a new scenery, takes the person off the cognitive track [26]. This results in the following hypothesis and sub-hypotheses:

H2: Multisensory stimuli enhance the user's overall VR experience.

H2a: Multisensory stimuli enhance the educational realm of the user's VR experience.

H2b: Multisensory stimuli enhance the entertainment realm of the user's VR experience.

H2c: Multisensory stimuli enhance the esthetic realm of the user's VR experience.

H2d: Multisensory stimuli enhance the escapist realm of the user's VR experience.

2.4 Brand Relationship Quality

An essential strategic factor in the long-term relationship between the brand and its customers, is customer retention in brand management [27]. Relationship quality itself inherits the perception of another party regarding social, cultural, economic, or political aspects [28]. To debate the importance of long-term relationships, the concept has been applied in various fields. In the tourism industry, entities are realizing the need for an in-depth understanding of the established bonds between travelers and the destination [29], because a tourist's commitment to a destination defines the competitiveness of a region, which is considered as a pillar of brand quality [30]. Marketing-based VR could play a critical role in facilitating a brand's performance, whereas negatively perceived VR could diminish the brand relationship [30].

There are multiple constructs and factors measuring BRQ [32]. As BRQ evolves through a meaningful interaction between a brand and its consumers, actions shape the quality of the relationships by fostering, diluting and even dissolving them [33]. The strength of the brand relationship is discussed by six indicators, including: *"love and passion, self-connection, commitment, interdependence, intimacy and brand partner quality"* [33, p. 366].

Brand love is part of the multidimensional attachment construct, including the items passion, affection and connection [34]. Not consuming the brand for a while is experienced as "something is missing" [33]. It is not only based on passion, but also on frequency and an ongoing long-term relationship [34]. Within the facet of self-connection, the brand sends out important identity values, themes and tasks, communicating and stating an aspect of self. Commitment is the psychological or emotional attachment to a brand and its product class [33]. This develops more from the person's attitudinal rather than behavioral trait [35], preferring one product or service over another. Intimacy arises through the customer's elaborate knowledge about the company and its personal brand stories [36]. By advertising cues, such as slogans or a specific character, the personalized brand information enters the long-term memory [37]. Brand partner quality is the positive alignment of the brand towards its customers. People should feel respected, listened to, wanted and cared for, building the base for the customer's judgement about the brands performance [33]. Therefore, the following hypothesis and sub-hypothesis have been formed:

H3: A 4D VR experience has a stronger influence on the levels of BRQ than a 3D experience.

H3a: A multisensory VR experience in the post-travel phase will increase the love and passion of travelers towards a destination.

H3b: A multisensory VR experience in the post-travel phase will increase the self-connection of travelers towards a destination.

H3c: A multisensory VR experience in the post-travel phase will increase the commitment of travelers towards a destination.

H3d: A multisensory VR experience in the post-travel phase will increase the interdependence of travelers towards a destination.

H3e: A multisensory VR experience in the post-travel phase will increase the intimacy of travelers towards a destination.

H3f: A multisensory VR experience in the post-travel phase will increase brand partner quality towards a destination.

2.5 Conceptual Framework

The following hypothesis model designed for this research indicates, that the overall VR experience is dependent on Pine & Gilmore's [15] four realms of an experience formed by education, entertainment, esthetic and escapist factors. The VR experience depends on the user's technology acceptance, resulting from the user's perceived usefulness and perceived ease of use [18]. The influence of the overall VR experience on the six levels of brand relationship quality concludes the construct (Fig. 1).

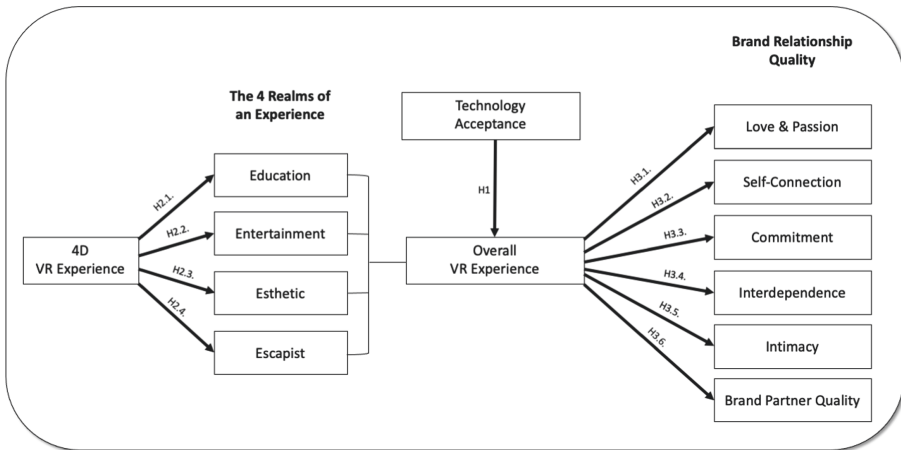


Fig. 1. Conceptual framework based on Pine & Gilmore [15], Davis [18] and Fournier [33].

3 Methodology

The study is based on an experimental research design. Laboratory experiments are commonly chosen as a methodology to explore causal knowledge in life and physical sciences but have been criticized for their lack of generalizability and realism. In contrast, field experiments are logistically more difficult, time-consuming and costly

[38]. To enable the quantitative field experiment by examining a DMO's real use of VR, the tourism destination "Wagrain-Kleinarl" has been chosen as a case study region. To expand research on the use of VR in the post-travel phase, participants of the study have been guests who spent their vacations in the destination in the past. In the research process, study participants were recruited via the destination's Facebook page which has more than 15,000 followers and Instagram channel with over 9,300 subscribers. Within one hour, the limited number of participants, willing to be part of the project, was achieved. In total, 100 guests of the destination agreed to participate in the field experiment.

All participants were randomly assigned to Group A, the experimental group, and Group B, the control group. Within the framework of a post-test-only control group design, both groups did not conduct a pre-test and underwent the same visual and auditory VR experience. The goal was to add a different intervention to only the experimental group, in this case an olfactory and haptic component to the VR experience. An online questionnaire was utilized as a measurement tool. Levitt and List [39] pointed out that the same degree of control as in laboratory experiments cannot be achieved in field-experiments. For this reason, all other factors that could influence the outcome must be controlled [40] and possible confounding variables detected [41].

For this study's research design, a prototype of a multisensory VR experience, tailored to the destination's corporate identity was sent with a package to the guests' homes. Both groups received a box, including a pair of VR cardboard glasses, detailed instructions on how to conduct the VR experience, a QR code leading to a tailored 360-degree-video hosted on YouTube and a second QR code guiding to the online survey. The VR video was shot with an Insta360 in April 2021. Within 3:18 min, the user experienced a sunrise above the destination of Wagrain-Kleinarl, a farm, a stable with two children playing in the hay, a mountain and lake scenery. In addition, the experimental group received the olfactory and haptic component of hay and herbs from the region as intervention. In the first step, the participants were instructed to sit down in a quiet place. The second step was to take the VR cardboard goggles out of the box and open the flap for the smartphone. After that, the participant scanned the QR code on the instructions, whereupon a video opened. After selecting the VR mode and turning the device to landscape, the user placed the smartphone in the goggles. Additionally, the experimental group was instructed to pick up the hay and take a deep breath. After both groups watched the same 360-degree-video in the goggles, the QR code for the online survey was scanned.

Both groups conducted the same questionnaire, measuring the user's technology acceptance in case of perceived usefulness, perceived ease of use and attitude towards using [18, 20]. This allows a better understanding of the tourist's use of the virtual environment, which in return influences travel intentions [19]. To measure the experience dimensions within the virtual environment, Pine and Gilmore's [15] four realms of an experience, i.e. entertainment, educational, escapist and esthetic, have been adopted as items. Fournier's [33] construct of BRQ explored the six factors of brand partner quality regarding the traveler's intimacy, commitment, self-connection, interdependence as well as love and passion towards the destination. The online survey was a fully standardized questionnaire, based on predominantly closed questions with suggested answers and statements to assess on a Likert scale ranking 1 "totally agree" to 5 "don't agree at all". Subsequently, the data analysis was executed by using SPSS20.

4 Results

4.1 Sample Description and Reliability Analysis

The tested sample consisted of 100 participants, whereas a response rate of 85% ($n = 85$) has been achieved. 41 of those participants belong to the experimental group and 44 to the control group. The majority of the participants were female with 65.9%. The age groups were well distributed: 34% were under 31 years old, 31.8% between 31 and 40 years and 34.1% over 40 years old. 50% of the questioned travelers were Austrians, closely followed with 40% German guests. In total, six European nations were represented. The highest education of 30% of the participants is high school, followed by Master's and Bachelor's degree. With 60% of the participants of the study are currently employees. By investigating the reliability, the stability and consistency of each constructed was evaluated. No statistical differences between the control and experimental group were identified. The dimensions of technology acceptance reached a Cronbach's Alpha from .609 to .756, the four dimensions of the overall VR experience achieved values from .627 in education and the highest value of .902 in the realm of escapist. All six dimensions of BRQ have a Cronbach's Alpha over .709.

4.2 Test of Normality and Hypotheses

With the Shapiro-Wilk and Kolmogorov-Smirnov test, the questionnaire was tested for normality. A normal distribution was present in H2, H2a, H2c and H3d. A T-Test was used to compare the two samples. For the remaining hypotheses, the U-Test according to Mann and Whitney test was generated. Regarding the hypothesis testing in Table 1, the questionnaire applied a 5-point Likert scale with 1 representing the best rating and 5 the worst, showcasing with values ≤ 2.5 the more positive answers. In the following table, the hypothesis testing is presented. With significant values from .29 to .91, H3a to H3f had to be rejected and are therefore not separately presented in the table below.

Table 1. Hypotheses testing

Hypotheses	Dep. variable	Group	M	p	Decision
H1	Technology Acceptance	3D	1,7	.000	Supported
		4D	1,5		
H2	Overall VR experience	3D	2,2	.037	Supported*
		4D	1,9		
H2a	Education	3D	2,6	.045	Supported*
		4D	2,2		
H2b	Entertainment	3D	1,8	.294	Rejected
		4D	1,8		
H2c	Esthetic	3D	2,0	.068	Rejected
		4D	1,8		
H2d	Escapism	3D	2,3	.024	Supported
		4D	1,9		
H3	BRQ	3D	1,9	.916	Rejected
		4D	1,9		

* Rejected by T-Test

4.3 Further Correlation Analysis

Examining the technological acceptance in correlation with the fact that the respondents have a VR experience, no significant correlations were found ($p = 0.096$). Thus, it can be said that technology acceptance does not depend on prior experience of using VR. A highly significant result was shown by the Kruskal Wallis test ($p = 0.002$). Accordingly, it can be said that technology acceptance is related to age. The youngest age group (>31 years) had a significantly higher technology acceptance compared to the eldest respondents (>40 years). Differences were not only apparent in age. There were also significant differences ($p = 0.036$) in technology acceptance regarding the highest level of education completed. In the middle ranks, it could be observed that those with a bachelor's degree have a significantly higher technology acceptance than those with a completed primary school education. Furthermore, the T-test showed that participants with prior experience of VR did not enjoy a more intense VR experience than those who had never experienced VR before ($p = 0.692$). Thus, the overall VR-experience was not related to whether someone had experienced VR before. The T-test which was used to evaluate whether a difference occurs with respect to the overall VR experience, indicated that there was no such difference ($p = 0.544$) regarding distractions, such as noise from a radio or TV. Upon further review, it appeared that other people in the room in fact do not make a difference on the VR experience ($p = 0.425$).

5 Discussion

Previous research stated that the success of new applications depends on the willingness of customers to adopt them [16]. In this study, the openness towards new technologies was elevated among the participants with a mean value of 1.4. Both groups indicated a relatively high technology acceptance regarding the perceived ease of use and usefulness of the VR application. With a positive correlation according to Pearson (0.602), the assertion proves to be true. People with a high technology acceptance enjoyed a greater overall VR experience. The study's findings differ from the literature, as the participants' prior experience with VR did not influence the user's degree of technology acceptance [42].

In the design of VR experiences, Hopf et al. [3] suggested, that at least two more senses should be involved in the use of VR. In this study, no major deviation between the purely audio-visual experience and the advanced experience with the haptic and olfactory components was detected. Although the means demonstrated, that 4D improves the VR experience, according to the T-Test, statistically significant differences could not be found in this data. Therefore, engaging additional senses besides visual and auditory do not enable a better overall VR experience. Reflecting deeper on the overall VR experience, a rich experience consists of all four realms [15]. Here it can be stated that the additional multisensory components allowed a greater degree of escapism compared to a 3D experience. Contradictory results were similarly obtained for education and esthetics. Solely the area of entertainment, with equal mean values and a U-Test after normal distribution showed, that the hypothesis had to be rejected.

This study also explored the effect of a multisensory experience on the levels of BRQ. Findings revealed, that with a score of 0.916, there was no significant difference between a 4D and a 3D experience, even though each level represented elevated levels. Regarding the most important aspect of BRQ, love and passion towards a brand [43], all items presented very good to good mean values. The study supports Fournier [33] by declaring, that “something is missing” when one cannot consume a brand for a certain period of time. The multisensory component did not lead to any deviations.

6 Conclusions and Implications

This study aimed to explore the effect of multisensory VR on the levels of BRQ in destination management. By considering the user’s degree of technology acceptance, this study supports prior research in agreeing to the positive contribution to the overall VR experience. The study contributes to the experience economy, stating that experiences are multidimensional. Specifically, the engagement of the senses contributes significantly to intensity and authenticity [25]. Applying the four realms of a memorable experience as a benchmark proved to be useful. It was confirmed that the haptic and olfactory components positively influence the audio-visual VR experience in the area of escapism. However, this research clearly revealed that the additional sensory stimuli do not enhance the overall VR experience in the post-travel phase, although guests did feel more immersed in the virtual world. Thus, there is no different impact on the relationship between the guest and the region when more than audio-visual senses are engaged in a virtual reality experience. One possible reason for this could be that, in general, a VR experience in the post-travel phase is very novel to customers and thus this single factor of the multisensory component does not entail a significant difference on the BRQ.

In terms of theoretical implications, this study opened a novel research area by bridging multisensory VR experiences, post-travel experiences and BRQ. The study partly contradicts previous research highlighting the importance of the implementation of additional senses in the design of VR experiences. Limitations have been discovered, since the experiment did not take place in a laboratory setting under observation, unmediated confounding variables, such as noise, other odor influences or social presence from other individuals or subjects could have influenced the results. Due to the choice of the post-test only control-group design, no pretest was conducted. For further research it is suggested to apply different objective and subjective measurement techniques, such as personal observations or post-experiment interviews to verify the results and to gain further insights into the traveler’s perception of multisensory VR in the post-travel phase. The same prototype could be tested to explore emotional arousal or booking intentions. The study provides implications for tourism providers in the design of multisensory VR applications. Herewith, the implementation of the four realms education, entertainment, esthetics and escapism is recommended. Especially in the fourth variable, the additional multisensory components allow for a stronger

immersion. Ultimately, the participant's high technology acceptance revealed that multisensory VR applications in the post-travel phase are highly appreciated by the destination's guests.

Acknowledgments. This work was supported by the Austrian Federal Ministry for Digital and Economic Affairs and the Destination Management Organization Wagrain-Kleinarl Tourism, which funded the field experiment.

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Do DMOs Promote the Right Aspects of the Destination? A Study of Instagram Photography with a Visual Classifier

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Abstract. As global travel emerges from the pandemic, pent up interest in travel will lead to consumers making their choice between global destinations. Instagram is a key source of destination inspiration. DMO marketing success on this channel relies on projecting a destination image that resonates with this target group. However, usual text-based marketing intelligence on this channel does not work as content is consumed first and foremost as a visual projection. The author has built a deep learning based visual classifier for destination image measurement from photos. In this paper, we compare projected and perceived destination images in Instagram photography for four of the most Instagrammed destinations worldwide. We find that whereas the projected destination image aligns well to the perceived image, there are specific aspects of the destinations that are of more interest to Instagrammers than reflected in the current destination marketing.

Keywords: Destination image · Visual classification · Instagram photography

1 Introduction

Instagram may be the most significant source of destination inspiration for a significant number of travel-interested Internet users, especially in the 18–34 year old age group¹. After all, 48% of Instagram users rely on the images and videos that they see on the social media platform to inform their travel decision making and 35% of users use the platform to discover new places². It is therefore not surprising that destination marketing organisations (DMOs) have expended significant effort in marketing on this channel. Instagram is a highly visual social network and therefore content marketing is focused on the use of photography and videos, more so than the text of postings. When an Instagram user consumes destination marketing content, the intention of the

¹ 62.8% of the users are aged 18–34 according to the Digital Internet Snapshot 2021 <https://datareportal.com/reports/digital-2021-global-overview-report> (last accessed on 24 March 2021).

² Rezac, J. “Instagram: The Place To Be For Travel Brands”. Available online. <https://www.mediapost.com/publications/article/263167/instagram-the-place-to-be-for-travel-brands.html> (last accessed on 28 July 2021. Requires free sign-in.).

marketer is that the visually projected image of the destination resonates with them and increases their interest and positive attitude towards the destination – leading to an intent to visit the destination. Multiple case studies have backed up the assumption that an optimally marketed destination on Instagram can lead to an increase in visitor numbers³. Indeed, Instagram is now being blamed for causing overtourism in certain “Instagrammable” locations⁴. A challenge for DMOs or other stakeholders is to know if they are indeed marketing their destination optimally on Instagram. A rise in visitor numbers can only suggest marketing success a posteriori. Marketing intelligence – the analysis of marketing data to identify the factors of marketing success – has classically made use of analysis of text (of reviews, or of social media postings) and quantifiable metrics (e.g., in social networks number of likes, comments and shares) [15]. However, the primary component of Instagram marketing is visual: the photo or video used in the posting. Ignoring this component in marketing intelligence in Instagram would mean the primary factor for the marketing success is being excluded from the analysis.

In this paper, our assumption is that the target audience for the destination marketing – the Instagram users – reveal the aspects they are most interested in and find most appealing in a visit to the destination through their own choice of the photography they post to the social network as part of their touristic experience. Photography has been long understood as an expression of the photographer’s mental image of the destination [19]. They take photos of the aspects they consider most indicative, and this is now even more the case in social networks where the user chooses which of their photos they want to post and share with others. Therefore, the content of Instagram photography from a destination (user generated content, or UGC) can be analysed for the “perceived destination image”. Equally, the content posted by the DMO on its Instagram channel can be subject to the same analysis to measure the “projected destination image” [11]. Common marketing theory says that marketers want to influence consumer attitudes towards their product and can measure the success of this influence by surveying consumers after a marketing campaign and determining if attitudes have become closer to the marketing message. In e-tourism, this has translated as marketers defining their intended “projected destination image” and measuring how close the “perceived destination image” comes to it after a marketing campaign. However, such thinking persists the assumption that marketers are the primary conveyors of the destinations image when in fact today’s traveller has a destination image which is strongly influenced by the UGC they consume about that destination [14], especially from social networks [25]. Therefore, we turn this theory on its head and argue that, in fact, destination marketers should inform themselves of the “perceived destination image” of their target audience and, given that this reflects the that resonate most with those consumers, aim to align their “projected destination image” to it.

Measuring destination image from Instagram photography is quite different from analysis of text or statistics. In the following chapter, we look at destination image in e-

³ e.g. Iceland and New Zealand case studies from “Insta tourism explained: What, why and where”. Available online. <https://tourismteacher.com/insta-tourism/> (last accessed on 28 July 2021).

⁴ Tenbarge, K. “15 destinations Instagram has helped ruin” Available online. <https://www.insider.com/travel-destinations-instagram-influencers-ruined-2019-7> (last accessed on 28 July 2021).

tourism research and how visual media classification has been researched in the field of computing. Section 3 introduces the author's implementation of a deep learning-based visual classifier for measuring destination image and its evaluation results for accurate classification of tourism photography. Section 4 explains our experiment: we take four top Instagram destinations and download sets of DMO and UGC photos. We describe the measured destination image as multidimensional vectors and compare projected and perceived images including for selected features. We identify differences between the destination marketing and UGC. Section 5 concludes this paper with a look at our findings, what DMOs can learn from this for their future destination marketing and which limitations and future work remain.

2 State of the Art

Destination image has been a subject of tourism research since several decades [5]. It has been defined as the mental construct a person has of a destination and is sourced initially from indirect sources, i.e., before they visit the destination and form an opinion [8]. From the perspective of a group, the destination image may be considered the ideas and feelings most expressed about the destination (e.g., Costa Rica may be most typically associated with jungle and adventure). Destination image has been important as a concept to tourism stakeholders as a correlation is assumed between a positive image and an increased intention to visit [16]. Originally, destination marketers considered their marketing as significant in determining the image of their destination among a target audience, as their marketing materials were a primary source of impressions about the destination for someone who was exploring the option to visit. Nowadays this no longer holds as the Web and digital photography has led to an explosion of destination imagery from tourists which is globally distributed and easily consumed on popular Websites. This imagery is now dominant in forming an initial destination image among connected consumers [13]. Destination marketers now need to accept that Internet users participate in the co-creation of the destination brand [1], referring to the influence on the destination image of the user content being shared online [2].

Initial destination image research used either surveys and other solicitation techniques from the public or expert knowledge to define the attributes people commonly associate with destinations [8]. Measurement of destination image consists of determining a value for each attribute. Given a classification of those attributes, surveys were also used to directly extract the destination image for a given destination from a group of people, e.g. [3]. As more destination related content became available online through Websites, researchers turned from survey-based approaches to data-based approaches where they collected the data from the Web and used software tools to analyse it. Text analysis could be used with collections of reviews of tourism POIs (points of interest), e.g. [15]. However, this proves less effective with multimedia content (images and videos) where the only text that might be available would be an associated description, tags or even the content of the comments on that multimedia item.

Tourism researchers have long been aware of the importance of photography in understanding how visitors perceive a destination [6]. The choice of elements in the photos are seen as reflecting the photographer's own idea of what is most important about the destination [19]. Initial research on destination image and photography solicited directly from participants their impressions from observing a certain photo, a technique known as PEI (Photo Elicitation Interview), which has also been applied with Instagram [9]. Later work manually classified the photos found on Websites according to their content or theme, e.g. [21, 22]. Such efforts were largely small scale and did not concur in how to classify the photos, nor aligned their classifications to other research on destination image attributes [20].

With the advent of social networks and photo sharing, the scale of available photography about destinations has expanded greatly. The Web also drove "big data" research where analysis could be performed on larger scale data collections that could be sourced online and hence provide more accurate results. However, in the research domain of image understanding, accessible and accurate software systems have only emerged with the advent of deep learning-based approaches [24]. These use neural networks (AI systems that seek to replicate the neural activity of the brain) with multiple processing layers (hence "deep") to 'learn' to identify the content of images based on training with large datasets of already classified images. State of the art deep learning classifiers have been trained with the ImageNet dataset, a set of 1.3 million photos annotated according to a list of 1 000 visual categories, reporting high levels of accuracy when evaluated against previously unseen image sets⁵. The classification abilities of deep neural networks are also available to users via Web based APIs hosted by companies such as Google (Cloud Vision), IBM (Watson Visual Recognition) or Microsoft (Azure Computer Vision). They tend to offer object recognition, i.e., classification of images based on the detection of visible objects, drawing from concept sets in the tens of thousands.

Tourism research using deep learning classifiers to analyse larger photo sets has only appeared in the past few years, cf. [7, 12, 26–28]. Off-the-shelf pre-trained classifiers have been used which return generic concepts for each image, largely based on the ImageNet classification. A few papers have acknowledged that this is not directly useable in the touristic context where destination image is defined as an aggregation of more general cognitive attributes (such as "entertainment") rather than the specific objects explicitly visible in the image (such as "guitar", "turntables" or "stage"). The classifiers are not trained specifically on tourist photography and the few experiments to measure the accuracy of a classifier when used in the tourism domain report lower figures than for the ImageNet classification for which evaluation results are reported. [18] evaluated two pre-trained classifiers with Instagram photography of Vienna and found f1 measures (the harmonic mean of precision and recall) of 0.54. [12] found an accuracy score of 28% for their classifier when tested specifically in the use case of touristic destination image. Past work has also not mapped the labels

⁵ <https://keras.io/api/applications/> lists pre-trained models available in the Python library Keras with top-5 accuracy scores of 89 to 96%.

returned by the off-the-shelf classifiers to destination image attributes, a task made more complex by the lack of any official listing of all labels.

There is the option to train a deep learning neural network specifically for visual classification in some new domain, given that the ImageNet pre-training is accepted to be too generic when classification is to be done for a specific use case. While networks could be trained from scratch, *transfer learning* is a common approach to reach high accuracy with less training cycles. Here, we start with the pre-trained model from ImageNet and then train the new model with the domain-specific annotated images. However, to the best of the author’s knowledge, no-one has trained a visual classifier specifically for destination image measurement. In the next chapter, we introduce the author’s implementation and evaluation of such a system.

3 Implementation of a Visual Classifier for Destination Image

Given the lack of an accurate classifier for destination image from photography, we decided to implement our own. While the leading benchmark systems in (general) visual classification tend to be highly complex (hundreds of layers and ten of millions of parameters) they also need expensive, powerful hardware to run. In our case, we are considering a more specific task (narrow domain) and aim for a model which can be trained and used with more common computing resources (e.g., a laptop with one GPU, or in cloud services such as Google Colab). We develop in Python, using the Keras open-source library for developing deep learning networks.

The standard workflow for a deep learning model is to prepare training data, build a pipeline to input the data, build a model, train the model with the data, test the model and then iterate on improving the model. To prepare training data, we need to decide on the set of visual categories for which the classifier will be trained then prepare a set of data for training which consists of tourism photography where each photo is annotated as belonging to one of those visual categories (every photo is considered as belonging to a single category. Multi-label classification is a subject for future work). Finally, train a model with the data and measure the accuracy on the test data set (we follow a standard convention of taking 20% of the data for testing).

To choose the visual categories for the classifier, we want to use the commonly accepted cognitive attributes of destination image as defined in the research literature. However, there is no single, widely accepted definition of destination image attributes. We start with the factors influencing destination image defined by [4] as the authors aimed for a comprehensive aggregation of all attributes that are considered in a destination. [17] wanted to measure destination image from Instagram photography (through a survey) and took a subset of the list in [4] which was best suited to cognitive identification (tangibly visible in an image). This led to a new list of 53 attributes where some attributes were more specific than [4] (e.g., “Flora and Fauna” became “Plants & Flowers”, “Animals” and “Trees”). In a further refinement step, the author took this list of 53 attributes and cleaned it to 18 visually distinct categories based on aggregations (e.g., “Concerts” and “Cinema/Theatre” could be grouped into “Entertainment”) and filtering out categories that are difficult to generalise for classification (e.g., “Arts and Crafts” and “Traditions” would look very different from place to place) (Table 1):

Table 1. Summary of [4]’s destination image attributes following aggregation and filtering by the author into visually distinct categories

Natural Resources	General Infrastructure	Tourist Infrastructure
Beaches Landscape Water Mountains Desert Plants and flowers Animals Trees	Roads and traffic	Shops and markets Accommodations Gastronomy
Leisure and recreation	Culture, history and art	
Sport Entertainment	Art and museums Historical buildings Modern building Monuments	

To create the training data, we have noted that available classifiers have used public large scale annotated photo datasets such as ImageNet. However, these datasets are not annotated with tourism photography and destination image in mind and tend towards generic object detection tasks such as identifying a “car”, “dog” or “football”. Therefore, we found it important to source a new image training dataset specifically for our task. There is no golden rule for how many images are needed for training each category but following the TensorFlow tutorial for visual classification⁶ where 3670 photos were used to train for 5 classes i.e., 734 photos per class, we also aimed to average at several hundred photos for each category. To find photos suitably representative of tourism photography in each category, we used Google Images search with the conjunctive query “tourism AND (label)” where label is the name of the visual category (categories like “plants & flowers” were split into two queries). The Fatkun Batch Bild plugin was used to download 500–800 images per category and the result was manually filtered to colour photographs without any overlays, leading to 100–500 photos per category for the training dataset. The final training dataset has 4949 photos, or an average of 275 photos per category. After training, the photos were discarded.

The initial architecture is a Convolutional Neural Network (CNN) with three convolution blocks, a max pooling layer in each, a fully connected layer on top with 128 units activated by a relu activation function and, in our case another fully connected layer with 18 units which outputs the result (a confidence value for each of the 18 visual categories). While the initial CNN had an accuracy score of 63–68% on the test dataset (after 20 epochs), we decided to explore the use of transfer learning to train our new model on top of the visual classification already learnt by an existing, re-usable model. Several models are available in Keras for transfer learning and after experimenting with results from a few options, we chose InceptionResNetV2 which reports

⁶ <https://www.tensorflow.org/tutorials/images/classification>.

the best results on the ImageNet validation dataset yet is not the most complex to train with (56 million parameters)⁷. Further experimentation with the settings for the model training led us to choose max pooling and making all layers trainable. We loaded InceptionResNetV2 without the last two convolutional layers and added three convolution blocks with a max pooling layer in each, as in our original CNN. We run this new model for 10 epochs, and this model scored 90% accuracy on the test dataset.

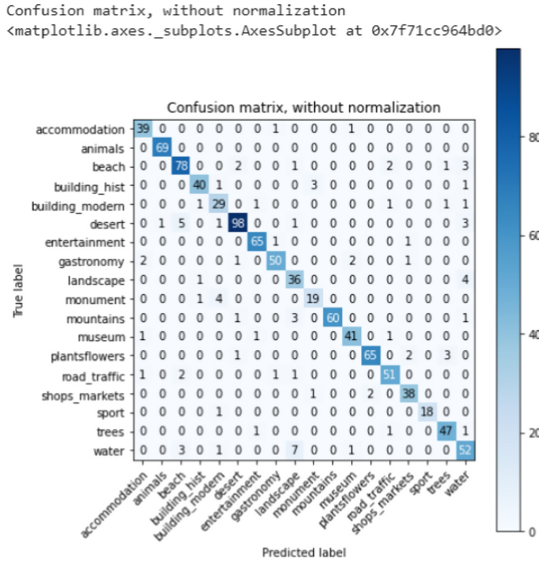


Fig. 1. Confusion matrix for classification of the test dataset

We produced a confusion matrix to check if the accuracy is consistent across the categories (Fig. 1. NB the 18 visual categories can be seen on the vertical axis in the order they are classified). In the test dataset (983 images), 29 out of 34 images (85%) labelled building_modern and 19 out of 24 images (79%) labelled monument were predicted correctly with the main confusion being 4 monument images labelled as building_modern (out of 24). Other confusions visible in the matrix are desert images labelled as beach (5), landscape as water (4) and water as landscape (7), all of which are understandable given the common-sense similarities (deserts and beaches both have sand, landscapes also contain water). Overall, the classifier has correctly labelled the vast majority of images and has been consistent across categories.

⁷ InceptionResNetV2 Simple Introduction, by Zahra Elhamraoui, Medium, May 16, 2020. <https://medium.com/@zahraelhamraoui1997/inceptionresnetv2-simple-introduction-9a2000edc6b6> (last accessed August 31, 2021).

4 Experiment

Having made available a visual classification model that can annotate photography according to a shortlist of destination image cognitive attributes with high accuracy, we will use the classifier to compare the perceived and projected destination image of a number of top destinations according to the Instagram photos posted by users and by the DMO respectively. Based on lists of most Instagrammed locations, we chose the cities of Paris, Barcelona and New York as well as the country of the Maldives, which also complement one another in the sense of each being quite distinct as a destination (Paris: romantic, historical; Barcelona: beach, modernism; New York: urban, entertainment; Maldives: water, relaxation). We use a Python library to download Instagram photos for each destination (i) from its official DMO account and (ii) according to the DMO recommended travel hashtag (this helps focus our data collection of tourism-related photography). We discard the photos once we have classified them. Table 2 shows the selected account and hashtag and the number of photos acquired for each (the downloading took place in the second half of August 2021):

Table 2. Photos used in the experiment by destination

Destination	DMO account	No. photos	Travel hashtag	No. photos
Maldives	@visitmaldives	2525	#visitmaldives	1742
New York	@nycgo	1404	#itstimefornyc	1017
Paris	@parisjetaime	1575	#parisjetaime #jetaimeparis	1503
Barcelona	@visitbarcelona	1675	#visitbarcelona	957

The classifier labels each individual photo with a set of 18 confidence scores (on a scale of 0 to 1), one for each visual category (in the order seen in Fig. 1). We accept one label per photo in that we select the visual category with the highest confidence score. Given an input of multiple photos, we can produce an array of 18 integers where each integer is the sum of photos labelled with a respective visual category. Vectors are representations of objects in multi-dimensional space. Following the use of vectors to represent data items in embedding layers of neural networks, where the items can be subsequently compared and learnt about (e.g., similar items are closer together and can be clustered), we will interpret the destination image array produced by the visual classifier as an 18-dimensional vector. Such a vector can be understood as a set of feature weights where the features are the visual categories and the weights are the presence of the feature in the dataset (to allow for comparison, all features need to be at the same scale so we take the no. of photos labelled with the feature divided by no. photos in the dataset to produce for every feature a value between 0 and 1). For example, the vector produced for the projected destination image (the DMO account) of Maldives is: [0.01663366 0.00871287 0.3829703 0.00435644 0.02336634 0.02336634 0.02930693 0.02534653 0.02336634

0.01029703 0.0150495 0.00475248 0.03960396 0.01584158 0.01346535 0.01029703 0.00990099 0.34336634]. The two dominant features are clearly *beach* (in the 3rd position with a value of 0.383) and *water* (in the last position with a value of 0.343) as all other features (all other destination image attributes) are not larger than 0.04. We can say that the DMO marketing of the Maldives (projected image) is heavily based on the beach and water attributes. We can use the *cosine similarity* of two vectors to determine how close the projected image (DMO) is to the perceived image (UGC) of the destination. Cosine similarity measures similarity in terms of the orientation of the vectors rather than the magnitude, which makes sense for the representation of destination image in n-dimensional space since each weight represents a feature of the destination and the overall image is determined by the comparative relationship of the feature values (e.g., *beach* and *water* is stronger than everything else) rather than the absolute values themselves. The resulting cosine similarity measure between the Maldives' projected and perceived destination images is **0.983** (cf. Table 3), indicating no significant differences. It seems Maldives visitors equally post in their majority *beach* and *water* photos. We can consider the Maldives case a validation of our approach with the visual classifier, as the Maldives as a destination is arguably limited to the two visual categories of *beach* and *water* (it seems neither *accommodation* nor *gastronomy* form a focus of destination photography there) and therefore it could be expected that these two features dominate both the projected and perceived images of the Maldives. How about cities like New York, Paris or Barcelona, which contain many different features that could be subjects of photography? Do the DMOs present a different image of the city than the visitors themselves? Table 3 shows the cosine similarity for each destination image, i.e., the closeness of the vectors of the destinations projected destination image (DMO account) and perceived

Table 3. Cosine similarity between vectors for the projected and perceived destination image of each destination

Maldives	0.983
New York	0.941
Paris	0.946
Barcelona	0.956

destination image (UGC).

There is a close similarity in all cases, suggesting the projected and perceived destination images are well aligned. On one hand, DMOs can achieve this by reusing UGC in their own destination marketing, a common approach today on platforms like Instagram. On the other hand, it suggests that Instagram users do share the same perception of the destination as the one being promoted by the destination marketers – a possible proof of the notion of the *hermeneutic circle of representation* [23]. This is the idea that we replicate and reinforce the media depictions we already know (in Paris, we have to photograph the Eiffel Tower, etc.). [10] considered that tourist photography may either reflect or inform a destination image since, consciously or unconsciously,

tourists look for scenes that replicate their existing perceptions. While this result is positive for the DMO, there may be some differences in the images which we can explore by looking at specific features (visual categories) in the destination image vector. Figure 2 shows comparisons of the city destination images along three features that all

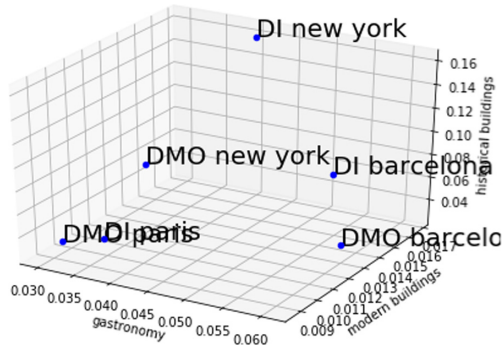


Fig. 2. 3D plot of the destination images of the cities along three features (DI = perceived image, DMO = projected image)

of the cities are known for: gastronomy, historical buildings and modern buildings.

While the projected DMO imagery of Paris is closest to the perceived image in UGC (both points almost overlap), Instagrammers focus more on all three features than the DMO in New York (it may be the DMO is actively working on promoting other features of NYC) whereas in Barcelona the DMO tends to feature more gastronomy than the perceived destination image (which more strongly features both historical and modern buildings in the city). In particular, the New York DMO might be advised to focus more on gastronomy and historical buildings in NYC as this is certainly of more interest to Instagrammers, and the Barcelona DMO should consider that Instagrammers are attracted to both the historical and modern architecture of the city more than is reflected in their destination marketing.

5 Conclusions

In this paper, we described our own deep learning visual classifier for tourism photography which can be used to measure destination image and demonstrated its accuracy. We used this classifier with both DMO and UGC photography from Instagram for four popular destinations and considered how the resulting destination image, measured as an 18-dimensional vector, may be analysed for destination marketing insights. We found that projected and perceived images align well in Instagram, so DMOs are actively projecting an image which resonates well with Instagram users' perceptions of the destination. However, along individual features differences can be found. Assuming DMOs are well advised to align their projected images to the perceived image on Instagram, New York could promote more gastronomy and historical

buildings and Barcelona could promote more its architecture, both historical and modern. We believe the measurement of destination image using our visual classifier can provide new insights into how destinations are presented through visual media such as photographs, which is an area of Internet marketing still not satisfactorily covered in business intelligence systems. Other experiments could be to compare the images of different destinations, to identify changes in destination images over time, or differences in destination image across different groups. As a limitation, we restricted our destination image attributes to 18 categories which were not only visually distinct but also globally consistent. Categories like *arts & crafts* or *traditions* were not considered as their visual appearance would vary greatly from place to place. Future work would be to both further improve the accuracy of the classifier, especially considering very visually different destinations, and to add further categories (related to the previous point, possibly ad hoc based on the classification task). The work could also be applied to video, which is ‘moving images’, although the temporal dimension should also be considered (i.e., how long a feature is visible for). The Python code for training a CNN with transfer learning for destination image classification as well as the weights of our best performing model (90% accuracy) are made available publicly on Github <https://github.com/lyndonixon/VisualDestinationClassifier> as well as a labelled set of Flickr photographs for evaluating visual classifiers on Google Drive <https://bit.ly/visualdestination>. We hope thereby to encourage further research in visual classification for destination image and further experiments with tourism photography and videos.

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Personalization of Multi-day Round Trip Itineraries According to Travelers' Preferences

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Abstract. Travel planning is a long and tedious process for tourists since it requires processing a vast amount of information. Recommender systems can be used to facilitate the process of scoring points-of-interests (POIs) according to the travelers' interests and creating feasible itineraries. However, itinerary planning is personal and each itinerary created must reflect the interest of the traveler as well as his/her travel style. In this paper, we extend the creation of multi-day round trip itineraries by adding different personalization options such as the pace of the traveler and diversity level of the route. The information about the travel style of the user is used to personalize the visiting duration of each POI and to create routes for each day that follow the constraints defined by users. We conducted a user study through a mobile application and the results show that the added personalization options improved the recommended multi-day round trip walking tours from a user's perspective.

Keywords: Recommender systems · Tourist Trip Design Problem · Clustering · Diversity · Personalization · User study

1 Introduction

With the massive amount of data accessible on the internet, processing information and collecting the most suitable options among these have become an exhausting task. Therefore, recommender systems are used in many different areas to present the most relevant options to the users according to their expectations. The travel industry is one of the areas that can benefit highly from recommender systems but travel recommendation is complex because several items have to be combined to create a reasonable itinerary. This problem of recommending a trip composed of multiple points-of-interests (POIs) is called the Tourist Trip Design Problem (TTDP) [1].

TTDP solutions focus on personalizing trips by applying different techniques to find POIs that are interesting to the user and create feasible routes that maximize the satisfaction of the traveler while taking certain constraints into account. Therefore, the route is only personalized by the selection of the attractions and consequently, the people with similar interests are recommended similar itineraries.

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J. L. Stienmetz et al. (Eds.): ENTER 2022, *Information and Communication Technologies in Tourism 2022*, pp. 187–199, 2022.

https://doi.org/10.1007/978-3-030-94751-4_17

However, a recommender system needs to take another factor into account, the travel style of the user. Two travelers might enjoy the same type of attractions; however, their travel style also affects how they create an itinerary. In this work, we propose a solution to create multi-day itineraries that are personalized according to the user's travel style using four factors: the level of interest of the user for different POI categories in terms of time spent on visiting POIs, the pace of the traveler, the effort of visiting each POI and the diversity of POI categories expected from the itinerary. These factors are incorporated into the itinerary creation process by altering the visiting duration of the POIs as well as modifying the clustering and route creation algorithms.

The paper is structured as follows: In Sect. 2, we discuss related work on recommending interesting POIs and generating feasible itineraries. Section 3 explains the methodology in incorporating personalization options into the itinerary creation process. In Sect. 4, we present metrics to test the success of the proposed algorithms in an offline experiment. In Sect. 5, we describe the user study we conducted to evaluate the solution from a user's perspective. Section 6 concludes the paper with a summary and directions for future work.

2 Related Work

Different approaches focus on solving the TTDP by recommending interesting POIs for travelers, creating feasible itineraries and taking travelers' constraints into account. Du et al. [2] suggest a data mining approach from GPS data to find the most suitable POIs for the travelers using features of scenic spots and the order of visit. Hsueh et al. [3] propose a personalized itinerary recommender system with time constraints using data collected from location based social networks to match users that have similar interests. Aksenov et al. [4] propose using traveler's dynamic needs and affects to recommend POIs by adding the users' emotions to the itinerary planning process. Lim et al. [5] collect user interests and travel behaviour through processing the previous routes using geotagged photos to personalize visiting duration of POIs and create itineraries. Zancanaro et al. [6] use unsupervised learning models on the travel pattern data collected from museum visitors to categorize the travel behavior of users.

Bolzoni et al. [7] use an approach to limit the number of POIs visited from a certain category throughout the itinerary to reduce the sensory overload. Chang et al. [8] propose an itinerary planner that creates a trip from a given starting location to an end destination and find out POIs that match users' interests using a greedy approach. Chen et al. [9] propose a novel approach by inferring user interests to select the interesting POIs and personalize the visiting duration of POIs by comparing how much the traveler spends time at a certain POI compared to an average visit. Luan et al. [10] tackle the issue of diversity of attractions visited within the itinerary by using an ant-colony-optimization strategy where for each itinerary, a trip score that denotes the satisfaction level and an entropy factor which denotes the diversity of the trip are calculated. Chen et al. [11] propose a multi-day itinerary planner that models the problem as a

variant of TOP where single-day itineraries are created using travelers' interests and then are combined to create multi-day trips.

In our solution, we extend existing work by combining several options to create personalized multi-day itineraries and evaluate them both in an offline study as well as from a user's perspective.

3 Method

We use a time-limit approach [12] for the initial route creation process. This time-limit approach divides the route creation process into two parts: (i) creating clusters with highly rated POIs for each day and (ii) creating routes with the highest *profit/cost* ratio. The personalization options are then added to the existing steps as well as adding new steps to assign intensity coefficients for POI categories and to calculate personalizing visiting duration of POIs.

3.1 Calculating Coefficients and Scores Related to POIs

In this section, various coefficients that are used to interpret the interests and the travel style of the user in order to generate feasible routes are explained.

Intensity Coefficients of POI Categories. For each POI category, an intensity score is determined so that the pace of the traveler can be matched with the POIs. We calculated the intensity coefficients by conducting a survey to collect the opinion of participants on the intensity of visiting a certain POI category in terms of physical or mental effort. A score of 1 means that a very low effort is needed to visit POIs in the given category and 5 means a very high effort.

In total, the questionnaire was filled out by 242 people (61.2% female, 38.4% male, 0.4% other). The user study participants were found by sharing the questionnaire on social media and among acquaintances. The distribution of the ages of the participants were 18–24 (41.7%), 25–30 (29.7%), 31–40 (5.4%), 41–59 (21.1%) and 60+ (2.1%). Each coefficient is used to categorize POI categories into low, medium and high-effort groups. For each age group, the POI categories with intensity coefficients that are one standard deviation above the mean intensity score for all categories are marked as high-effort, the ones that are one standard deviation below the mean intensity score for all categories are marked as low-effort, and the rest are marked as medium-effort. Each POI has the intensity coefficient of its respective category. Walking between the POIs is assigned the highest possible intensity coefficient of 5.

Interpreting the Travel Style of the Users. The travel style of the users is affected by many different factors such as the city they are visiting, their physical condition, interests and previous experiences. Therefore, the effect of different factors are taken into consideration and mapped to coefficients, which are then used to tailor the visiting duration of POIs as well as selecting and sequencing of POIs throughout the itinerary.

- Interest Coefficient: The interest coefficient of POI categories is calculated using the previously visited POIs by the user to understand how much they are willing to spend time at a POI category. Even though two users have a certain POI category as their favorite, their interest level may vary. Therefore, the interest coefficient of a user for the POI category c is calculated as:

$$Interest_c = \frac{\sum_{p \in POI_c} dur_p / avg_p}{|POI_c|}$$

where POI_c is the set of all POIs from category c that has a visiting duration added by the user, dur_p is the visiting duration added for the POI p and avg_p is the average duration suggested for POI p by the experts.

- Visiting Coefficient: Visiting coefficient defines if the user wants to spend longer times at selected POIs or visit different places. A lower visiting coefficient indicates that the user prefers to spend longer times at given POIs and a higher coefficient indicates that the user wants to visit more places and prefers to spend less time at each of them.
- Effort Coefficient: The effort coefficient defines how much the user is willing to exert effort to visit POIs. The users with higher effort coefficients spend the recommended time at high-effort POIs whereas the users with lower effort coefficients spend less time at high-effort POIs and spend more time at low-effort POIs.
- Diversity Coefficient: Diversity coefficient defines how much the user prefers to visit different types of attractions instead of visiting their highly rated types of attraction. Users with a low diversity coefficient are recommended highly rated POIs and the users with a high diversity coefficient have a diverse selection of POIs.

In order to collect the preferences of the users and calculate these coefficients, travelers are asked a set of questions through a mobile interface.

Rating of POIs. We calculate the ratings of POIs similarly to the research by Wörndl et al. [13] by using the traveler interest for each category as well as the TripAdvisor scores of the POIs:

$$score = category\ rating * TripAdvisor\ Rating * \log_2(amount\ of\ votes + 1)$$

This ensures that places that have low ratings on TripAdvisor or places that have fewer reviews are given lower scores. The ratings calculated for each POI are used during the generation of the routes as the profit of visiting a POI is measured through its rating.

Calculating Visiting Duration for POIs. For each POI, an average visiting duration is recommended by experts. However, these values often don't match the personal expectations of the user. In order to assign personal visiting durations, firstly, each POI is assigned a minimum and maximum visiting duration,

where the minimum duration is half the duration and the maximum is twice the duration recommended by the experts. This ensures that travelers spend a feasible amount of time at the POIs and still get personalized recommendations. For a user u , the personalized visiting duration of a POI p is then calculated as:

$$VisitingDuration_p = \frac{AverageDuration_p * Interest_p * Intensity_p}{Visiting_u}$$

where $Interest_p$ is the interest coefficient of the POI, $Visiting_u$ is the visiting coefficient of the user. $Intensity_p$ is calculated using the intensity score of the POI calculated in Sect. 3.1 to mark each POI category as low, medium and high-intensity. For each level of effort coefficient, a value between 0.5 and 2 is assigned to each intensity level according to its similarity to the effort coefficient. Therefore the pre-calculated intensity coefficients are selected for each POI category according to its intensity group.

3.2 Clustering POIs into Multiple Days

To have an itinerary with routes that match the travel style of the user, the overall intensity of the POIs in the route must reflect the pace of the traveler. Therefore, the clusters must have different types of POIs with different intensities while keeping closer and highly rated POIs together. This way, the diversity criteria can also be met since each cluster has a variety of POIs from different categories. The basic time-limit approach aims to cluster the highest-rated POIs together and selects the clusters with the highest ratings. However, in certain cases, this approach might yield an uneven distribution of POIs from different categories and the number of POIs in the clusters might be too low for certain POI categories. To solve this problem, each POI is pre-processed within its respective category, rather than the overall score for all categories and each category has POIs marked as must-visit, can-visit and don't-visits by comparing individual ratings to the average rating of categories similarly in [12]. Then, agglomerative clustering with time limit is applied to the POIs from each category separately to create clusters that only include POIs from that category. In the agglomerative clustering step, the visiting duration of each POI is used as the minimum value of the average and personalized duration.

After the agglomerative clustering is applied to each category and clusters are obtained, the resulting clusters are further merged using a modified version of agglomerative clustering. Instead of adding a time limit to the clusters, the two closest clusters that have POIs from different categories are merged. The resulting clusters have different types of POIs and the top n clusters with the highest ratings are selected to run the routing algorithm. One drawback of this approach is that the clusters obtained are too large to be visited in one day and higher rated POIs might be discarded, since each sub-cluster for a POI category has the time limit as the total visiting duration of that day. To mitigate this issue, the user can specify a higher level of diversity expectation, where a strict-clustering approach is used that assigns the time limit of each cluster as $totalDuration/numPOICategories$.

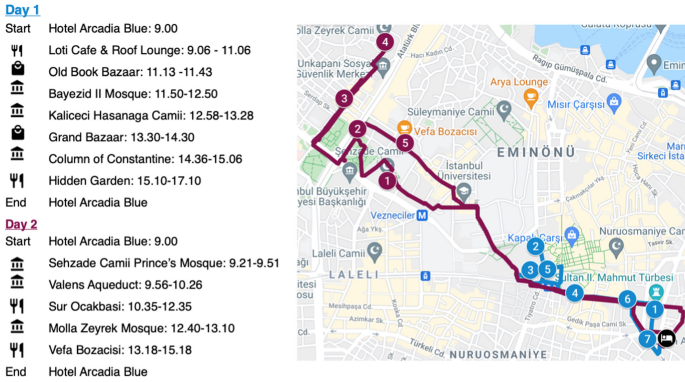


Fig. 1. Sample route with diversity options enabled

3.3 Creating a Sequence of POIs for Each Day

To add diversity within the route, the ordering of the POIs must ensure that different types of POIs are selected in succession. One way to implement this is to add a diversity coefficient as a contextual factor: a POI that is selected next has a penalty of 0.5 if it is from the same category of the previous POI on the route and a penalty of 0.75 if it is from the same category with the POI that was added before the last added POI.

For the route creation step, we use the greedy approximation algorithm proposed by Laporte et al. [14]. At each step, the POI with the highest *profit/cost* ratio is selected, where the profit is calculated as *rating * penalty* of the POI with the rating calculated in Sect. 3.3. In certain cases, POIs within a cluster might have longer visiting durations and therefore, a sufficient route cannot be created. Thus, the personalized duration of POIs is used until the time limit is reached during the route creation process. Then, for each POI the algorithm switches to average visiting duration, if it is less than the personalized duration to ensure more POIs can be added to the route. A sample route is shown in Fig. 1.

3.4 Generating a User Interface to Present Itineraries

We developed an Android application to present the itineraries to travelers. Users can add information about their age, gender, interests, travel preferences and the POIs they visited before with the time they spent there. The information is then used by the recommender system to generate multi-day itineraries as explained above.

Once the routes are generated, the mobile application shows the time to visit a place, approximate walking duration between POIs and how long to stay there. The interface for a sample three-day itinerary is shown in Fig. 2(a). While showing the routes, the app also shows the route on a map so that the travelers

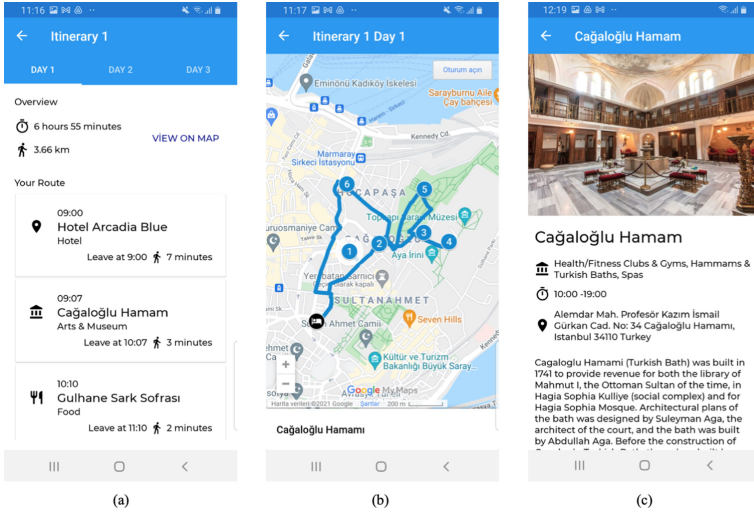


Fig. 2. Mobile application to present itineraries: (a) Overview of the routes (b) Route of each day on the map and (c) Detailed information about the selected POI

can follow the routes (Fig. 2(b)). The app also presents information about each POI (Fig. 2(c)).

4 Offline Evaluation

To understand if the itineraries follow the constraints given by the user, we evaluated generated itineraries with different intensity and diversity levels in an offline study. To evaluate different intensity levels, we used four variants: the baseline time-limit approach, the low-intensity variant that promotes visiting low-effort POIs for longer times, the medium-intensity variant that balances visiting different types of POIs and the high-effort variant that promotes visiting higher effort POIs for longer times. To evaluate diversity levels, three variants are used: the baseline time-limit approach, the low-diversity variant that promotes diversity using modified time-limit clustering only and the high-diversity variant that enables diversity both in clustering and the route creation process.

4.1 Intensity Score of Routes

For each route, the intensity of the route r with n POIs, where the first POI is the hotel of the user, is calculated as:

$$Intensity_r = \frac{\sum_{i=0}^n walkIntensity_{i,i+1} + \sum_{i=1}^n Intensity_i + walkIntensity_{n,0}}{duration_r} \quad (1)$$

where the intensity score of POI i is $Intensity_i$ and

$$Intensity_i = intensityCoeff_i * visitingDuration_i \tag{2}$$

where $intensityCoeff_i$ is the coefficient calculated for the POI category of i in Sect. 3.1. $walkIntensity_{i,j}$ is the intensity score of walking between POIs i and j and

$$walkIntensity_{i,j} = intensityCoeff_{walking} * duration_{i,j} \tag{3}$$

where $duration_{i,j}$ is the time to walk from i to j and $duration_r$ is the total duration of the route.

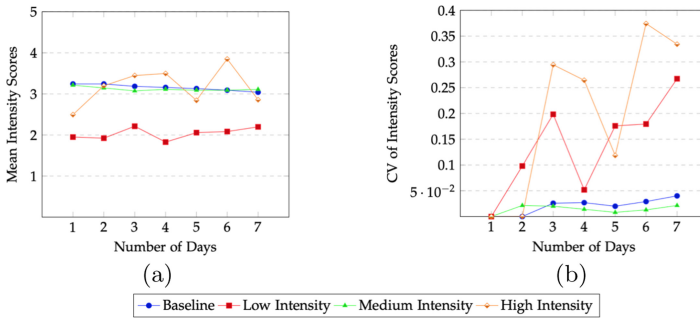


Fig. 3. Mean of intensity scores for the algorithm with different intensity levels (a) and coefficient of variation of intensity scores for the algorithm with different intensity levels (b)

For different intensity variants, the mean of intensity scores of routes are shown in Fig. 3(a) and the coefficient of variation of intensity scores are shown in Fig. 3 (b). The time-limit approach yields similar results to the medium-intensity variant because the personalized visiting duration of POIs are similar to the recommended duration that are used for the time-limit algorithm. For all routes, the low-intensity route has a lower intensity score than other variants and high-intensity variant produces a higher mean intensity score than others in some cases. One possible reason for high-intensity variants not having significantly higher intensity scores than others is due to the dataset including less POIs from high-intensity categories.

4.2 Diversity Score of Routes

The mean diversity score of each route is calculated by giving a penalty to the POI, similarly to the penalty explained in Sect. 3.3. For a trip with n days, where each day d has k_d POIs selected, the mean diversity score is:

$$\overline{div} = \frac{\sum_{d=1}^n \frac{\sum_{p=1}^{k_d} penalty_p}{k_d}}{n}$$

For different diversity variants, the mean diversity scores for 1 to 7-day trips are shown in Fig. 4(a) and the coefficient of variations are shown in Fig. 4(b). The diversity score is lowest for the baseline time-limit approach, since the POIs selected are mostly from the highest rated category. As expected, the high diversity variant has a higher diversity score than other variants and a lower coefficient of variation since it enables diversity within route creation step and chooses the POIs while checking the previously selected POIs.

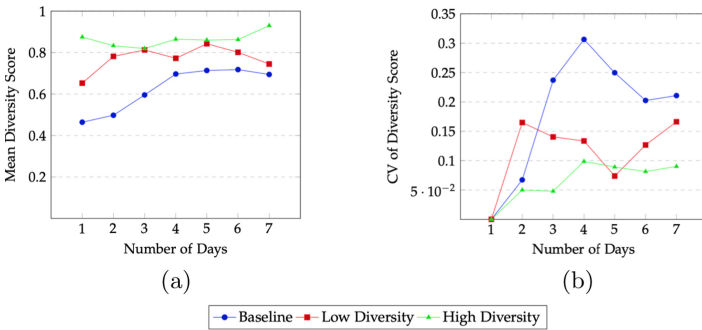


Fig. 4. Mean diversity score for the algorithm with different intensity levels (a) and coefficient of variation of diversity score for the algorithm with different diversity levels (b)

5 User Study

In addition to the offline evaluation, we conducted a user study to evaluate the different options from a user’s perspective. To ensure that the routes generated for different participants match their travel style, we created three personas to reflect different preferences: adventurers, museum lovers and foodies. Each persona has different interest coefficients for the POI categories, different intensity and visiting coefficients as shown in Table 1. The participants of the user study were asked to select the persona closest to their travel style and given a detailed explanation to evaluate the routes according to the pre-defined travel styles.

To compare the different algorithms and options, we created five different types of routes from two different hotels as starting points for a total of ten routes for each persona. The algorithms had enabled personalization options of user interest, personalized visiting durations and diversity in different levels to measure the effect of these options on user satisfaction. The personalization options for each algorithm variant are shown in Table 2.

Table 1. Coefficients to calculate visiting durations of POIs for each persona

Persona	Visiting coefficient	Effort coefficient	Interest coefficient					
			Arts	Food	Outdoors	Shopping	Music	Nightlife
Adventurer	4	4	1	1	2	1	1	1
Museum lover	2	3	1.5	1	1	1	1	1
Foodie	3	2	1	1.5	1	1	1	1

Table 2. Personalization options enabled in each variant for the user study

Variant	User interest	Personalized visiting duration of POIs	Diversity
Popularity Based Time-Limit Approach (PBTTL)	x	x	x
Time-Limit Approach with Personalization (TL)	✓	x	x
Time-Limit with Personalized Visiting Durations (TLVD)	✓	✓	x
Modified Time-Limit (MTL)	✓	x	✓
Modified Time-Limit with Personalized Visiting Durations (MTLVD)	✓	✓	✓

For each route, the participants were shown the same 10 routes that were created for their persona and were asked to answer the following questions on a Likert scale ranging from strongly disagree (1) to strongly agree (5):

1. The recommended points-of-interests match the selected travel style
2. The number of points-of-interests on each day of the trip is good
3. The points-of-interests visited throughout the itinerary are diverse
4. The time spent visiting each point-of-interest is suitable for the selected travel style
5. The overall intensity of the itinerary matches the selected travel style (The itinerary isn't too light or too tiring)
6. The recommended itinerary matches the selected travel style overall
7. I'm satisfied with the overall recommendation

In total 53 people (66% female, 34% male) participated in the user study. The user study participants were found by sharing the questionnaire on social media and among acquaintances. The distribution of the ages of the participants are 18–24 (14.8%), 25–30 (33.3%), 31–40 (14.8%), 41–59 (29.7%) and 60+ (7.4%). The selected personas of the participants were adventurers (39.6%), museum lovers (28.3%) and foodies (32.1%). Table 3 shows the results for each of the seven questions.

Table 3. User study results (* $p < 0.1$, ** $p < 0.05$)

Question	PBTL	TL	TLVD	MTL	MTLVD	Avg	Std Dev	p-value
1	3.92	4.07	4.22	3.97	4.05	4.04	0.11	0.63
2	4.14	3.99	4.06	4.12	4.20	4.10	0.08	0.34
3	4.08	3.76	4.06	4.08	4.19	4.03	0.16	0.095*
4	3.60	3.82	4.02	3.79	4	3.85	0.17	0.004**
5	3.95	3.86	3.96	4.10	4.10	3.99	0.11	0.061*
6	3.78	3.84	4.20	4.01	4.09	3.98	0.17	0.03**
7	3.91	3.81	4.09	4.01	4.04	3.97	0.11	0.115

We performed a one-way ANOVA test to test significance. The results of the ANOVA test showed that for questions 4 and 6, the differences between the algorithms were significant on the level of $\alpha = 0.05$ and for questions 3 and 5, it yielded significant results for the level of $\alpha = 0.1$. We applied further pairwise comparison tests with a significance level of $\alpha = 0.05$ for the questions that yielded significant results to compare the algorithms. In terms of diversity, all algorithms performed significantly better than the TL approach. In terms of visiting durations of POIs, TLVD recommended significantly better visiting durations for POIs than the PBTL, TL and MTL variants, also MTLVD performed significantly better than the PBTL approach. In terms of matching the expected intensity level, MTL and MTLVD performed significantly better than the TL approach. In terms of matching the overall travel style of the user, TLVD performed significantly better than all other approaches except MTLVD.

6 Conclusion and Future Work

In this work, we investigated different factors that affect the travel style of the travelers when generating personalized multi-day round trip itineraries. The results showed that personalizing the visiting duration of POIs provided better itineraries in terms of matching the pace of the traveler and also in providing more satisfying itineraries. The users found the visiting duration of POIs more suitable than the suggested average durations. The approaches used for clustering POIs and route creation were also successful in increasing diversity in the itineraries. Overall, the proposed personalization options provided better and more enjoyable routes than their non-personalized counterparts.

For future work, each POI can be evaluated individually to calculate the intensity coefficient, since the category of a POI is not enough to reflect its intensity. To better understand the travel style, the user can select periods to rest for each day or specify time for a lunch break. The pace of the user can also be interpreted better by understanding the physical condition of the user such as collecting average walking distances from smartphone sensors to tailor walking

distances. In terms of route creation, the current approach follows the shortest paths between the POIs to generate the directions and as a future work, routes can be altered to include scenic walking routes to create more enjoyable trips.

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Destinations and Data State-of-the-Art in Switzerland and Liechtenstein

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Abstract. This research investigates the state of the art among Switzerland (CH)'s and Liechtenstein (FL)'s destinations, intended here as Destination Marketing Organizations (DMOs), when it comes to their relationship with data: what data are collected, how they are stored, analyzed and what impact they have on the destination. This study aims at bringing insights into smart tourism studies as a key aspect of the debate is how DMOs deal with data. Based on a survey performed with CH's and FL's DMOs and related stakeholders, results suggested that there are common conceptual nodes shared by practitioners when it comes to defining smart destinations. However, when it comes to data-related practices (data collection, storage, analysis and sharing) DMOs have very different processes in place. There are organizations that collect but do not extensively analyze data, while others are still not so keen on sharing their data with the whole destination ecosystem. Furthermore, organizations' decision-making processes appear to be based to some extent on data, especially when it comes to (digital) marketing initiatives and campaigns, although behaviors are quite different also in this area. Destination managers might benefit from this paper as the study shows how to investigate data-related practices of an organization. This type of analysis could allow an assessment of the situation and an understanding of the direction in which the organization might move forward.

Keywords: Smart tourism · Smart destination · Big data · Data management · Data analysis · DMOs

1 Introduction

While “smart tourism” has become a very popular term among researchers and practitioners, its definition is still debated [1–9]. It is anyway clear that, in order to be smart, destinations should be able to properly collect, analyze and use relevant data [1, 4, 10, 11]. However, what the actual practices in data collection, analysis, sharing and storage are and what it means to be smart when it comes to data-related processes in tourism is still under study [12–15]. This article aims at contributing to this domain by investigating how DMOs and related stakeholders in CH and FL collect, store and analyze, as well as integrate data within their ordinary processes as actionable insights to make wiser and more effective managerial decisions. To do this, a survey has been conducted

with 35 tourism stakeholders in CH and FL investigating the following aspects (i) understanding of the concept “smart destination”; (ii) dealing with data (data collection and storage, data access and management; data analysis; iii) data-related decision-making processes; iv) perceived usefulness of data-related practices.

2 Literature Review

2.1 Smart Tourism

In the past decades, the word “smart” has become a buzzword in the tourism field, as a consequence of this sector’s highly reliance on information and communication technologies (ICTs) [4]. New concepts such as “smart city” and later on “smart destination” and “smart tourism” have started to be increasingly popular. The concept of smart is, generally, very much connected with that of (big) data [16], as being smart means “exploiting operational, near-real-time real-world data, integrating and sharing data, and using complex analytics, modelling, optimization and visualization to make better operational decisions” [4, p. 179]. This applies also to the tourism industry, where technology connects the physical with the digital world, supporting value creation, innovation, and competitiveness [4]. The term remains nonetheless ill-defined and it is not understood either in academia or in the industry in a univocal way [4]. However, Lopez de Avila [7]’s definition of smart destination is often mentioned in the literature. According to him, a smart destination is “an innovative tourist destination, built on an infrastructure of state-of-the-art technology guaranteeing the sustainable development of tourist areas, accessible to everyone, which facilitates the visitor’s interaction with an integration into his or her surroundings, increases the quality of the experience at the destination, and improves residents’ quality of life” [quoted by 4, p. 180]. In addition to smart destinations there are two other components that come into play in the so-called smart tourism ecosystem [4, 5]: smart experiences and smart business. The latter is very relevant for this paper: it describes how stakeholders at a smart destination should on the one hand, internally digitalize their business processes, and on the other hand, externally collaborate with other public and private stakeholders at a destination [1, 4]. This is expressed very well in the idea that in a smart tourism ecosystem different elements and stakeholders are interconnected thanks to the support of technology [17].

2.2 Destinations and Data

A key aspect of this ecosystem is data/information, which need to be effectively and efficiently analyzed to enrich tourism experiences [5]. Data include not only tourism-related and internal data, but also data coming from external sources. This, in addition to mobile and wireless technology data, social media, location-based and sensor technology is what enables a tourism destination ecosystem to become smart [6, 18, 19]. Considering the central concept of data and information, Gretzel et al.’s [4] definition becomes very relevant: smart tourism is “tourism supported by integrated efforts at a destination to collect and aggregate/harness data derived from physical infrastructure, social connections, government/organizational sources and human bodies/minds in the

combination with the use of advanced technologies to transform that data into on-site experiences and business value-propositions with a clear focus on efficiency, sustainability and experience enrichment” (p. 181). It is then crucial for stakeholders at a destination to know how to capture, store, manage, analyze and use the potential and opportunities that these data entail to create value, make better business-related strategic decisions and understand tourists at their destination [14]. In fact, in a smart tourism ecosystem data processes entail a smart information layer for data collection, a smart exchange layer for interconnectivity and a smart processing layer for data analysis, visualization, and integration [4]. So far, despite a clear increasing interest by researchers in the topic, studies on data in tourism are still quite fragmented [13, 20]. There are more general and conceptual articles discussing big data and their importance [10, 21]. Other studies have been conducted mostly focusing on User Generated Contents (UGC), device and transaction data [12]. These include, for example, online textual data, location-based/GPS data, and web search data [12, 20, 22–24] that can be used by destinations to understand and predict [25, 26] travelers’ profiles [27], behaviors and preferences, and to create value as well as increase competitiveness [28–30]. Looking at research in Europe, the focus is rather on the development of smart tourism applications to enrich experiences using already existing data [4]. Considering this, a gap is found: more research with a managerial perspective is needed [4]. While it is clear to most (or at least many) destinations that being smart and working with (big) data is crucial to stay competitive and to increase the value of communication and experiences, and while many destinations are nowadays claiming to be smart, a step back should be taken in order to analyze the actual situation and where destinations position themselves on a scale of “smartness” – what processes they actual have in place to manage data and what possible business issues need to be solved.

3 Research Design

This research aims at investigating which data-related practices DMOs and related organizations in CH and FL (convenience sample) have implemented, together with their actual understanding of the concept of smart destination. The following research questions were defined:

- RQ1. How do CH’s and FL’s DMOs understand the concept of being “smart”?
- RQ2. How do they deal with data when it comes to collecting, storing, analyzing and sharing them?
- RQ3. How do they use such data in order to make decisions?
- RQ4. Do they perceive their data-related practices as being useful?

A survey has been designed and shared with tourism stakeholders in CH and FL in order to answer the RQs. To define the structure and questions of the questionnaire, the existing literature on the topic, both from academia and industry was taken into consideration [4, 5, 12, 13, 31–33]: in particular, Gretzel et al.’s model [4] of smart data layers – smart collection, smart processing, smart exchange and Hortonworks [32] and Halper et al. [33]’s big data maturity models. The questionnaire’s structure is summarized in Table 1.

Table 1. Structure of the survey and background literature for its items.

Level of investigation	Data collection (and background literature)	Data treatment
i) Understanding of “smart destination”	Collection of 3 open keywords	Cluster identification based on a content analysis
ii) Dealing with data: – what data are collected (collection) – how and where data are stored (coll.) – how data are analyzed (processing) – with whom and how data are shared (exchange)	Pre-defined options + open-ended questions Sources: [4, 5, 12, 13, 31–33], interviews with ATT’s employees	Frequency investigation
iii) Integration on decision-making	Pre-defined options + open-ended questions Sources: [13, 31–33], interviews with ATT’s employees	Frequency investigation
iv) Perceived usefulness of data-related practices	Pre-defined options Sources: [13, 33], interviews with ATT’s employees	5-point Likert scale

3.1 Case Studies

CH is a country divided into 26 cantons, with about 8.6 million inhabitants. DMOs can be of different typologies: national, cantonal, regional, and city. Regional DMOs usually cover a territory that is smaller than a canton, however, there are regional DMOs which cover more than one canton. For the sake of this paper’s comprehensibility, sub-cantonal DMOs are here called “local DMOs”. On average, considering the time period from 2010 to 2019 (2020 was excluded due to the impact of the COVID-19 crisis on the tourism industry) – the country counts about 17.5 million arrivals and 36.5 million overnights per year [34]. Different budgets are allocated to different types of DMOs and it is not a given that cantonal DMOs have more money than local DMOs. FL is a small principality neighboring CH and has a population of about 38,500 inhabitants. It has a national DMO, which covers the whole country but also collaborates with Swiss DMOs. On average, considering the same time period, the country counts about 72,600 arrivals and 147,600 overnights per year [35].

3.2 Data Collection

To validate the questionnaire, a pilot study was conducted with five participants working in a Swiss DMO (their responses were not merged with the final results). In order to recruit participants to the survey, members of the Swiss Tourism Federation,

which includes 140 tourism organizations, were contacted. Additionally, ATT's network was used to contact stakeholders and ask them to participate in the survey via email and LinkedIn. Data were collected from June 24 to September 2, 2020. At the end of this timeframe, 35 valid and complete responses were received (30 by DMOs and 5 by attractions).

3.3 Sample

The geographical distribution of the 35 respondents covers FL and 18 of CH's 26 cantons. All the statistical regions of CH are represented: Lake Geneva region, Espace Mittelland, Northwestern CH, Zurich, Eastern CH, Central CH, Ticino. Also in terms of linguistic representation, all the different linguistic regions are included in the sample: German, French, Italian and Romansh. Respondents were divided into the following categories, according to their organization type: (i) national DMOs (#2); (ii) cantonal DMOs (#4) – one of the respondents in this category is a DMO operating in more than one canton; (iii) local DMOs (#13); (iv) city DMOs (#4); (v) attractions (#5). Seven respondents did not indicate their typology and hence could not be classified accordingly. Overall, among the respondents, the roles covered are that of online manager, (digital) marketing manager/assistant, communication manager (media/press/PR), social media manager, market/product manager, project manager, content manager, sustainability manager, CEO/member of the management board.

4 Results

4.1 Defining “Smart Destinations”

Respondents were asked to indicate three keywords they mostly associate with the concept of “smart destination”. 105 keywords were collected, content analyzed and grouped into topic clusters. Similar keywords were grouped together (words in German and Italian were translated into English, and words like “smart” and “smartness” were not considered in the analysis as the word “smart” was used in the question). Four main clusters of topics related to the concept of “smart destination” were identified:

- Cluster I “technology”: included 50 keywords related to technology, data and ICTs (e.g. app/application, data/big data, digitalization, ICTs), as in Lopez de Avila [7] and Gretzel et al. [4].
- Cluster II “management practices”: included 23 keywords related to expressing management practices by DMOs (e.g. connection, cooperation, decision making, integration, innovation, intelligence) as in Lopez de Avila [7] and Gretzel et al. [4].
- Cluster III “sustainability”: with 9 keywords related to the idea of sustainability (e.g. ecological, environmentally friendly, sustainability/sustainable) as in Lopez de Avila [7] and Gretzel et al. [4].
- Cluster IV “users”: with 13 keywords related to users/tourists (e.g. customer-oriented, experience, guest needs, user experience) as in Lopez de Avila [7] and Gretzel et al. [4].

9 keywords resulted as off-topic (e.g. ideas of heritage, fun and beauty) when considering the most widely accepted definitions of smart destination in the literature.

Despite the varied range of words mentioned by the respondents, the results show that there are common conceptual nodes shared by practitioners. Looking at the order in which words belonging to these clusters were mentioned by respondents, we can say that top-of-mind domains are those of technology and management practices, while users seem to come to mind only in the last position for the first keyword, and in third position for the second and third keyword. Based on the four topic clusters the authors could draft a definition of smart destination that could represent the understanding of the participants: “a smart destination is a destination where innovative and efficient management practices use technology and data to better serve users within a sustainable context”. We might consider it as a triangular relationship among sustainability, management practices and users, with technology/ICTs at the center. It is interesting to highlight that the clusters actually very well represent the elements of most definitions of “smart destination”.

4.2 Dealing with Data

Data Collection

Figure 1 illustrates data collected by the respondents. It is divided into internal and external sources: the first are sources directly collected by the organization while the latter are collected by other stakeholders and passed to the organization.

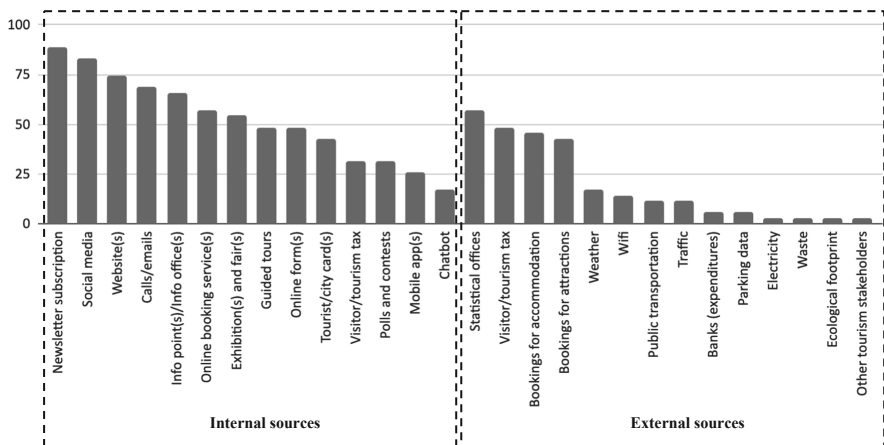


Fig. 1. % of respondents collecting specific data from internal and external sources (more than one answer allowed).

Visitor tax appears as both internal and external data source, since there are DMOs/tourism offices that collect this tax themselves while in other cases the tax is collected by an external party.

Data Storage

The tools used for data storage were analyzed. Interestingly, 28.6% only uses a single Customer Relationship Management (CRM) platform managed in house, 14.3% only uses spreadsheets (especially smaller organizations), while the most common combination is a CRM platform combined with spreadsheets (14.3%).

Data Analysis

Most of the respondents (74.3%) analyze the data they collect in house, 11.4% combine in-house with outsourced analysis, while only one respondent completely outsources the analysis. It has to be specified that two respondents claimed to analyze their data only partially and one respondent has just started developing an analysis process. 11.4% of the respondents do not analyze data collected (in particular attractions and a cantonal DMO). This result suggests that there is neither complete clarity on internal processes nor a unique understanding of what is implied and meant by data analysis. The organizations that are outsourcing their data analysis, or part of it, to external organizations mostly give their data to public bodies (universities, statistical offices and the cantonal DMO), only one is working with a private company. Looking at the categories, 100% of national and city DMOs analyze their data in house, while there is only one DMO that outsources the whole data analysis process, on the contrary, 40% of the attractions do not analyze their data. Respondents had the possibility to add comments to their answers. These comments were gathered to have a deeper understanding of the respondents' processes. It emerged that there are organizations whose data collection and analysis processes are still in their infancy, while there are others that are working on more advanced data management and analysis processes. In more details, three DMOs are not collecting a large amount of data, two are storing the data but not really analyzing them, and two do not have a platform dedicated to data collection. A DMO is starting now to develop a more elaborated data analysis process, while two other DMOs are only partially analyzing the data they collect. On the other hand, there is one DMO that is working to develop a marketing automation process and is oriented towards an open data strategy. This demonstrates that the situation in CH and FL is varied and not all DMOs and attractions have the same level of data management and analysis practices. The frequency of data analysis was also investigated. Most types of data are analyzed monthly and/or seasonally. On the other hand, data coming from social media is analyzed daily by 35% of the respondents gathering them. Data analyzed yearly by all the responding organizations gathering them are data related to electricity consumption, waste, data coming from other tourism stakeholders and ecological footprint.

Data Sharing

38.2% of the respondents do not share data with external organizations, those who do, mostly give their data to public institutions (e.g. other tourism organizations such as local DMOs), municipalities and cantonal bodies, and tourism observatories/universities. This shows that open (government) data is not yet largely adopted: DMOs do not extensively share data with the whole tourism ecosystem [4], possibly because of the complexity of the several Swiss administrative bodies.

In general, when analyzing respondents' answers according to the type of organization, there is no real pattern that emerges. In other words, national and cantonal

DMOs are not necessarily conducting more activities with the data they collect and analyze than local and city DMOs and attractions.

4.3 Integration within Decision-Making

Table 2 shows the activities for which the respondents use data.

Table 2. Usages of collected data (more than one answer allowed).

Type of data usage	%
Measure the performance of marketing activities	80.0
Making decisions and defining strategies for the company	71.4
Personalized messages and/or campaigns	60.6
Monitoring activities	60.0
Creation of new projects/services	54.3
Forecast	48.6
Institutional/corporate communication	45.7
Personalized products and/or services	43.8
Measure the performance of the employees in your organization	2.9

Participants were also asked to give more detailed examples of decisions that were taken by their organization based on data analysis. The most popular responses were related to decisions regarding the DMO's/attraction's strategy and investments (digital, business- and budget-related), the development/improvement of new products, marketing campaigns and partnerships, optimization of the website and other communication channels (social media, newsletter), rebranding strategies, and reaction/recovery strategy related to the COVID-19 crisis. Participants were also asked whether, based on data analysis, some initiatives/projects were discontinued. 39.4% of the respondents answered that their organization did indeed interrupt some initiatives/projects, 36.4% did not stop any initiative, while 24.2% of the respondents could not answer. As for the previous questions, examples were asked to the respondents. Most answers were concerned with marketing initiatives, products and partnerships that have been discontinued for not being successful and/or productive, and resources that have been differently allocated. It appears that, at the moment, responding organizations are more focused on using data to improve their communication rather than their products and services. The type of personalization initiatives described by the respondents, however, is more addressed to group segmentation, where tourists are clustered and messages are crafted for these clusters, rather than personalized for each individual. A respondent mentioned marketing automation initiatives being developed. Examples of more personalized messages/campaigns related mostly to digital campaigns regarding social media, newsletter, website, and in general more poignant communication to different groups of tourists, but also in terms of B2B communication with partners, travel agencies, tour operators, etc. Examples of more personalized products and services that were mentioned regarded the adaptation of offers and promotions of specific successful

products. As a last question on the actionability of data analysis, participants were asked whether their organization uses data to measure return on investment (ROI) of data collection and analysis. Only 6.3% of the respondents declared having a ROI measurement system (65.6% do not have one, while 28.1% do not know), but then most of them specified that it mostly refers to digital marketing campaigns.

4.4 Perceived Usefulness of Data-Related Practices

Respondents were asked, on a Likert scale from 1 to 5, whether the data they collect and analyze are considered as useful for their organizations. The data collected and analyzed by respondents are considered as very useful by at least 60% of the DMOs collecting them. This indicates that most organizations have reached an understanding of what is actually worth collecting and analyzing, or, in other words, the majority of respondents is not collecting/analyzing data that are not perceived as useful. Figure 2 shows the percentage of responding organizations that consider a certain type of data collected as useful. Data coming from digital tourism-related sources such as newsletters, social media, website, emails (and calls) and online booking tools, as well as data coming from statistical offices, tourism cards and info points appear to be the most useful. Also “niche” data - which is collected only by one or a few respondents - are said to be useful: that explains the effort and commitment by those collecting it.

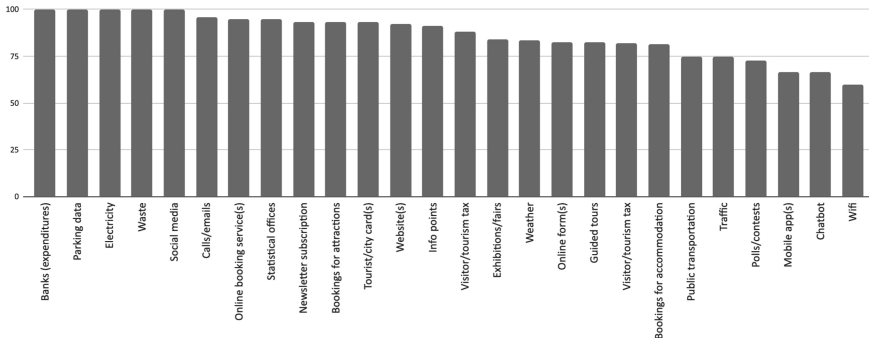


Fig. 2. Usefulness of data (% on respondents collecting them). When the number does not reach 100% it means that some respondents answered that the type of data are “not useful” or that they do not know if they are useful (more than one answer allowed).

5 Conclusions

This study investigated the state of the art of CH’s and FL’s DMOs and attractions in order to understand their data-related processes, by using a questionnaire to which 35 DMOs and attractions responded. By analyzing the answers to the questionnaire, it was possible to investigate how CH’s and FL’s tourism organizations understand the concept of being smart. Results highlight how, despite the variety of words mentioned by respondents, when clustered into common conceptual nodes, they actually very well

represent the elements of most definitions of “smart destination” (RQ1). When it comes to dealing with data (RQ2, RQ3, RQ4), it emerged from the analysis that organizations in CH and FL have very different data processes in place. Some organizations are collecting and analyzing several types of data both coming from internal data sources, the most common being newsletters, social media and organizations’ websites, and external data sources, the most common being statistical offices, visitor tax and bookings for accommodation; on the other hand, others mainly gather data coming from internal touchpoints and their analysis processes are still in their infancy. Regarding data storage, most respondents declared to use a single CRM in combination with spreadsheets. With respect to data analysis most respondents conduct this activity either partially or totally in house, while only one totally outsources it. The results of the analysis of data sharing activities show that the idea of a smart destination in which data is shared and accessed by different stakeholders in order to create value is not present yet, especially when it comes to sharing data with private stakeholders in the tourism industry (e.g. hotels, restaurants). Respondents’ decision-making processes appear to be based to some extent on data, especially when it comes to (digital) marketing initiatives and campaigns, although behaviors are quite different also in this area. All in all, most of the tourism organizations are aware of the importance of data and of their usefulness in supporting strategic decisions. This paper contributes in the field of research of data management practices of tourism organizations, by providing insights on how organizations use data in terms of collection, storage, analysis and sharing practices, as well as how they integrate these data on their decision-making processes, and how useful they perceive them to be. Limitations of this research regard the limited sample, as only two countries were taken into consideration for the analysis. While this paper has mostly taken the perspective of adoption, exploring which data practices are integrated by surveyed organizations, future research might take the point of view of “maturity” [32, 36–40], providing a model of how (much) a tourism organization can be mature and hence smart when it comes to data. In this direction, future research could investigate obstacles in data usage and intention to adopt certain technologies. The actionability of data analysis could be also investigated with in-depth interviews in order to clarify respondents’ answers. Finally, this study also has practical implications: managers can benefit from it as they might find its structure relevant in terms of steps and processes to investigate their own data-management and -usage practices. This could allow an assessment of the situation and an understanding of the direction in which the organization might move forward.

Acknowledgment. The work described in this paper was funded by the DESy (Digital Destination Evolution System) Interreg Italy-Switzerland Project.

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Identifying the Main Service Elements for Customer-Oriented Live Guided Virtual Tours

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Abstract. Virtual tourism allows people to see and experience the world without physically travelling to the destination. The objective of this study is to identify service elements critical to the development of customer-oriented live guided virtual tours. A total of three focus group discussions were conducted, with 4–5 participants in each group. All the participants were Japanese who had previously participated in live guided virtual tours. The data was analysed with qualitative content analysis, where an inductive approach was used. The findings reveal that the main expectations of the participants are related to experiencing the local culture and way of life, feeling of actually being in the destination (sense of connection), social interaction and active participation. These factors make the virtual tour feel realistic and attractive and the tourism businesses need especially to focus on these when designing virtual tours for example by providing ample opportunities for the virtual tour participants to discuss with each other and learn from each other. This study brings valuable insights into the virtual tours research from the customer perspective, especially in a non-Western context.

Keywords: Tourist experience · Virtual reality · Guided tour · Experience design · Content analysis · Virtual tourism

1 Introduction

Virtual tourism allows people to see and experience the world without physically travelling to the destination. So far virtual reality in tourism is mostly explored from a marketing perspective [1]. However, research has begun to focus on guided virtual tours during the COVID-19 pandemic [2]. When COVID-19 halted the traditional in-person visits, many attractions, sites, destinations and businesses started to invest in virtual tours [2]. Virtual tourism also can help to promote sustainable tourism and enhance virtual accessibility [3]. However, within the virtual tourism field, there have not been studies on a relative novel phenomenon of live guided virtual tours. These tours are similar to other tours in tourism but they happen completely online. They are completely or partly recorded and there is always a live guide on the tour. For example, during the pandemic many Airbnb Experiences hosts had to transform their destination tours into live guided online tours. Even though Airbnb Experiences have been studied in the tourism literature [4], the online live versions of these tours have not received

considerable attention. These live virtual tours can be considered as tourism experiences in themselves. As the phenomenon is still relatively new, there is a lack of research on what kind of experiences live guided virtual tours are and why tourists join these tours.

Customer perspective is critical in designing successful virtual tours [5]. Virtual tourism experiences have to be able to offer a satisfying user experience, not only from the technological perspective but also from the content perspective [6]. The goal of this study is to identify what are the main service elements of customer-oriented virtual tours. We test the usefulness of the customer-oriented tourism service model [7] in the context of virtual tours and aim to identify the critical elements of the service concept, process, and system. We also contribute to virtual tourism research by studying Japanese virtual tourists, which is a culture and a market that is often overlooked in research [8].

This study is done as a part of a tourism development project called Experience Kalevala which aims to design authentic travel experiences by combining Finnish nature, culture, and stories of Kalevala, the Finnish national epic [9]. One goal of the project is to develop a virtual tourism experience, a live guided virtual tour, that utilizes all the factors just mentioned. The target group of the pilot project are Japanese customers, and thus Japanese customers are also the target group of this specific study – more precisely Japanese customers that have already participated in a virtual tour, so they already have an idea about virtual tourism experiences. There have been calls for more research in a non-European context [8] on virtual tourism. This study provides more insights into the Japanese market by exploring their expectations and discusses how this understanding can be used in new service development.

2 Theoretical Framework

2.1 Virtual Tourism and Virtual Tours

Virtual tourism has gained considerable attention during the COVID-19 pandemic. Virtual tourism can be considered to include virtual reality (VR) and augmented reality (AR) applications as well as live broadcasting and streaming of tourism [3]. Virtual tours can be considered as a specific type of virtual tourism.

The term virtual tour is widely used on tourism organization websites, even though there is no clear consensus about the term. Virtual tours are said to be presentations of existing (or previously existing) locations, often consisting of a series of videos and photos [2]. They can also include other multimedia elements like sounds, speech, music, and text. Virtual tours can be distinguished from the programs presented on television as they are more interactive. Virtual tours often allow people to explore the environment in a similar way they could do in real life, but it only happens through computers and the exploration of space is limited only to points that are defined in advance [10]. In other words, there is no possibility for completely free navigation [11]. Virtual tours are also said to be a specific type of virtual experience that include computer-mediated interaction when exploring a destination [10]. During the COVID-

19 pandemic, many museums and cultural heritage sites have launched virtual tours using virtual reality technologies [2].

Virtual tours and tourism are now being intensively studied in the academic literature. El-Said and Aziz [2] studied what affects a person's decision to go on virtual tours. They found out that the Technology Acceptance Model and Protective Action Decisions Model can be integrated to effectively predict users intention to adopt virtual tours and that virtual tours increase the tendency to visit the actual tourism site. Lu et al. [3] used a mixed-methods approach to study the factors influencing the use of virtual tourism. They found out that among the Chinese tourists in their study, virtual tours in museums and other indoor sites were the most popular and that tourists are willing to use virtual tourism after the pandemic is over. Kim et al. [12] used a stimulus-organism-response theory to understand what factors make consumers visit the destinations they visit in VR. They identified authentic experience as an important factor in VR tourism and that cognitive response influenced intention to visit a destination in VR more than affective response. In a recent literature review, Wei [8] identified instrumental, experiential, psychological and social dimensions as aspects that users refer to when they describe and evaluate their virtual tourism experiences.

All the different types of virtual tours and videos of destinations have so far been mostly free to access for the consumers because they have been used as tools for promoting the destinations or tourism products. However, virtual tours that customers are paying for is a new phenomenon raising from the COVID-19 pandemic [13]. As customers have not been able to physically travel, they are replacing their physical holidays with virtual experiences. Tourism companies are offering so-called *live virtual tours*, *guided virtual tours*, *live online tours*, *digital tours* and *live online experiences* and customers are indeed paying for these experiences. The live connection is a new development step on virtual tours. There is a live guide who can interact with the participants online. In many ways, these guided virtual tours resemble traditional tours but utilize ICTs to connect the guest, the guide (host), and the destination in virtual form. Research on Airbnb Experiences tours has shown that user characteristics and tour guiding service are the most relevant factors for tourist satisfaction with tour and service [4]. However, little information is still available on what are the important characteristics of guided virtual tours from the customer perspective. For example, Wei [8] did not identify any papers related to the topic in the recent literature review between 2000–2018. Thus this is a relatively novel and underresearched field at this moment.

2.2 Modelling Tourism Services

Live guided virtual tours can be considered as tourism services. To be able to provide services for tourists, businesses need to understand their service concept, service process, and service system [7]. The service concept relates to the needs of the customers, and it explains how these needs can be fulfilled with the design of the service package or the content of the service [14]. Service process means a series of sequencing functions that should operate accurately so that the company can provide the service. By focusing on the important functions, the correct quality at a rational price can be achieved [14]. The last component, the service system, relates to the resources that are

available for the service process [7], for making the service concept possible through the processes that utilize these resources. The resources might include for example the staff, physical and technical environment, customers, and organization [14].

The service concept is at the core of everything. The service concept refers to the idea of the value that customers desire [15]. In other words, it is the answer to the customer's expected value [16]. For this reason, the empirical research in this paper aims to find out what the customers expect of the live guided virtual tours so that the service concept for the Experience Kalevala online experience can be developed. The service concept is enabled by the service process. For the customer, it means the visible components of the service, expressed for example in the form of a brochure, while for the company it means the chain of activities that can be presented for example with blueprints [15]. The service system for tourism products includes internal and external resources, hospitality, image and business mission. Together these three mentioned components create the prerequisites for tourism experiences [1].

Defining the tourism service model is an important step in the service development process. Understanding the service from the customer perspective enables novel service concept design [17]. Thus, this study aims to identify service elements at the concept, process, and system levels from the customer perspective for live virtual guided tours.

3 Research

3.1 Target Group and Data Collection

The research approach for this study is the qualitative approach. The qualitative research approach is used when the studied phenomenon requires holistic understanding [18]. The qualitative approach was chosen for this study as the purpose of this study is to understand the expectations toward live guided virtual tours from the perspective of Japanese customers, and develop a new service based on their expectations and perceptions.

In this study, the data was collected through focus group discussions. Focus group discussion refers to a data collection method where a group of people is "focused" on discussing a specific topic or issue [18, pp. 181]. Focus groups are commonly used in academic marketing research to study consumer behaviour, including customers' attitudes, needs, perceptions, preferences and choices [18], as well as opinions, values, expectations and perspectives [19], and therefore it works well as a data collection method in this empirical study. Eriksson and Kovalainen [18] state that focus groups can be used in three ways; as an only method, when the focus groups are the only source for empirical data, as a part of multi-method qualitative research, or as a supplement to a survey. In this study, the focus groups were the only data collection method.

The purpose of this study was to recruit Japanese people who had previously participated in a live guided virtual tour. For this reason, the researchers contacted a person who was familiar with this target group – a virtual tour guide from Japan. The participants for group discussions were recruited through her networks, as Eriksson and Kovalainen [18] state that participants can be recruited for example through a contact

person who knows the target group well. A total of 15 people enrolled on the study, but one of them had to cancel at the last minute. In the end, three group discussion sessions were conducted. In two of those groups, there were five people, while in one group there were four people. The group discussion sessions were organized online, using the Zoom platform during Spring 2021, as the COVID-19 situation prevented physical meetings. Two facilitators were present in the Zoom meetings, one focusing on taking notes and the other keeping the conversation ongoing.

The participants were asked some background questions in a separate form (Table 1). All the participants of the group discussions were females, so unfortunately no male perspective on the matter was included in the study. The positive factors were that the age range, as well as the number of virtual tours taken, had a wide range. Participants' age ranged from 26 to 61. The number of times participants had taken a live guided virtual tour ranged from one to even 30. The participants were asked if they were interested in participating live guided virtual tour again and if they were interested in participating in a virtual tour also after the pandemic when there are no more travel restrictions. Everyone answered both of these questions with "yes". They were also asked if they would consider replacing a holiday trip with virtual tours, and 12 out of 14 answered "yes" to this as well.

For this study, a group discussion guide with semi-structured questions was created [18, 19]. The questions focused on their previous experiences in live guided virtual tours and what kind of expectations and desires they had towards live guided virtual tours. The questions were designed to identify the prerequisites for customer-oriented tourism products and services [7]. The questions focused on the previous experiences of the participants as well as on the expectations and desires.

Previous Experiences

1. For what reasons did you decide to take part in a guided live virtual tour in the first place?
2. How would you describe the experience?
 - What was particularly memorable and meaningful?
 - Is there anything you would have changed or added to the experience?
3. Compared to traditional travelling, what kind of benefits virtual travelling has brought you?

Expectations and Desires

4. Please describe your general expectations for guided live virtual tours.
 - Next time you decide to purchase a virtual tour, what do you especially expect from the experience?
 - What are the most important factors for you?
5. What kind of content in the virtual tours would be most desired or most attractive for you?

6. *After showing some photos and videos of Finnish nature and Kalevala: What would you want to particularly experience in a virtual tour that is combining the elements of Finnish nature, culture, and Kalevala?*

Before the last question, some photos and videos were shown to the participants to give them an idea of Kalevala. Other materials or special techniques were not included as they would have been complicated (or at least too time consuming) to arrange through Zoom. Due to the time limitations of the participants, one hour was reserved for each group in this research, and this was told to the participants in advance. It was enough to go through all topics in the group discussion guide, as the facilitator made sure that all the topics were discussed during the sessions. All the sessions were video-recorded and transcribed, including all the non-verbal notions.

Table 1. Focus group discussion participant information.

Group	Participant	Age	Occupation	Number of live guided virtual tours taken
G1	P1	40	Freelancer	1
	P2	49	School assistant	7
	P3	45	Freelancer, interior coordinator	5
	P4	51	Consultant	10
	P5	56	Construction company worker	1
G2	P6	60	High school teacher	8
	P7	30	Part-time worker	5
	P8	45	English teacher	3
	P9	28	Web editor	4
G3	P10	56	Interior coordinator & life coach	2
	P11	35	Travel agent	30
	P12	61	Architect	15
	P13	50	Teacher	10
	P14	26	Local official	2

3.2 Data Analysis

The data were analysed through qualitative content analysis, as it is often used for drawing together and comparing focus group data, and it aims to provide a holistic picture of the studied subject [18]. Content analysis is a flexible method of analysing written, verbal, or visual data, and it is used for systematically describing phenomena [20]. It can be used in both qualitative and quantitative studies, and in an inductive and deductive way. The purpose of the study determines the used approach. The inductive way is recommended to use if there is not enough previous information about the phenomenon, whereas the deductive approach is used when the structure of the analysis

is based on previous knowledge and the purpose of the study is theory-testing [20]. In qualitative content analysis, the coding categories are commonly derived inductively from the data, meaning that the coding scheme is generated with the help of data, and this allows the creation of new theoretical and conceptual ideas [18]. Therefore, an inductive approach was used for analysing the data in this study. The inductive approach is also described as a conventional approach [21].

First, all the group discussion sessions were transcribed. This included also all the non-verbal notions that the researcher made, e.g., body language, emotions, and non-verbal agreements and disagreements. The data analysis started with reading through the transcripts several times and getting familiar with the data. This was done to achieve a sense of the whole data set [20, 21]. The familiarizing is referred to as the preparation phase, after which comes the organizing and reporting phases [20]. Once the researchers were familiar with the data, it was time to move on to the next phase. The organization stage started by going through the text again and underlining phrases, sentences or expressions that were relevant to the study. This is also known as coding [18, 20, 21], and it was done manually on a Word document.

The researchers first underlined those statements that were either common or exceptional. From the focus group data, it would be important to analyse issues that are repeated by several participants or by several groups, and on the other hand issues that are disagreed by several people or discussed by only one group [18]. Attention was paid especially to the commonly repeated issues, different issues between the groups, and to the situations where someone brought out an issue, and then others in the group demonstrated agreement verbally or non-verbally [18]. The coding was done by one of the authors and random checks were performed by the other to ensure an agreement that the coding was done correctly. Once the whole data set was coded, the codes were collected on a separate Excel sheet and then grouped to create categories. First categories were created around similar topics, and these topics were then categorized according to the service system model. In the last phase, the created categories were again grouped to create bigger main categories. This is known as abstraction [20].

4 Findings

As the goal of this study was to map out the main service elements for guided virtual tours, we focused on the customer perspective of the service concept, service processes, and service system. The context of the research is the Kalevala themed virtual tour. The main findings of the study are presented below, and all the data from the interviews were used to create Fig. 1 as a comprehensive demonstration of the results.

4.1 Service Concept

The service concept of live guided virtual tours can be constructed around **the realistic feeling of actually being there, interaction with other people, experiencing local culture and way of life, and active participation.**

The realistic feeling was strongly connected to the other memorable and meaningful factors.

“It was good that there were local people included to the tour, as it made the tour more realistic. I actually never thought the virtual tour would feel so real, so I was quite surprised that I would feel like we were actually travelling there, and like we were actually meeting those people.” (P8)

Interaction with other people was also a widely discussed factor in all groups. With this the participants were either referring to interaction with the other participants of the live guided virtual tour, as it was stated that *“having small group discussion with other participants was memorable”* (P6) and *“I was very impressed, and it felt memorable, to have the group talks”* (P11), or with the local people involved in the tour, as it was stated that *“I was also able to talk to the local people directly, which was very exciting for me”* (P1).

Those who were referring to the interaction with local people, also felt that **experiencing local culture and way of life** is a meaningful factor in the tours. They were referring especially to local people’s lives and learning about them by meeting locals. For example, P1 was mentioning the interaction (discussion) with local people, but she also said:

“I would say that being able to experience the lives of local people was most memorable. It was interesting to see and visit a local home, as we visited Danish architect’s private home, and learned about his life.”

Active participation (through live connection) was also a highly expected attribute of live guided virtual tours. The participants were stating that they do not want to just watch and listen, they want to be involved somehow themselves, and actively participate in the tour. This is possible through the live connection, as the participant can discuss, ask questions, and participate in activities in real-time. It is similar to Cho et al. [22] stating that on web-based virtual tours it is important to make customers active participants, “players”, instead of passive participants, “watchers”. These findings prove that this is also expected from the customers’ side. Participants stated for example the following:

“I expect the guide to involve everyone on the tour, and not just to talk about the places like keeping some kind of presentation.” (P9)

“What I want is an interactive experience, rather than a one-sided reception like watching a TV. I want to feel like I am actively participating the tour.” (P4)

“This was mentioned before, but having short surveys or quizzes makes us feel like we are actually participating the tour. Because if we are only looking at the photos and videos, or listening to the speakers, it would not really feel like we are on a tour.” (P8)

These four elements seem to form the service concept of live guided virtual tours. They differentiate live guided virtual tours from other virtual tourism experiences and especially from online museum tours that have become commonplace. This contributes to the literature by identifying the unique value proposition as the reason to use virtual tour services. Whereas previous studies have used the Technology Acceptance Model [2] or Theory of Planned Behavior [3] to explain the use of virtual tourism, we suggest that understanding customer perceptions of expected value is a useful approach.

4.2 Service Process

The service process explains how the service concept can be delivered to the customer. Several important elements could be identified from the data.

Videos and images of real places were desired by all participants, so those can be considered as important content to include in the tours. All the participants wanted to watch videos and images while on the virtual tour. The desired content of the videos themselves was varying according to the participant, but all of them wanted to see videos from the real environment, such as nature, buildings, attractions, and so on. Videos of nature sceneries were most often mentioned: *“video clips of nature, for example, going to the woods step by step, as it would feel realistic”* (P6). As can be seen from that example, the videos often make the tour feel more realistic, as if the customers would be there. In the discussions, there was no mention about the types of videos and no preferences for example for 360-degree videos. However, this might be because they had not seen these types of videos on their previous virtual tours.

Meet and greet with local people was also often expressed among the participants because all but one participant mentioned it or agreed about it. For example, the following statements were made: *“the kind of content I seek from virtual tours is meeting local people”* (P12), *“for me, it would be fun to communicate with local people in real-time”* (P2), and *“I would also want to talk to the locals”* (P1). Therefore, it would be crucial to always include local people in the virtual tours, so that the participants can meet and talk to them.

Group discussions refer to the discussions with other participants of the virtual tour. The participants of the tour are usually divided into smaller groups, where they can talk with each other and share their experiences. For example, P11 said that: *“It was so much fun to discuss and talk with other people in the group, so I would desire that also from my future virtual tours.”*

All the participants wanted to hear **stories of Kalevala** and **storytelling** during the Kalevala-themed virtual tour, for example: *“I am very interested in hearing the Kalevala stories and mythology, and also the background of Kalevala”* (P11) and *“I want to hear more about Kalevala and how the stories connect to the nature”* (P13). However, it was not stated that in which forms the stories should be presented, as the participants just said they want to *hear* the stories. The stories could be still presented together with videos, images or 3D presentations to make them even more appealing.

Q&A sessions were again talked about in all groups. Discussions in small groups and with local people seemed not to be enough, as the participants wanted to have time specifically reserved for questions and answers sessions. Besides the local people, they wanted to ask questions also from the guide and the companies included in the tour. As an example, it was stated that *“I want to ask questions from them about the place and about the life there”* (P2) and *“I want to ask many questions, so I also prefer having enough time for asking and answering to these questions”* (P11).

Activating tasks (quizzes, surveys) as well as **“souvenirs”** were discussed only in the G2. However, also these were expressed with unusual importance. For example, P7 said that *“the quizzes were so much fun, and made us feel like we are participating, that I would like to have those in the tour”*. “Souvenir” does not necessarily need to be any physical item, but just some kind of memory from the tour. It was said that *“after*

the tour it would be nice to get some kind of “souvenir” or “gift” as a memory from the tour” (P7), “I agree, it would be nice to get something afterwards, even if we would need to add some money to it. I was thinking that for me it would be nice to get even some tasks to do afterwards” (P8).

The service process emphasizes various means of interactivity between the tour guide and the guests. This interactivity can be considered as the main characteristic of the live guided virtual tour service delivery process. Whereas in many other forms of virtual tourism the tours can be launched online and they work independently, live guided virtual tours need the host and preferably other organizers and representatives of local people that utilize storytelling and many digital tools available to increase interaction in real-time.

4.3 Service System

The service system enables the service process. In live guided virtual tours the destination characteristics such as local culture, people, businesses and their employees, history and nature and landscapes form a major part of the service system. These factors enable differentiation among live guided virtual tours when, for example, the online platforms used all over the world are similar to each other.

All the participants also expected to see **sceneries of Finnish nature (lakes and forests)**. This was expressed for example as *“viewing the lakes and forests” (P5)* and *“seeing nature and forests” (P14)*. **Finnish culture & history** was desired by almost all participants. One of them stated that *“the more we hear about the history, culture and Kalevala stories, the more we can learn from your current culture and life” (P2)*. All in all, the connection between Kalevala, the Finnish culture and nature seemed to be very interesting for the participants. Related to nature, they also desired to hear some **sounds of nature** to feel more connected to the place. For example, P14 stated that: *“Being in the nature and hearing birds singing, it would be very relaxing. – If I close my eyes and listen to the sounds, I could feel like being there”*.

5 Conclusions and Discussion

This study aimed to identify the main service elements for customer-oriented live guided virtual tours. Figure 1 describes the service system model. At the heart of live guided virtual tours are the experiences of local culture and the way of life, the feeling of actually being in the destination, and social interaction and active participation. The service concept of the live guided virtual tours can be designed around these elements. These differentiate live guided virtual tours from other forms of virtual tourism. The service process should focus on enabling the interaction between the host, the locals, and the guests using online tools such as Q&A sessions, quizzes and surveys, multimedia, and storytelling.

The service system provides resources for the service process. In live guided virtual tours the local destination, its history and culture, people, businesses and natural surroundings are the key resources. Live guided virtual tours can be designed to be based on these resources as the virtual tourists, especially the Japanese tourists in this study, seem to be people who value these aspects.

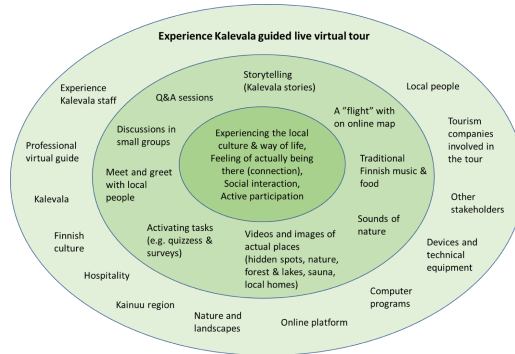


Fig. 1. Prerequisites for Experience Kalevala live guided virtual tour.

Virtual tourism has gained considerable attention during the COVID-19 pandemic [2]. It has been regarded as an alternative business model during the pandemic for many tourism businesses and attractions, it can help promote sustainable tourism, and improve virtual accessibility of tourism services [3]. The results of this study show that live guided virtual tours can indeed even replace actual travel, but this effect was not thoroughly investigated as it was out of the scope of this paper. Many of the respondents had already taken several live guided virtual tours with one respondent (P11) claiming to have participated in around 30 tours. This means that the service provided by these tours is indeed valuable for tourists and loyalty towards this kind of tourism service can be identified. This suggests that there will be demand for live guided virtual tours also after the pandemic.

The findings of this study show that Q&A sessions, videos of hidden spots and joyful experiences can provide value for customers. Also, storytelling, discussions with other group members, meetings with local people, activating tasks, all types of videos (including real-time videos), sounds, traditional music and recipes, 3D presentations, as well as some “souvenirs” of the tour may provide value for customers. The results demonstrate how important interactivity is in these tours and that this aspect differentiates live guided virtual tours from other forms of virtual tourism.

The factors mentioned above would work for all types of live guided virtual tours. However, customers prefer that virtual tours have some kind of theme or topic, like in the case of Experience Kalevala virtual tour. The expectations regarding Kalevala-themed virtual tour refer to hearing the stories of Kalevala, seeing sceneries of Finnish nature (lakes and forests), hearing nature sounds and traditional music, learning about Finnish history, culture, and traditions, and experiencing Finnish saunas. Nature is a much-desired element. Hence, the uniqueness of live guided virtual tours comes from the special combination of all of these. It needs “live like a local” experience and a sense of connection to the destination through content from the real environment, while also including discussions and active involvement through real-time connection. Also easy access from home through an internet connection and web-based platforms is needed.

This study contributes to the theory in several ways. First, it is one of the first studies to explore a special type of virtual tour, namely live guided virtual tours. Earlier

literature on virtual tours has studied mostly pre-made video tours such as museum or heritage site tours [2]. However, the results show that live guided virtual tours have a specific interactivity component that separates them from other types of virtual tours. Second, this study examines Japanese virtual tourists and provides evidence on this often overlooked, non-Western market [8]. Third, this study validates the use of service concept, service process and service system to understand the main elements and building blocks of virtual tourism experience [7].

In conclusion, it can be said that live guided virtual tours provide unique benefits as they allow people to experience the culture and atmosphere of the destination country and other realistic aspects of tourism interactively using technology, without physically visiting the destination. Virtual tourism is thus capable of providing realistic tourism experiences, even though it takes place through technological devices.

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Travel Incheon as a Metaverse: Smart Tourism Cities Development Case in Korea

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Abstract. The central government and local governments of the South Korea execute a project to build smart tourism city for tourism and urban development. However, little study has shed light on the details of smart tourism city project. To approach the concept of smart tourism city and understand the phenomenon of smart tourism city construction, this study conducts a case study. Incheon is the first city in which implementing the smart tourism city creation project. We apply the metaverse concept to check how Incheon implements a smart tourism city. Specifically, the metaverse concept applied tourism service operated by Incheon is divided into real based and virtual based (AR Incheon and Incheoncraft). Along with an introduction to the case, how the concept of metaverse supports the creation of a smart tourism city is discussed. This is an early-stage study that explores the phenomenon by considering the relationship between the smart tourism and metaverse.

Keywords: Smart tourism city · Metaverse · Incheon open port

1 Introduction

A city's ICT (Information and communication technology) infrastructure can play an important role in making the city competitive in tourism [14]. The central government and local governments in South Korea are operating a project to build a smart tourism city based on ICT to revitalize local tourism. The number of organizations applying for the project increased by more than 33% in 2021 compared to last year [9]. Research related to smart cities and smart tourism has been conducted in a variety of ways since the early 2000s. However, research on smart tourism city remains in its infancy [11]. Therefore, it is necessary to conduct research to understand the current status of urban development projects applying the concept of a smart tourism city. Incheon is the first selected area in South Korea to create a smart tourism city, providing services, content, and information for smart tourism to tourists. In addition, Incheon is making efforts to overcome the spatial limitation that a smart tourism city requires a physical space. As part of this effort, it also developed contents that applied metaverse concept. This study will conduct case studies for services to create smart tourism cities in the physical environment of Incheon open port and virtual spaces as a metaverse.

2 Literature Review

2.1 Smart Tourism City

Smart tourism city is semantically the combination of the three words: smart, tourism, city. ‘Smart’ is a buzzword that describes the technology integration in various sectors serving to enhance efficiency and convenience. ‘Smart tourism’ is an application of ‘smart’ in the tourism sector, allowing a technology-oriented on-site tourism experience at a destination [5]. ‘Smart tourism city’ is a city that facilitates smart tourism to offer innovative tourism destinations with sustainable development [11]. Although the term smart tourism city seems to be the technical sum of three separate words, its definition is not confined to the mere integration of technology in tourism and the city. Smart tourism city pursues the ideal form of tourism destination, not only providing tourists with convenient experiences but also aiming to enhance the residents’ quality of life which sustains the ecosystem [5]. In this regard, smart tourism city is oriented toward a similar goal with smart city, which represent up-and-coming city fueled by digital technologies to optimize resource efficiency, improving the quality of life of all residents [14]. Smart tourism city can be considered a specialized concept, operating upon the technological and theoretical foundations that the smart city provides, but mainly focused on the innovativeness of the tourism sector. Therefore, smart tourism city is particularly concerned with integrating technology into tour-related realms, which enhance the enjoyment of tourist attractions and provide easy accessibility to the destination [4]. Meanwhile, the recent development of virtualization technology makes it possible for tourists to experience smart tourism city in the virtual world, allowing them to enjoy the attractions regardless of physical accessibility. This new shift in the tourism sector can be explained by the term metaverse.

2.2 Metaverse

Metaverse, a 3D virtual world where people can experience a social/economic environment same as the real world [6, 13], has recently gained explosive attention in tourism industry as physical movement and human touching are restricted in COVID-19 pandemic. Metaverse was commercialized as Second Life, a social virtual world game in 2003, 10 years after its first appearance in Snow Crash of Neal Stephenson in 1992 [6, 13]. However, it was virtually impossible for individuals and companies to actively engage in metaverse due to the limitations of the ICT level and the lack of public interest. Only today, active engagement is realized through smartphone and Wi-Fi, which allow people to access the metaverse freely [10, 14].

Metaverse based on hyper-connection not only satisfies the human instinct for social interaction and embodies experience of the real world but provides a transcendent space where people can express themselves through avatars, a new self, different from oneself in the real world [13]. The transcendental characteristics of metaverse plays a role of trigger that let various fields, such as tourism, marketing, and education, recognize metaverse as a new business model [1, 8]. Thus, over the past few decades, the scope of business has expanded from offline to website-based online, and now it is expanding once again from website to metaverse.

2.3 Smart Tourism with Metaverse

Smart Tourism City strives to provide improved attractiveness and accessibility of the city by gradually expanding tourists’ experiences that have been provided based on the city’s ICT infrastructure into real and virtual-based metaverse [11, 12]. Metaverse basically shares the concept of ‘convergence of real and virtual world’, but depending on which world is focused on more, it can be divided into real-based and virtual-based metaverse [2]. A real-based metaverse focuses on the real world and reinforces the experience in the real world through virtual technology. A mirror world (e.g., google earth), a thorough replication of the real world, and Augmented Reality (AR) adopted in museums (e.g., Casa Batlló AR) can be understood as the real-based metaverse [2]. On the other hand, a virtual-based metaverse provides a novel experience that unfolds in the virtual spaces are separated from the real world. It includes a lifelogging, including social media to share tourism experiences in a virtual space, and a virtual world that allows the individuals to participate in the experience as an avatar [2].

Specifically, the two metaverse types have different characteristics according to their Role, Location of experiences, Type of Interaction, and Form of ego (see Table 1). These different types of metaverse can be utilized in the smart tourism city to overcome the physical accessibility and provide tourists with vivid tourism experiences through online. Despite the metaverse’s potential and growing popularity, the existing studies only suggest a vague image of how it can be applied to the tourism sector [7]. Therefore, this study aims to introduce the case of Incheon, the leading smart tourism city in Korea, initiating various forms of metaverse for an enhanced tourism experience by focusing on each characteristic suggested in Table 1.

Table 1. Real-based vs. virtual-based: revealing the differences

	Real-based metaverse	Virtual-based metaverse
Role of metaverse	Reinforcing real experiences	Providing new experiences
Location of experiences	Physical world	Virtual world
Type of Interaction	One-way	Two-way
Form of ego	Same as the real self	A new self-made by a user

Source: Authors

3 Case Study

Incheon is a metropolitan city in the northwest of South Korea. Incheon open port is a tourist destination, with many modern historical cultural assets preserved around the time of Incheon’s opening in the late 19th century. Incheon open port is currently developing smart tourism city through building smart eco-system, environment, and experience. In this paper, we will introduce two main metaverse service provided by Incheon through ‘Incheon Easy’ smart tourism application.

3.1 Real-Based Metaverse – ‘AR Incheon’

AR, augmented reality is generally defined as reinforced real experience provided by computer-generated images through digital devices, based on the physical world environment [3]. Unlike virtual reality metaverse ‘Incheoncraft’, AR services designed by Incheon provides one-way interactive contents by smartphone camera, letting tourists experience AR in real-world as themselves through usage of AR application, increasing tourism attractiveness.

AR service in Incheon is more than other simple AR services such as delivery of information through digital display, description, and guide contents which most smart cities and museums provide. It provides AR navigation service and AR map, but it is differentiated by providing historic maps and experiences from the past. It engages the users in the environment(real-world), providing extended reality experience, such as environment-related historic figures guiding the tourists, panoramic virtual mirror world through AR where tourists can share experiences on social network, seamlessly connecting real-world based and virtual world based metaverse. Lastly, there is a gamified service ‘Operation Incheon’ which gives missions to tourists, engaging in the service by providing incentives through clearing them.

3.2 Virtual-Based Metaverse – ‘Incheoncraft’

Incheon developed metaverse entertainment content which provide ‘Incheon experience’ through using Minecraft. Integrating Minecraft, a sandbox game which players explore a virtual world freely as avatars. This enabled users to create and experience Incheon without limits in the metaverse world, allowing Incheon to deliver the smart metaverse experience to tourists without their physical visit. There are examples of indirect experiences through Minecraft such as ‘English Heritage’ providing ‘mirror world’ experience without interactions. However, Incheon wanted to provide memorable experience which is impossible to be experienced in the real world through full ‘virtual world’ experience. The solution was to provide more than the city’s façade, through virtual time-travel in Incheon interacting as an avatar; a new-self made by the user, with other players’ avatars. In ‘Incheoncraft’, users can experience historic events with historic figures, and learn educational facts in Incheon metaverse (see Fig. 1).



Fig. 1. Players in ‘Incheoncraft’ experiencing historic event

4 Conclusion

This study tried to understand the phenomenon of smart tourism cities adopting metaverse, which are still in the early stages of research, through a case study. In particular, a study was conducted to introduce contents that could enhance the tourists' experience and increase accessibility to the Incheon area beyond the limitations of location-based services through metaverse. Through this study, we were able to form a link between the concept of metaverse and smart tourist cities that have rarely been discussed before. To the best of our knowledge, this is the first attempt to shed light on tourism in conjunction with metaverse, provided with a tangible case study. In addition to this novel first step, this study paved the way to discuss the current smart tourism cities in respect of the metaverse, opening the door for future studies to explore the interplay of the two subjects.

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CoViD-19



Communicating to Tourists During and Post-Covid-19: What Do They Want (Need) to Hear?

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Abstract. Swiss tourism relies heavily on international clientele to book rooms and purchase goods and services. However, from March to June 2020, due to the COVID-19 pandemic, travel and subsequent bookings slowed and, in some cases, stopped altogether. Based predominantly on Situational Crisis Communication Theory (SCCT), this paper investigates Swiss hotels' messages on their official Facebook pages and the SCCT strategies they employed during this crisis. The findings from 48 independent four- and five-star hotels show that the *Victimage* strategy was the most often employed when communicating about the COVID-19 pandemic in general. Further, most hotels published positive messages during this period (68%) and strongly emphasized their roles as victims at this time. Only 5% of the messages posted were negative messages. Hotels 'blamed' the government and the sanitary measures for their closing or reduced services. The findings presented here contribute to the literature by offering a pattern of crisis responses from Swiss hotels in the early period of the pandemic. These results are currently being updated with the messages communicated in the 12 months since the beginning of this study. The findings of this crisis communication during an early stage of the pandemic will be used to make concrete recommendations for the strategies that should be implemented in the future if the COVID-19 crisis continues or when faced with other crises.

Keywords: Swiss hotels · COVID-19 · Facebook · Situational Crisis Communication Theory (SCCT) · Crisis communication strategies

1 Introduction

Tourism in Switzerland is a lucrative business. The tourism industry is one of the largest export industries in Switzerland with 4.4% of export revenue [1], providing many jobs to the local communities and contributing significantly to the local economy in general. According to the 2019 official statistics, Swiss tourism includes 28 985 hotel and restaurant establishments that generate CHF 44.7 billion in total revenue, CHF 16.6 billion from foreign tourists in Switzerland [2].

The 2019 tourist season was a profitable time for Swiss tourism. The expectations for 2020 were equally positive until late December 2019, when news of the COVID-19 pandemic and its potential to spread globally was shared.

As word of the COVID-19 pandemic spread, the Swiss tourism industry experts began making ominous predictions regarding the 2020 tourism season, and early statistics confirmed those predictions. According to a press release from the official Swiss Federal Statistical Office (FSO) on Feb. 2, 2021- “In 2020, the Swiss hotel sector registered 23.7 million overnight stays. This represents a fall of 40.0% (–15.8 million overnight stays) compared with 2019. The exceptional context of COVID–19 explains this unprecedented fall at a level not seen since the end of the 1950s. Foreign demand registered 7.3 million overnight stays, i.e., a decline of 66.1% (–14.3 million). Swiss demand fell less drastically (–8.6%/–1.5 million) to 16.4 million overnight stays.” (para.1) [3].

Previous studies have examined crises in the hospitality industry, and Swiss hotels have remained relatively unscathed from previous crises. Nonetheless, with the COVID-19 pandemic, Swiss tourism was significantly affected. In the period examined in this study (March through June 2020), Swiss tourism saw foreign demand fall by 68% in March and overnight stays by Swiss guests by 55% [3]. The number of Swiss guests declined further in April 2020 (by –86%) and rose slightly in May 2020 (–54%) [3]. With the relaxation of some of the COVID-19 restrictions, domestic rose slightly to only 23% less than the previous year’s statistics [3].

This study aims to investigate the messages that Swiss hoteliers provided to their clients on their official Facebook pages. As many clients use social media, particularly Facebook, to gather information before traveling, this communication channel was selected as the most appropriate for analyzing the SCCT strategies these hotels employed. The overarching objective is to establish the strategies used and gauge their effectiveness in communicating during a crisis, namely, the COVID-19 pandemic. These results can be used to communicate ‘better’ when the next crisis hits the hospitality industry.

2 Literature Review

2.1 Crisis and Situational Crisis Communication Theory (SCCT)

Crises have been defined as unpredictable events that can disrupt an organization’s operations, impact their performance and, potentially, generate negative feelings toward the organization leading to reputational damage [4]. While an organization is concerned about its reputation, public safety and keeping customers safe comes first [5]. The COVID-19 pandemic is a crisis where the organization has little to no responsibility or control over the circumstances. This type of crisis is categorized by stakeholders as a Victim crisis, as the organization could do nothing to prevent its occurrence [6]. With this global pandemic, all industries were affected, but some industries fared better than others. For the tourism industry, COVID-19 had significant consequences. In this paper, one part of the broader tourism industry, i.e., hotels, will be examined to gauge how they faced the pandemic.

According to Coombs Situational Crisis Communication Theory (SCCT), when the organization has been attributed weak responsibility or has been identified as a Victim crisis such as COVID-19, the organization should implement an ethical base response. This base response consists of *instructing* information (i.e., explaining the crisis to the stakeholders) and *adjusting* information (i.e., helping stakeholders cope with the crisis) [7]. This is the overarching strategy that should be used in the case of any crisis. However, organizations can choose to employ other strategies as well based on the crisis. For example, they could include SCCT strategies such as *ingratiation* (i.e., praising stakeholders for efforts they have made), *victimage* (i.e., confirming that the organization is a victim of this crisis), or *reminder* (i.e., telling stakeholders the good things you did in the past) [8]. These are part of the crisis communication strategy cluster known as *bolster* [9]. Other crisis communication strategy clusters include *instructing* and *adjusting* (i.e., the base response of all crisis messages), *deny*, *diminish*, and *rebuild* [9]. Depending on the type of crisis, the attribution of responsibility, and the intensifying factors, organizations will choose which response or which combination of responses best fits the crisis at hand.

The research has evolved to include crisis communication strategies consisting of enhancing, scapegoating, and transferring. *Enhancing* is defined as telling stakeholders about current good works the company is doing [10]. *Scapegoating* occurs when companies shift the blame to another group outside of the organization [11]; this is part of the deny cluster [9]. *Transferring* entails naming a credible third party as part of the crisis response [10]. This paper examines how Swiss independent hotels communicated crisis responses on their official Facebook pages during 3 months in 2020.

2.2 Crisis Communication in the Hospitality Industry

Researchers have examined how and what companies communicate with their stakeholders in times of crisis. In the hospitality industry, specifically, researchers have examined the messages posted on social media platforms such as Twitter or Facebook during crises. Tourism organizations are encouraged to use social media to communicate during crises as many tourists turn to social media to seek information about the destination or property [12]. After all, their stakeholders are using social media and often post on their own social media accounts while on vacation [SAME]. However, studies have shown that the hospitality industry, in particular, has not been proactive and does not take advantage of the reach that social media has during crises [8]. Further, some hospitality organizations have given inappropriate responses in times of crisis [11]. The hospitality industry must become less averse to social media and embrace it as a potential channel for crisis communication. As Switzerland is dependent on international travel for their tourism, particularly for hotel occupancy, this study will analyze the crisis communication strategies used on the official Facebook pages and address the following two research questions:

RQ1: What crisis communication strategies were employed most frequently during the first wave of COVID-19 by Swiss hoteliers?

RQ2: What sentiment were the Swiss hoteliers trying to communicate to their clients during this first wave of COVID-19?

3 Methodology

This paper examines the messages during and after the first wave and first confinement of 48 Swiss four- and five-star, independent hotels to analyze the crisis communication strategies they employed during this period. Their messages posted on their official Facebook pages are measured against Situational Crisis Communication Theory (SCCT). Both content analysis and a sentiment analysis of their messages were conducted to establish the strategies they used and the emotion they created in doing so. This paper concludes with the implications of effectively using crisis communication strategies during the COVID-19 pandemic and future crises.

To examine the messages posted on Swiss hotel Facebook pages, a list of 222 independent hotels (four- and five-star independent hotels in Switzerland) was created. Of the original 222 hotels, only 96 had Facebook pages. Of the 96 remaining hotels, those that were part of a group (though not a chain) and hotels that were closed during this period were eliminated. The remaining 48 hotels were used in this study, and a comparison between their Facebook traction in 2019 versus 2020 was made. The Facebook comments were tracked from mid-crisis when many hotels were closed (March 13, 2020) to June 13, 2020, again, when many of the hotels reopened. The same dates were used in 2019 as well. Some hotels were preparing to open their doors when this study was conducted, while others communicated the reopening date. This study analyzes the crisis communication strategies employed by Swiss hotels during this first de-confinement stage.

The research team collected all posts and calculated descriptive statistics, including means and standard deviations. Two research assistants independently coded all comments based on the SCCT strategies and recorded the frequencies. Their results were compared to seek differences. Any differences were discussed until a final agreement was reached. A sentiment analysis was conducted by inserting each post to the sentiment analysis tool available at Monkeylearn.com. For each post, Monkeylearn.com classifies it as positive, negative, or neutral and provides its confidence level. The closer the confidence level is to one, the more reliable the result. The research team recorded the sentiment classification, frequencies, and confidence level.

4 Results

4.1 Descriptive Statistics Results

The means and standard deviations for the numbers of posts are 23.85 (S.D. 24.46) and 1.98 (S.D. 1.54) for 2019 and 2020, respectively. The two tail t-test result ($t(47) = 6.296, p = 0.000$) confirmed the significant difference between 2019 and 2020. While the literature suggests that communication during a crisis should be frequent, timely, and consistent [7], the lack of communication from Swiss hoteliers seems to indicate the opposite. They posted quite infrequently, particularly in comparison with the same period in 2019. One explanation could be that the hotel business is quite competitive; thus, hotels post their special offers to attract clients during their busiest seasons. In the case of COVID-19, there was nothing new to post and nothing to offer.

Further, international tourists who could not travel due to sanitary restrictions, quarantines, or lockdowns would not search for hotel information on Facebook. The typical exchanges on social media, i.e., travel stories or photos, were not posted during this period.

4.2 Hotel Official Facebook Comments – Frequency of SCCT Strategies

The Swiss hotels examined in this study are located in various regions in Switzerland. Thus, many of the messages are communicated in the local language. Switzerland has four official languages, French, German, Italian, and Romansch, but, as an international travel destination, Swiss hotels are obliged to provide messages in English as well. In this study, we focused on all the messages communicated in English. On Table 1, the frequency of the types of SCCT strategies employed by the hotels are analyzed. The only SCCT strategy that was not employed was *apology*; this result could be expected as all hotels were victims of this crisis.

Table 1. Frequency of SCCT strategies employed by Swiss hotels

Strategies	Number of times employed	Frequency
Scapegoat	11	12%
Justification	8	9%
Apology	0	0%
Compensation	7	8%
Endorsement	2	2%
Enhancing	5	5%
Ingratiation	10	11%
Reminder	3	3%
Victimage	46	49%
Transferring	1	1%
Total	93	100%

From the results, only one strategy, *victimage*, was used in 49% of posts communicating about the Covid-19 situation. All the other strategies were employed less than 12% of the time, such as *scapegoat* (12%), *ingratiation* (11%), *justification* (9%), and *compensation* (8%), *enhancing* (5%), *reminder* (3%), *endorsement* (2%), and *transferring* (1%). To further investigate these strategies, a sentiment analysis was conducted with all the posts. Table 2 displays those results. As seen in the literature, *ingratiation* and *victimage* derive from the *bolster* crisis communication cluster.

4.3 Hotel Facebook Comments and Sentiment Analysis

The 93 messages on Facebook were also examined through sentiment analysis. As seen on Table 2, the vast majority of the messages posted were classified as positive messages. Nonetheless, there were examples of positive, negative, and neutral in the data.

The confidence levels for positive messages ranged from .4 to .99 indicating a strong relationship between the words and the sentiment as the closer to one, the more reliable the result. For negative messages, the confidence levels ranged from .56 to .80 and, for neutral messages, from .40 to .94.

Table 2. Sentiment analysis and frequency of communication strategies

Sentiment	Positive		Negative		Neutral		Total	
	#	In %	#	In %	#	In %	#	In %
Scapegoat	0	0%	1	1%	10	11%	11	12%
Justification	3	3%	1	1%	4	4%	8	9%
Apology	0	0%	0	0%	0	0%	0	0%
Compensation	3	3%	0	0%	4	4%	7	8%
Endorsement	1	1%	0	0%	1	1%	2	2%
Enhancing	2	2%	1	1%	2	2%	5	5%
Ingratiation	9	10%	1	1%	0	0%	10	11%
Reminder	2	2%	0	0%	1	1%	3	3%
Victimage	43	46%	1	1%	2	2%	46	49%
Transferring	0	0%	0	0%	1	1%	1	1%
Total	63	68%	5	5%	25	27%	93	100%

Overall, comments classified as positive were the most frequent in the study at 68%, followed by neutral (27%) and negative (5%). This finding indicates that under difficult times, hoteliers still wanted to create positive sentiments. Neutral responses were relatively common which could be explained by the need to give ‘distressing’ information while still holding a positive attitude. Only five messages were categorized with negative sentiment. Nonetheless, these results can be explained by the SCCT strategy adopted.

Based on Table 1, victimage and scapegoat are the most adopted strategies. Table 2 demonstrated that different strategies could be applied in positive, negative, or neutral tones. Victimage was the dominant strategy employed by Swiss hotels and was primarily executed in positive tones but could be in negative, or neutral tones. For example, a positive sentiment analysis phrase for victimage read: ‘We wish you a lot of energy for the coming weeks and are already looking forward to welcoming you again in the summer’ (confidence level = .67). A neutral sentiment analysis of victimage stated: ‘The hotel is closed at this due to Corona measures’ (confidence level = .50). The negative example of victimage was: ‘Finally it starts again today Wednesday, and we will see you again after a long break’ (confidence level = .56).

For comments with negative sentiment analysis, five SCCT strategies were used equally: Justification, victimage, ingratiation, enhancing, and scapegoat. Nonetheless, the negative category had the least comments (one per category), which could explain this even spread. Justification, victimage, and scapegoat may be explained by the need

to 'blame' someone outside of themselves or to justify the measures they have taken against their will. As these decisions were imposed on the hotels, they may have felt obliged to communicate this to their clients. The only other strategies used with negative sentiment analysis were enhancing and ingratiation.

For neutral sentiment analysis comments, eight SCCT strategies were employed. The least frequent strategies were reminder, endorsement, and transferring (once each), enhancing and victimage (twice each), and justification and compensation (four times each). Scapegoat was the most commonly used strategy (10 times). The latter could be explained by the hoteliers' need to blame someone else for their situation; it appeared simpler to identify an enemy, i.e., COVID-19, than to admit a fault that was clearly not their own.

By conducting both the SCCT strategy analysis and sentiment analysis, this research advances the SCCT research in the hospitality industry to another level.

As shown in Table 2, the SCCT provides a general guideline, but these strategies can be executed in different tones. For example, victimage, justification, and enhancing appeared in positive, negative, and neutral sentiment analysis results. Practitioners are encouraged to explore the different sentiment tones when implementing the SCCT strategies.

5 Discussion

As mentioned in the literature review, The COVID-19 pandemic was not a unique crisis affecting an individual property or region; instead, this crisis affected all hotels and regions equally. There was minimal responsibility attribution allocated to the hotels; thus, their response could be justifiably minimal as well. Many establishments could have posted only a base response, i.e., *instructing and adjusting* information without communicating further. In some cases, hoteliers did not need to communicate about the sanitary measures if their establishment was closed or had only limited business; thus, even the base response was unnecessary. Nonetheless, from this study, it can be seen that many Swiss hoteliers chose to offer more than the base response. Further, they attempted to communicate positively despite the dire circumstances and immediate bleak season in sight.

RQ1: What crisis communication strategies were employed most frequently during the first wave of COVID-19 by Swiss hoteliers?

When they communicated via Facebook, Swiss hoteliers predominantly employed the *victimage* strategy, i.e., reminding customers that the hotels are victims of this crisis as well as the clients. In this way, it is a shared victim status that could, in theory, bring customers and hoteliers together for a common cause. While seemingly contradictory, a *victimage* strategy is not negative in the case of a crisis; instead, it shows that the stakeholders do not attribute blame to the company, i.e., the company could do nothing to avoid this crisis. Of the other strategies, *scapegoat*, *ingratiation*, *justification*, and *compensation* were used in fewer than 12% of the messages. No apologies were offered as the pandemic was not a crisis that was in their control.

RQ2: What sentiment were the Swiss hoteliers trying to communicate to their clients during this first wave of COVID-19?

As seen from the sentiment analysis, Swiss hoteliers preferred to focus on positive messages to convince the clientele that the opportunity to return to their properties had finally arrived. These messages did not inform the guests that the experience could potentially be different from previous stays; instead, the messages focused on getting the clients back. Swiss hoteliers did not post daily updates on the COVID-19 pandemic nor the status of their hotels. While they may have missed an opportunity to show compassion or empathy, as the literature advises, their strategy revolved around the better days to come.

6 Conclusion/Implications

Coombs outlines the importance of preparing strategic messages that align with a company's crisis and applying the appropriate SCCT strategies to communicate these key messages. Based on the SCCT theory, crisis communication teams can brainstorm potential crises for their industry and proactively prepare crisis communication templates for the different communication channels they use. The COVID-19 pandemic was the latest in a long line of health crises that the hospitality industry has endured. However, the extent of the COVID-19 pandemic and its long-lasting effect on the industry has yet to be seen. While some hotels have reopened, closed, and opened again, others have suffered lay-offs and, in some cases, closures.

The COVID-19 pandemic placed all hotels (and their guests) in the position of the victim. This could explain why the *victimage* strategy was employed in their Facebook posts. Swiss hoteliers preferred to state the facts, i.e., “we are closed due to COVID-19”, followed by frequent communication about the ever-changing COVID-19 status or regulations, i.e., “guests must wear masks in the public areas” or “hand sanitizers are available in all public spaces.” With the vaccine and the falling number of new COVID-19 cases, hoteliers need to take strategic decisions on how to reopen safely and sustainably without putting themselves, their guest, or their reputations at risk.

As the sanitary conditions improve and more guests and employees are vaccinated, Swiss hotels can begin reflecting on how well they dealt with the COVID-19 crisis and communicated about it during this unprecedented crisis. While many hotels reduced their Facebook posts, there may have been a better strategy to use. These hotels could have opened a dialogue with their customers to entice them to return once the situation improved. Swiss hotels could have proactively promoted next season's opportunities or offers instead of waiting until they were open.

7 Limitations/Future Studies

This study had several limitations. Firstly, the hotels were limited to four- and five-star Swiss independent properties that posted messages from March to June 2020 on their official Facebook page. Future studies could evaluate other social media platforms or other periods. Secondly, this study focused on Swiss hotels. Comparative studies against other countries could be preferable in the future to identify best practices in communicating about a crisis on an industry level. Thirdly, the messages in this study derived uniquely from the hotels' official Facebook pages. A further study should investigate the comments posted by the other stakeholders as well. Finally, while the

SCCT strategies and their sentiments were analyzed in this paper, there was a lack of discussion on the influence of these messages on their clients. A future study could examine the relationship of these strategies with the public's response or emotions.

When this ENTER2022 conference occurs in January 2022, the tourism industry will have opened, closed, and opened again, with restrictions being relaxed only to return to lockdown. Now that the base of SCCT strategies has been established during this time frame, a study is currently being undertaken to analyze the messages posted on social media for the nine months that followed. Examining a full year of crisis messages will inform tourism professionals of the best practices to employ when a future crisis arrives. In the end, a complete picture of what Swiss hoteliers communicated through the various phases of the COVID-19 pandemic will be examined to gauge which strategies were used and their overall effectiveness.

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An Exploratory Study of Consumers' Travel-Related Concerns About COVID-19

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Abstract. This study explores consumers' travel-related concerns about the COVID-19 pandemic via YouTube comments. Drawing on the risk perception theory and adopting a Markov Chain approach, this study demonstrates the topics that consumers discussed and empirically illustrates perceived risk in the tourism and hospitality industry via sentiment analysis across four sectors: recreation and entertainment, accommodation, transportation, and food and beverages. Results indicate discussion regarding travel-related videos is not only limited to travel-related topics but also includes a broad perspective of social, political, and historical topics. For instance, hotels have a new function as quarantine facilities with effective disease control procedures and social responsibility for public health. Additionally, health, performance, financial, social, and psychological risks are identified. Whereas the presence of travelers is typically regarded as positive, travelers during the crisis are regarded as “irresponsible” and “selfish” individuals who spread the virus and endanger public health. This shift of perception calls for both the industry and academia at large to educate people about the importance of disease control and rebuild travelers' image and reputation. Recommendations to reduce the perceived risk in each sector are also provided.

Keywords: Risk perception · Sentiment analysis · Markov chain · YouTube comments · User-generated content

1 Introduction

Even though the outbreak of Covid-19 imposed extraordinary uncertainty and crisis in the hospitality and tourism industry, the World Tourism Organization (UNWTO) has announced to switch the direction towards reopening and restarting tourism [1]. Because the pandemic-related restrictions are gradually lifted and COVID-19 vaccination doses have been widely administered in U.S. [2], people are heading back to restaurants and travel destinations [3]. Based on the report released by [4], the level of the seated customers in restaurants has reached the pre-pandemic levels in the U.S.

Following the devastating impact and forthcoming recovery in the hospitality and tourism industry, numerous studies are calling for theoretically driven, and systematic research about how customers perceived travel-related activities and correspondingly perceived risk and concerns [1–4], so that the hospitality and destination managers can develop the coping strategy to reduce the perceived risk and recover the whole industry [5].

However, the majority of current studies about perceived risk are conducted in designed questionnaires [5–7], which constrained the capability that consumers can freely speak out their perceived risk. In fact, it calls for an exploratory study related to COVID-19 in tourism and hospitality, instead of fully grounded in the existing literature [5]. Considering the outbreak of Covid-19 pandemic created an unprecedentedly social and economic environment, people are likely to have unpredictable behaviors and feelings, which makes the validity of existing knowledge under the new normal much more challenging and questionable [6].

Given the identified research gap, this study explored the consumers' travel-related concerns about the crisis of the Covid-19 pandemic. Drawing on the risk perception theory, this study adopted the Markov Chain text mining method to identify the topics discussed by consumers and empirically illustrated the perceived risks in the overall tourism and hospitality industry and four sectors respectively. Results show that when consumers are watching travel-related and Covid-19 related videos, what they are discussing is not constrained in travel-related topics, but include a broad perspective of social, political, and historical topics. Noticeably, hotels are assigned a new function, the quarantine facilities, which require hotel businesses to develop effective disease control procedures and shoulder more social responsibility for public health. Additionally, health risk, performance risk, financial risk, social risk and psychological risk are all identified. Different from the previous that travelers are regarded as positive image, travelers during the crisis are regarded as "irresponsible" and "selfish" who spread the virus and danger the public health. It calls for both the industry and the academia to educate the importance of disease control and rebuild travelers' image and reputation. Practically, this study can benefit policymakers and managers to understand customers' beliefs and behaviors under the crisis as well as consumers' expectations towards the post-pandemic, which is crucial for designing and operating actionable policies and coping strategies.

2 Literature Review

2.1 Risk Perception

Perceived risk refers to the potential future loss that may happen if a particular decision has been made [8]. People perceive risk since the uncertainty may potentially trigger negative outcomes. Perceived risk has been widely recognized as the critical factor that have an effect on consumers' decision-making and behavior [8–10]. There are a variety of perceived risks that have been identified in destination marketing [11], food delivery [12], and service industry [13]. Performance risk refers to the expectation may not be satisfied after the service is delivered [14–16]. Financial risk refers to the potential financial loss that the service has to be replaced, fixed or compensated [17, 18]. Psychological risk refers to the psychological discomfort (e.g., regret, worry) caused by the service experience [11, 19]. Social risk is linked to the probability of a customer's buying behavior that can influence another customer's opinion and perception [20–22]. Health risk reflects the situation that the consumption of the service can trigger an unprecedented hazard to the customer's health [15, 23].

Perceived risk from COVID-19 is very critical since it has severely negative impacts on revisit intention for hotels [24]. However, most of the studies are supported by primary data [5–7], which constrained the capability that consumers can freely speak out their perceived risk [25]. This study adopted the User-Generated Content, specifically, YouTube comments, to explore consumers' travel-related concerns in the inductive way.

2.2 User-Generated Content

User Generated Content (UGC) is regarded as the creative work that is published on accessible and public platforms and usually has no direct linkage to commercial profits or monetary interests [26]. Customers are more likely influenced by the UGC with negative valence [27]. Novelty, reliability, understandability, and interestingness embedded in UGC would influence consumers' selection of destination [28]. Since Covid-19 is the first pandemic most of us faced, the repercussions for the travelers are not researched before. This study aims to explore the risk perception of travelers via YouTube comments, classify the risks based on different tourism sectors, and understand the sentiment of these comments. YouTube comments were selected since this platform features genuine debates on controversial issues and has been regarded as a significant public space for engaging in debate and exchanging opinions [29]. For many less active social users are the observers, their attitudes and intentions may be influenced by being exposed to YouTube comments [30], highlighting the significance of exploring them as a textual corpus of study.

3 Method

3.1 Sample

This study employed YouTube Comments as the sample. First, we designed a list of keywords that includes both Covid-19 related words and tourism and hospitality related words. Next, we scraped the YouTube videos whose titles include any of the keyword. Finally, we exported the comments below each of the video and compiled all the comments as the sample of this study. The data sample includes 521 YouTube videos and 9,727 unique comments. The data were collected on October 5, 2020. At that time, the videos that include the keywords were relatively limited. Since the perception from consumers is the research objective in this study, the producers and origins of the videos were not collected.

3.2 Contribution of Sentiment Words

Sentiment analysis was used to not only understand the opinions and attitudes delivered in the comments, but also capture which words with emotional and opinion information are critical in the text. Considering the exploratory nature of this study, we didn't assess the sentiment scores in traditional way but explore the most significant sentiment words according to the frequency of the word.

3.3 Popular Bigrams

We further examined the relationship between words by Markov Chain. Markov Chain, the common model in text mining, was selected as the approach for visualization [31]. Markov chain theory refers to the adjacent characters sequences are employed to generate the probabilities transition matrices. In the linguistic field, Markov Chain has been widely used in identifying malicious attack [32], predicting the geo-location of Twitter users [33], evaluating digital document authentication [34]. In fact, Markov Chain have been used in tourism literature to forecast tourist arrivals [35] or model the spatial and temporal movement of tourists [36] but rarely used for text analysis [37]. This study innovatively used Markov Chain to visualize the topics that consumers discussed about the travel-related concerns. Markov chain in this study is used to identify the words are more likely to follow others immediately or to co-occur within the same document. Specifically, we tokenized the text into pairs of two consecutive sequence of words to explore how often word A is followed by word. This process is called “bigrams” [38].

3.4 Sector of Hospitality and Tourism

In order to capture the dynamics of each sector underlying the hospitality and tourism industry, we categorized the YouTube Videos in the sample into five groups based on the sector of hospitality and tourism industry, including accommodation, food and beverage, entertainment and recreation, transportation, and others [39–41]. Tables 1 and 2 and demonstrate the process of classifying the YouTube Videos.

Table 1. Keywords for classifying videos based on four sectors.

Sector	Keywords
Recreation and entertainment	Travel, tour, beach casino, park, Las Vegas, Florida, Disney, holiday, wedding, Halloween, gym, vacation
Accommodation	Hotel, motel, Airbnb
Transportation	Airplane, airport, flight, fly, train, bus, car
Food and beverages	Restaurant, bar, food, dining

Table 2. Descriptive information about the sample.

Sector	Number of Video	Percentage	Number of Comments	Percentage
Recreation and entertainment	186	35.70%	3630	37.32%
Accommodation	78	14.97%	1157	11.89%
Transportation	39	7.49%	1024	10.53%
Food and beverage	36	6.91%	603	6.20%
Others	182	34.93%	3313	34.06%
Total	521		9727	

4 Results and Discussion

4.1 Sentiment Contribution

There are 2,441 unique sentiment words identified in the dataset, including 1,656 negative words and 785 positive words. Table 1 demonstrates the top 20 Words that contribute to negative and positive sentiment. The results in Table 3 demonstrate three types of risk, including health risk as the direct outcomes of the Covid-19 (“die”, “infect”, “sick”, “symptom”, “outbreak”, “cold”, “kill”), the psychological risk as the cognitive perception of Covid-19 (“bad”, “risk”, “fear”, “hard”, “scare”, “lost”, “sad”) and social risk as the skeptical behavior towards the related information (“lie”, “fake”, “stupid”, “wrong”, “blame”). As anticipated, health risk is the most salient risk, which is consistent with current study that there is significant interaction between perception of coronavirus pandemic and perceived health risk besides non-pharmaceutical intervention [42].

Table 3. Top 20 words contributing to negative and positive sentiment.

Negative sentiment	Positive sentiment
Virus, die, bad, infect, risk, sick, symptom, lie, fear, fake, stupid, hard, scare, lost, outbreak, wrong, sad, cold, kill, blame	Safe, love, protect, clean, free, healthy, nice, healthy, nice, glad, happy, cure, support, enjoy, trust, beautiful, top, freedom, amazing, bless, fine, luck

Table 3 illustrates the top 20 positive words that contributed most. Consumers are very concerned about the disease protocol issues in the travel process, including “safe”, “protect”, “clean”, “healthy”, “cure”, “support”, and “trust”. At the same time, consumers still anticipate the travel experience with “love”, “nice”, “glad”, “happy”, “enjoy”, “beautiful”, “amazing”, “fine”. It indicates consumers concerned about the performance risk and are very likely to expect both high level of precautions and positive travel experience at the time same, which presents a significant challenge for practitioners to satisfy consumers’ expectations.

Figure 1 demonstrates the most popular bigram that occurred more than 10 times, which reflects the consumers’ travel-related concerns from a comprehensive point of view. The largest cluster of the bigrams is represented by “covid-19”, which includes the testing and spreading process as well as the negative consequences of Covid-19. “People” represents the second cluster, which focuses on the self-protection activities, including mask wearing and staying home. Next came the cluster called “quarantine”, which demonstrated the 14-day requirement endorsed by CDC. Noticeably, “hotel industry”, “hospitality”, “airlines” and “restaurant” are closely related to this cluster, indicating our industry, especially hotels, are assigned new function as the quarantine facilities during the pandemic. Another representative cluster is “travel”, which strongly tied with “travel ban” and “travel restrictions”. The topic related to politics cannot be ignored, including nations and government (e.g., “china”, “uk”) and political figures (e.g., “trump”, “prime minster”, “johnson boris”). Consumers can also consult

Table 4. Sentiment words in each sector.

Sector	Negative	Positive
Recreation and entertainment	Selfish, crowded, nervous, hoax, ignorant	Fun, worth, ready, peace, correct
Accommodation	Expensive, cheap, disgusting, collapse, recession	Smart, fair, refund, approve, affordable
Transportation	Useless, selfish, cheap, expensive, contagious	Brave, comfortable, ease, accurate, appreciated
Food and beverage	Idiots, carp, panic, irresponsible, destroy	Effective, fast, backbone, benefits, fresh

Next, Accommodation Sector includes “expensive”, “cheap”, “disgusting”, “recession”, “collapse”, “affordable”, “refund”, “approve”, “fair”, “smart”. Financial risk is the most salient risk in this sector. People are worried about the price (e.g., “expensive”, “cheap”, “affordable”) and also the change or cancel of the booking can be “refunded” successfully. At the same time, people are worried about the cleanness of the accommodation (e.g., “disgusting”) as the performance risk. Interestingly, people are aware the loss and challenge that the accommodation sector are facing right now and worried about the overall social and economic condition as “collapse” and “recession”. We recommend hotel companies and Airbnb need to clarify the coronavirus related changes, in terms of cancellation policies and price policies on booking websites to reduce perceived financial risk. It is also necessary to circulate positive industry news to boost the overall confidence. For example, SoftBank’s is investing \$1.7 billion in Yanolja, the company that provides AI-powered hotel software and contactless services for guests. The endorsement of SoftBank represents a wave of travel-related optimism [43].

In the Transportation Sector, people as usual are concerned about the punctuality (e.g., “accurate”) and on-board experience (e.g., “ease” and “comfortable”) as the performance risk. Consistent with the accommodation sector, people are concerned about the financial risk (“cheap” and “expensive”) and social risk (e.g., “selfish”). Noticeably, consumers are concerned the health risk considering the virus can spread in the close environment with the interaction with people (e.g., “contagious”). We recommend airlines companies should highlight the coronavirus change and cancellation policies on booking websites to decrease perceived financial risk. It is also critical to strictly follow the CDC guidelines and demonstrate the efforts on social media platforms.

Last, in the Food and Beverages Sector, social risk is the most salient risk since drinking in bars and similar activities are regarded as “idiots”, “crap” and “irresponsible”. While people feel “panic” as the psychological risk, they still anticipate the food and beverage service can be “fresh”, “fast”, “effective”, which can reflect the performance risk. We strongly recommend restaurants and bars strictly follow the CDC guidelines, including preparing adequate supplies (masks, soap, hand sanitizer and disinfectant wipes) and maintaining healthy environment by cleaning and disinfecting regularly [44]. Additionally, social media can be used to communicate how restaurants

and bars strictly implement the strategies, considering social media is an critical tool in crisis communication and crisis management plan [45]. We suggest restaurants and bars can reduce customers perceived social risk and psychological risk by demonstrating the process of executing the relevant protocols on various social media platforms.

5 Discussion and Conclusion

Drawing on the risk perception theory, this study explored the travel-related concerns about the outbreak of Covid-19 by automated text analysis. It is the first study which employed YouTube comments as the sample to conduct tourism research. Sentiment analysis of the overall tourism and hospitality industry indicates that the health risk is most concerned by consumers, showing that people are highly aware of their health in terms of the general travel activities. By drawing the most popular bigrams by Markov Chain, this study found that when consumers are watching travel-related videos, what they are discussing is not constrained in travel-related topics, but include a broad perspective of social, political, and historical topics. At the same time, this study explored consumers' idiosyncratic concerns towards four sectors of the tourism and hospitality industry and provides practical recommendation to reduce the perceived risk.

Despite its contribution, this study has some limitations. First, this study focused on the UGC in English language. Considering the Covid-19 is a global crisis and is devesting the worldwide industry, Asian customers may perceive travel risks drastically different from American and European customers [46], which is calling for future research to explore this topic in different language settings (e.g., Chinese, Spanish and Korean etc.). Also, policymakers need to consider different approaches for dealing with the pandemic among different regions [47]. Second, this study adopted YouTube comments as the sample, but the comments are highly associated with the specific videos [48]. Future research can explore UGC from other social media platforms in order to understand a comprehensive picture of the travel-related concerns. Third, this is an exploratory study focusing on the descriptive findings. Future studies can empirically conduct relational analysis, for example, particular risks or concerns are related to demographic variables.

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Building Resilient Smart Cities for Sustainable Urban Tourism in Africa Post-COVID-19 Pandemic

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Abstract. This paper contributes to the knowledge by examining the role of smart tourism technologies in destination resilience amidst the COVID-19 pandemic. Considering tourism in the COVID-19 crisis as an emerging stream of research, the study also explores how African cities deployed smart tourism technologies and how effective it has been in creating resilient and safe destinations. Data were collected through a semi-structured online interview from destination managers in Ghana, Kenya, and South Africa. The findings pose critical lessons for city destinations and how they need to transition into smartness to create safe spaces for travellers during and post-COVID-19. Our study makes novel contributions to literature and practice. Theoretically, our study fills the void identified in the relationship between STTs and COVID-19. Our study also offers practical recommendations that will accelerate African destination reset strategies.

Keywords: Smart cities · Smart technologies · Post-COVID-19 · Urban tourism · African cities

1 Introduction

As the world reels from the effect of COVID-19, different industries have structurally rebalanced their operations to remain competitive. Banks now mostly serve their customers via digital channels; the same is true for groceries and educational institutions [2]. The tourism industry is not an exception. Destinations are increasingly deploying virtual and augmented reality to connect with tourists [1, 21 pp. 1]. While these measures are essential for the short term, COVID-19 will be with us for a long time [28]. This requires destinations to strategically implement more digitally sustainable programmes to be resilient from the effects of the pandemic and remain competitive in the long term. The adoption of smart tourism technologies (STT) by tourist destinations has gained popularity in recent years [14, 24]. STTs imply various technologies embedded at destinations to enhance value-added to the people [4]. Studies have found that STTs are integral to tourists' satisfaction at destinations and their intention to revisit [13; 14]. STTs are also linked to urban resilience [9].

Resilience from COVID-19 is critical for the survival and competitiveness of destinations. However, literature is not clear on the role of STTs on resilience from the effect of COVID-19.

The United Nations World Tourism Organisation reported an increase of above 7% and 2% on international tourist arrivals and receipts, respectively, in Africa in 2018 [27]. COVID-19 threatens the upward trajectory of this growth. Interestingly, there is a lack of empirical studies that have explored the nexus between STTs and resilience from COVID-19, especially from a developing country context. Using Africa as a case in point, the objective of this study is to examine the role of STTs in destination resilience amidst the COVID-19 pandemic. Specifically, this study explores (a) how different African destinations deploy STTs, (b) how effective has these STTs been in fostering destination resilience amidst COVID-19, and (c) what strategic implications STTs have for the future of African tourism.

Our study makes novel contributions to literature and practice. Theoretically, our study fills the void identified in the relationship between STTs and COVID-19. Furthermore, it builds the importance of smart technologies for African destinations generally deemed authoritative and unwilling to support national-level technologies. Our study also offers practical recommendations that will accelerate African destination reset strategies.

2 Literature Review

2.1 Smart Cities and Smart Tourism Technologies/Destination

The concept of smartness is a multidisciplinary term with several definitions depending on the context [4]. The smartness of a city implies interconnecting different information and communication technologies to enhance value for different stakeholders [14]. The proliferation of different ICTs has also created avenues for city administrators to creatively use them to enhance living and social services. In today's complex scenario, the role of the smart cities as leading actors to face Covid-19 and future pandemics cannot be overemphasised. Similarly, these ICT tools provide various value-enhancing experiences for tourists. Destination managers have used them to enhance tourists' experiences and increase destination competitiveness [4].

Smart tourism technologies (STTs) constitute general and specific ICT tools employed by destinations to enhance tourists' experiences and value [12, 14]. While there are different variants of STTs, the most popular ones identified in literature includes social network sites, augmented reality, smartphones, beacons, the internet of things (IoT), cloud computing, sensors, mobile apps, Google maps, etc. [4, 13, 14]. The harmonious operation of these tools in creating, managing, and sustainably integrating them to enhance the touristic experience gives rise to the smart tourism ecosystem [11]. The literature identified such destinations as smart destinations [13].

Shafiee et al. [24] categorized smart tourism destinations under five components: stakeholders, structure, process, technology, and policies. Per stakeholders, these comprise the public and private sectors. Public sectors include national governments, while private sectors comprise active enterprises in smart tourism, information

technology companies and other tourism organisations. For structure, they argue that it comprises strategic-communicative level, instrumental level, and applied level. Processes are value-creating process, decision-making process, digitization, and information exchange. The technology component comprises those as listed above. Lastly, policies deal with data access, privacy and security of customers' data, and personal data generated by smart devices.

On the other hand, smart tourism technologies possess four key attributes essential to their usability in each destination: informativeness, accessibility, interactivity, and personalization [13, 14]. Informativeness implies the quality of the information from the STTs. Accessibility has to do with how tourists can easily access information from the destination via the STTs. On the other hand, interactivity implies how tourists can communicate effectively and obtain feedback via the STTs. Finally, personalization implies how tourists can obtain specific and relevant information suitable to them from the STTs.

Scholars have conducted empirical studies that examined the application of STTs on destinations and their effects on attractiveness and revisit intention. Huang et al. [13] found a positive association between the explorative use of STTs and travel experience satisfaction. Similarly, Jeong and Shin [14] found that the three key attributes of STTs (informativeness, interactivity and personalization) are positively associated with travellers' memorable experiences. In the same study, the memorable experience was also found to positively influence satisfaction and travellers' intention to visit.

2.2 Resilient Smart Cities in Post-COVID-19

Pandemics such as the current COVID-19 pose varying levels of challenges to cities and their inhabitants. Thus, the concept of resilience implies the "ability of a city to understand and prevent the disaster risks, mitigate those risks, and respond in such a way as to minimize loss of or damage to life, livelihoods, property, infrastructure, economic activity and the environment" [12 pp. 97]. Foreseeing risks and preparing adequately for them greatly enhances cities' ability to withstand those risks and equips them to bounce back immediately [23, 29].

Tourism is one of the most affected sectors due to the ongoing COVID-19 pandemic. Geographically, cities were significantly affected by the COVID-19 pandemic as they were hotspots for transmitting the virus [18]. However, as many destinations lift travel restrictions, sound recovery strategies are pertinent to remain competitive post-COVID-19. Scholarly evidence suggests that smart solutions are linked to urban resilience, such as community disaster resilience [9], emergency management [15], crime prevention [20] and disaster recovery [25, 30]. Thus, research notes that cities are becoming more resilient to crises due to their adoption of smart technologies, including IoT, artificial intelligence (AI) and big data [18]. For instance, the use of contact tracing apps could help check COVID-19 transmissions among tourists. The app could easily identify and alert relevant authorities where they are found [22, 26]. Though STTs have strongly been linked to post-COVID-19 recovery strategies, research investigating their adoption in urban contexts have largely been done in cities in China and Western democracies [18], leaving African cities relatively understudied.

This study foresees an uptick in adopting STTs by destinations as part of COVID-19 recovery strategies. Tourists' perception of post-COVID-19 destination attractiveness would be hinged on the availability of accessible digital technologies. For instance, while social distancing and lowered mobility may continue post-COVID-19, augmented reality could be a critical technology to offer tourists deep, unique, context-specific, and memorable experiences [21]. Even at the destination, the functionalities of STTs such as the internet, free Wi-Fi access points, big data and various social networking apps afford tourists up-to-date information on possible areas to avoid due to crowd and opportunities for information sharing.

3 Methodology

Smart tourism is an underexplored concept in Africa as a tourist destination. A qualitative methodology that followed an exploratory research design was employed in this study to examine the smart solutions implemented in East, West and Southern Africa cities as a response to building resilient cities post-COVID-19. Data were collected using a semi-structured interview guide. This instrument was chosen to allow participants to communicate how cities use smart solutions to create safe tourist spaces during the pandemic [7]. The instrument was designed based on a comprehensive review of literature on smart tourism and technology. We pretested the instrument before data collection, and unambiguous wording was revised accordingly. The interview schedule contained the following questions:

1. Do you think your destination or city has the networked infrastructure that enables informativeness and accessibility of tourism resources needed to support urban tourism development post -COVID-19?
2. What policies are available to support business-led urban development and creative industries to promote resilient urban tourism growth?
3. Your comment on the social inclusion of various urban stakeholders, including residents and social capital in urban tourism development for a safe and resilient post-COVID-19 city environment?
4. Are there any smart plans that your destination is currently pursuing to create resilient and safe tourist environments? They are hinged on what? Does your plan utilise any technologies? If yes, which ones?
5. Which technologies are you using as a destination to make the destination COVID-19 safe and resilient?
6. Does the destination offer free internet, Wi-Fi access points, or other big data or open data technologies to enhance tourist experiences?
7. Do you think the official tourism website of the destination was created to be present throughout the tourist Lifecycle? Explain your answer?
8. Does your destination use QR codes? If yes, explain what they are used for?
9. As a destination, are you able to do data-driven marketing and base your decisions on data? Have you been able to collect data on the impact of smart solutions on the experiences of tourists?
10. Are tourists aware of any smart solutions in your destination?

A combination of purposive and snowball sampling approaches was utilised in selecting participants. Destination managers recruited to participate in this study were from Kenya, Ghana, and South Africa. We used our professional networks to recruit participants using WhatsApp and emails. These platforms were used to confirm availability and consent to participate in the study. The messages sent to participants outlined the purpose of the study and its nature and explained why the participants' opinions were being sought. Furthermore, the participants were also informed of their right to participate and withdraw at any time during the research. No financial incentives were offered for participation. Destination managers were eventually invited to refer the researchers to other managers in their respective countries and cities. Data were collected until saturation, and the anonymity of the participants was guaranteed.

Participants were interviewed between June and July 2021 using MS Teams and Zoom facilities, and each interview lasted approximately 30 min. Interviews were conducted in English. Creswell [6] recommended conducting between 5 to 25 interviews to reach data saturation. In this study, data saturation was reached after 9 interviews. All the interviews were done synchronously, and the details are summarised in Table 1. Interviews were conducted, transcribed, and analysed using thematic analysis. Data analysis started with full data transcription, data familiarisation, codes identification, searching, reviewing, defining themes, and generating results. Coding was performed manually through repeated reading of and making notes on interview transcripts.

Table 1. Participants' profile

Participant ID	Gender	Location
DM1	Male	Nakuru, Kenya
DM2	Female	Accra, Ghana
DM3	Male	Tshwane, South Africa
DM4	Female	Accra, Ghana
DM5	Male	Nairobi, Kenya
DM6	Male	Nairobi, Kenya
DM7	Female	Accra, Ghana
DM8	Male	Johannesburg, South Africa
DM9	Male	Johannesburg, South Africa

4 Findings

Based on the analysis of the interviews, it was possible to examine and categorize smart solutions being used by the destination to create safe and resilient cities for a post-pandemic era. The findings of the study are organised based on the objectives, namely (1) how different African cities deployed STTs during the COVID-19 pandemic, (2) how effective has these STTs been fostering safe and resilient cities amidst COVID-19 and (3) the strategic implications STTs in creating safe and resilient tourism cities in Africa.

4.1 Deployment of STTs in African Cities During COVID-19

To achieve greater resilience during COVID-19 for the travel industry, cities need to implement a range of smart technologies [10]. Such technological interventions are critical given that currently, anything that involves touch is frowned up. A destination manager from Nakuru City in Kenya argued that “digital cities are important, as they give tourists a perception of safety”. This view is consistent with past research that advocated for developing digitalized cities as a fundamental concept of smart tourism [3, 19]. Further data analysis shows more smart technologies deployment during COVID in Kenya than in South Africa and Ghana. This could be explained by the commitment of the Kenyan government, as summed up by this quote:

“There is a greater government involvement in enabling the utilisation of technologies. For instance, there was a creation of the Data Protection Commission of Kenya, to help with data breaches”.

The South African government has made similar efforts that saw the Presidential Commission on Fourth Industrial Revolution being established to drive the smartness concept. Table 2 provides a range of smart technologies deployed to create safe spaces for tourism in Ghanaian, Kenyan, and South African cities during COVID-19. Key among the interventions was promoting mobile payments, reducing data bundles, using drones, and contact tracing apps. The aspect of mobile money payments was already in existence in Kenya but was magnified during the pandemic. These findings are consistent with earlier studies [16, 31] that argued that using such technologies is critical in decreasing contact among tourists and contagion.

Table 2. Interventions and STTs deployed during COVID-19 in African cities.

Intervention(s)	Location	Objective
Portals; Interactive dashboards, toll-free lines, and WhatsApp channels (in multiple languages)	Ghanaian, Kenyan, and South African cities	To disseminate reliable information on the pandemic as well as enable citizens to report suspected cases
Digital platforms	Ghanaian, Kenyan and South African cities	Remote learning; working from home; service providers such as health, banking, and entertainment
Cashless payments	More pronounced in Kenyan cities; Ghana, and South Africa	To reduce contagion and transactional fees were waived
Doubling internet speeds	Kenya (Google Loon)	To enhance universal 4G coverage and connectivity in the country for people working from home. Speeds were doubled at no extra costs

(continued)

Table 2. (continued)

Intervention(s)	Location	Objective
Contact tracing apps	Kenyan cities of Nairobi and Kisumu (Msafari); Ghana (GH COVID-19 Tracker App), and South Africa	To track passengers on public transport
Drones	Ghana, Kenya, and South Africa	To ferry medicines, blood, vaccines and share information about the pandemic
Promotional of work from home data bundles	Kenya	Campaign to educate the public on the pandemic
QR codes	Kenya and South Africa	For online ordering, virtual queues in restaurants, hospitals and reducing restaurant visits

Before COVID-19, there was a huge convergence of disruptive effects in the form of new technologies. As a result, this resulted in the proliferation and consolidation of smart cities. However, with consumer concerns for more sustainable, resilient, and safer spaces, technologies in the African cities of Accra, Nairobi, Nakuru, Cape Town, and Johannesburg are at the heart of city development and the tourism sector. There was a consensus among participants from all the cities that COVI-19 has increased the need for a smart technological solution to safer tourism. The participants noted an increased usage of STTs in cities, tourism establishments, hotels, and restaurants to manage the spread of COVID-19. Most of the cited technologies used are aimed at decreasing tourist contacts.

4.2 STTs' Effectiveness in Fostering Safe and Resilient Cities Amidst COVID-19

The study sought to establish how effective STTs were in creating safe and resilient tourism cities during the COVID-19 pandemic. Participants from Kenya and South Africa pointed out coordinated efforts between the government and other stakeholders in creating safer and resilient cities during the pandemic. This was evidenced by the creation of the Data Protection Commission of Kenya. Though there was a huge drive for technological solutions in South Africa pre-COVID-19, through the formation of the Presidential Commission on the Fourth Industrial Revolution (PC4IR), destination managers from South Africa argued that efforts to create smart tourism in the city of Tshwane, Johannesburg and Cape Town appears to be slower. Past research has long identified these aspects as critical in developing smart cities for enhanced tourism competitiveness [8].

“I think due to the effort of the government of Kenya, smart technologies have been effective in making our cities safe and resilient.”

“In South Africa, the pace before COVID-19 was amazing. However, more could be done to create safe and resilient urban spaces”.

“The government of Kenya has a full-fledged ICT, Innovation and Youth Affairs ministry driving smart innovations to reduce transmission during COVID-19”.

“Data Protection Commission of Kenya is responsible for dealing with complaints about the data breach, and this is a critical step in creating safe and resilient spaces for tourists in Kenya.”

Based on the narratives received from participants in Kenya, it appears that STTs were more effective in fostering safe and resilient cities amidst the COVID-19 pandemic. This could be attributed to government policy and innovative digital culture. Regarding Ghana, the participants noted that the digital innovation aspect is rather silent, and therefore, the notion that STTs are thus not driving more from the government. However, one destination manager from Ghana noted that *“more recently, the ministry of health has been distributing COVID-19 vaccines to remote areas as a means of speeding up its vaccination campaign, and this is a right step in ensuring that cities in Ghana are safe for tourism purposes”*.

There are currently no public policy plans in Ghana to direct the implementation of smart technological solutions, as is the case in Kenya and South Africa. The use of drones in delivering vaccines is a welcome solution. This could be more meaningful if the government put policies to promote the usage of smart technologies.

4.3 Implications of STTs in a Post-pandemic City Environment

One of the key attributes of STTs is to ensure that tourism products and services are accessible. Due to COVID-19, participants from all three countries noted that the demand for STTs was high, given its implications on tourist safety. [21] argue that using STTs during and post-pandemic must also ensure aspects of uniqueness, accessibility, personalisation, context-specific, memorable experiences among travellers. The data analysis shows that Kenyan tourism is currently implementing several smart technologies to build decision support systems of the destination to deepen travellers' experiences.

A destination manager from Kenya mentioned that *“building an information hub is necessary though current efforts around that are currently fragmented”*. Most participants in Kenya and South Africa argued for the need to develop regulated and coordinated information hubs. This was argued as critical in ensuring that information about COVID-19, COVID-19 guidelines, visas, and attractions is widely accessible for tourists during and post-pandemic. Participants mentioned that using STTs such as drones, GIS, and QR codes is crucial in providing thematic maps to help cities with smart elements of accessibility and informativeness. One destination manager from South Africa added that *“using smart technologies is critical in helping tourists during COVID-19 understand the destination comprehensively”*. This view is consistent with past literature that argues that such provision of smart technologies is imperative for enhancing visitors' experiences [21].

“Technologies are crucial in enhancing the promotion of Kenya tourism to domestic and international travellers during and post-pandemic.”

“We are currently implementing smart solutions that help tourists identify and find the best tourism spots here in Kenya. QR codes are widely used in Kenya for this aspect”.

“South Africa, at the beginning of the pandemic, has been using drones and geospatial technologies. This should continue in the future to provide timely information about COVID-19”.

“Mapping of existing and potential tourism facilities, services, infrastructure, resources, and attractions using smart technologies is important in displaying the well-known tourism products and opening the underutilized regions.”

Most of the technologies used in Kenya and South Africa are aimed at digital mapping as a strategic response. The study also found that South Africa, just like Kenya, has been using GIS and location technologies to provide real-time visualizations, identify hotspots, and update current progress on its national dashboards. A study on smart cities in South Korea showed that through technologies, firms, citizens, and the government could flatten the curve during the COVID-19 pandemic without closing their borders [17]. In this case, the proactive exchange of information allowed tourists to form a shared comprehension of the context while complying with the rules and security measures adopted to increase trust in the institution’s ability to manage the crisis.

This is critical in enhancing the informativeness attribute for smart tourism and the creation of safe tourism cities. Tourist maps have also been known to play vital roles in identifying and locating tourist attractions and have essential roles in the effective and efficient management of tourism resources. The creation of smart tourism cities, thus, depends on the availability of information that comes with spatial representation. This enables the analysis of the virus patterns and helps tourists to make informed decisions.

“In Kenya, we recently launched a digital mapping of tourism resources using drones, and it is a strategy that aims to enhance smart conservation”.

“All wildlife in Kenya is set to be counted using drones in the next six months. Geographical Information System (GIS)”.

“The use of GIS and location technologies during the pandemic has been very helpful for South Africa in creating safe spaces by helping travellers identify hotspots and be aware of current progress”.

Though mapping will be important in promoting safe and resilient tourism cities in Africa post-COVID-19, the role of the government in implementing smart solutions is relatively limited in the empirical context of Ghana. However, these findings show that smart tourism among African cities will be integral in the post-pandemic era, given their ability to provide tourists with an enhanced public health environment.

5 Conclusion

The study examined the smart technologies adopted by African cities in Ghana, Kenya, and South Africa to create safe, and resilient smart tourism cities. The findings show that cities in Kenya, Ghana and South Africa differ significantly in adopting smart technologies to create safe cities. In Kenya and South Africa, the findings show that the government actively coordinated and controlled the narrative of smart technologies based on initiatives such as the Data Protection Commission of Kenya and the

Presidential Commission on the Fourth Industrial Revolution in South Africa. However, cities in Ghana seem to lack coordination efforts with the national government to create safe spaces using smart technologies. Overall, the usage of smart technologies differed significantly.

Unlike research that focuses on the negative impacts caused by the pandemic, this paper focuses on evaluating actions and strategies based on the adoption of smart technologies in the respective countries to face the pandemic. The study highlights those smart technological responses are useful in dealing with an ongoing pandemic, even in a continent that often disregards such technologies as a means of wielding political power. Thus, instead of suppressing the consumption of smart technologies, African governments may gain full control over a situation by adopting a techno-driven approach when faced with a pandemic. Furthermore, the contribution of this study lies in bringing a perspective of developing countries in the African region. However, there is an overall concern that governments in Africa, generally known to be authoritative, may take advantage of the Covid-19 to reinforce technological visioning on citizens beyond controlling the pandemic.

African cities must fully benefit from these technologies to ensure that stakeholders increase smart governance and equitable data distribution [5]. Furthermore, based on Kenya's findings, there is a need for continued government participation, especially in creating an enabling environment crucial for creating sustainable smart cities.

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**Special Track on the Sharing Economy
in Travel and Tourism: Experiences and
Social Networking**



Identifying the Elements of Great Online Customer Encounters

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Abstract. Customer service is a major factor in the success of digital marketing. This study examines the service encounters between tourists and service providers, in this case, Visit Helsinki. The goal is to understand what are the dimensions of service quality in online chat discussions between tourists and DMO personnel and what elements in these discussions support the co-creation of great customer experiences. Altogether 123 chat discussions in June 2020 were downloaded and analysed using qualitative content analysis and statistical tests. The results show that great customer experiences are the result of extensive effort from the customer service agents where they go beyond just providing a satisfactory solution for the customer. The results are managerially important for destinations and tourism businesses around the world and increase the theoretical understanding of the moment of truth concept and its different elements in online service encounters.

Keywords: Customer service · Online service · Customer satisfaction · Customer value · Chat service

1 Introduction

1.1 Background

One of the most critical elements in producing services is the customer encounter, a situation where the customer and the service provider meet each other [1]. This service encounter is increasingly happening online. Furthermore, the challenge is not only to provide high-quality services as such but also to communicate with customers in such a manner that the service exceeds their expectations. This does not only improve customer satisfaction but also helps the company to improve its processes more effectively, motivate its personnel and build the company image and reputation successfully [1]. When encountering a customer in an online medium, the company finds itself in a situation where the old face-to-face service procedures do not work anymore. Without gestures, mimes, and tone of voice, the written context becomes essential as well as the technical elements like speed and visual design [2].

The demand for online services has increased during the past years [3–6]. Already in 2015 fifty-seven per cent of customers preferred to contact companies online [7] and the number has not at least decreased. Customers are often found complaining about

bad online service that is the result of, for example, unanswered questions [6], unpolite customer service agents [5], or unkept promises [6].

Research of online customer service has focused on technical issues, like information quality, website design, social media, and the role of chatbots or self-service [8], among others. Several researchers [e.g. 8, 9] have suggested more research on the moment of truths in technology-mediated encounters and thus improve the understanding of the critical elements in online customer service.

The purpose of this study is to increase understanding of the elements of great service in customer online service encounters. The study is inspired by Bitner and Wang [10], who encouraged researchers to study the prerequisites of good service in micro-level conversations in technology-mediated encounters. This study first identifies the elements of service quality in online chat discussions and then analyses how they support or undermine a great customer online service experience.

2 Theoretical Framework

2.1 Customer Service Encounter

Customer encounter can be considered as the core competence of a service business [11]. However, the concept of customer service is complex. Depending on the perspective and the author, it can be seen as a momentary interaction, as an offering – a package – of services, [12] or as a longer process [13] that is affected by actors not visible in the service event or outside of it, i.e. other customers and online reviews. Traditionally, service has taken place in direct customer encounters, usually in the face-to-face meetings between the customer and the service provider [14]. In a service encounter, a customer and a service provider interact and participate actively [12] in core service, i.e. in a moment of truth [9, 10], a unique situation, in which the perceptions of customers are tested.

Many companies have realized the meaning of service encounters online and invested in more effective customer–technology interactions in the moment of truth [8]. These interactions can happen in many channels. Customer’s capabilities, the availability of technology and, also, the co-creative role customer plays, determines which channel the customer chooses. Today, service encounters can be divided into three different types: remote encounters, phone encounters, and face-to-face encounters [15]. ICT-mediated service encounters are part of the remote encounters.

Larivière et al. [16] talk about service encounter 2.0 which they define as follows: “any customer-company interaction that results from a service system that is comprised of interrelated technologies (either company-or customer-owned), human actors (employees and customers), physical/digital environments and company/customer processes.” These service encounter 2.0s are increasingly important in the tourism field and a much better understanding of these encounters is needed to provide customers with the service that they expect and that even might delight them.

2.2 Online Service Encounters and Service Quality

Service quality depends on how customers' experiences are equivalent to customers' expectations, i.e. the customer is always the one who decides how the service experience was and this judgment can vary from one customer to another [12, 17]. The main issue in producing high-quality services is to fulfil customers' expectations or even exceed them [15]. Service quality is traditionally defined through five variables: tangibles, reliability, responsiveness, assurance and empathy [17–19]. *Tangibles* include the place where service is produced, the equipment that is used as well as written materials. With *reliability* researchers refer to a company's capability to perform the service it promises to its customer's. *Responsiveness* means the company's ability to give customers the help they need to provide the demanded service. *Assurance* is an outcome of employees' professionalism, knowledge and polite behaviour as well as the way they create trust and confidence. *Empathy* includes listening and personal, tailor-made attention to each separate customer [18].

These traditional elements are further defined and developed by Jawardheena [19], Ansari [20], Miceli [21], and Immonen [22] in the online setting. Most of these are adapted from the traditional model with specific emphasis on challenges caused by the technology environment. Quality elements in an online setting are called Effectiveness, Responsiveness, Politeness and Personalization by the researchers [19–22]. *Effectiveness* is defined as the ability to answer customer requests fast without delays. Also, if delays should appear, it is mentioned that customers should be informed of them and their length instantly. *Responsiveness* is characterized by solving customer problems and fulfilling customer expectations. *Politeness* refers to service providers professionalism, trustfulness and polite behaviour and can be analysed through thanking, apologising and way of greeting customers. With *personalization*, each customer gets tailor-made service, targeted especially to him to answer his questions and solve his problems [19–22]. Also, the length of the text, its structure and readability are important factors in online encounters [23], but precise effects of these on customer online experience in tourism are still largely unexplored.

Figure 1 builds upon the aforementioned literature to form a framework for analysing service quality elements. In addition to the traditional service quality elements, the online context adds several new perspectives that need to be accounted for.

Studies from online shopping have shown some central flaws in encounters causing dissatisfaction [24]. These are a failure in technology, failure in processes or failure in customer interaction. Also, slowness, easiness, competence and attitude were considered important factors. Customers wanted the service or the service agent to “get it done” while the service should be easy, effortless and enjoyable for the customer. This can be considered as part of the Responsiveness element.

Many authors [25–27] have stated that web 2.0 has not only a great effect on customer experience but also plays a major role in creating them. Thus digital service encounters should be taken into account during every step of the customer journey. Requirements for successful online presence during the customer journey lies in the understanding of the customer and his or her needs [28]. In all steps, it is important to activate the customer and create an interactive, collaborative and continual atmosphere online [29].

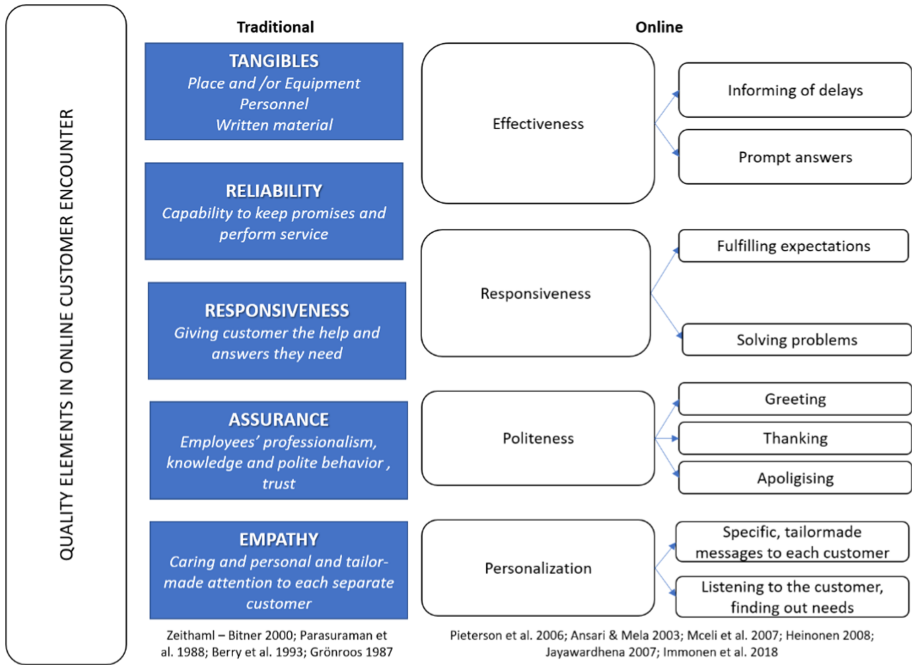


Fig. 1. The adapted framework of service quality elements

The service value, and thereby also the customer experience, has its grounds in either the tangible benefits customer experiences by participating in the service co-creation or the emotional benefits [22, 30]. This is also supported by the concept of customer engagement, which describes customers mental state and conviction when she or he feels committed and safe in a co-creative customer relationship [29]. Thus an important element to study is also Customer responses.

3 Research

3.1 Target Group and Data Collection

In this study, the framework presented in Fig. 1 is used to study online customer encounters and improve our understanding of the online service quality elements. We focus on understanding how the service quality elements contribute to customer service that exceeds customer expectations. Distinguishing great service from satisfactory service provides an even deeper understanding of the customer encounters online.

Data for this study were collected during June 2020 among Visit Helsinki chat users. Visit Helsinki is one of the biggest DMOs (Destination Management Organisation) in Finland. Chat users included both Finnish (domestic) and foreign customers asking for information about services and attractions in Helsinki. Two service agents from Visit Helsinki responded to all these discussions.

In total, data included 123 discussions that lasted 18 min on average and included 1623 lines in total (including both service agents' and customer's lines). Even though this might sound like a proper amount of data, it is still limited to the COVID-19 situation all over the world during summer 2020.

Data were analysed as anonymous with SPSS 27.0 and the focus was merely on the discussions and service quality elements in them. Due to the anonymity, it is assumed that all 123 discussions had a different, unique customer.

The main topics in these discussions involved different events in Helsinki (20 discussions), activities (18), opening hours (15) and opening hours (11 discussions). Surprisingly, there were also quite a many customers asking about jobs, entrepreneurship and co-operation in Helsinki (13 in total).

3.2 Methodology

The study can be described as abductive [31], since it starts with everyday observations and descriptions concerning online customer service, and then moves for deeper analysis and understanding of them based on literature. Content analysis was chosen as the research approach as it allows a holistic view and generalisation of the chat material, but at the same time, it provides a possibility for a deeper understanding of effects [32]. The cornerstone in content analysis is on messages. It provides an objective and systematic way to analyse material with preset, theory-based categories. Its nature is descriptive, not explanatory [32].

The analysis involved coding and categorizing the data first into four main service quality elements, based on the framework presented in Fig. 1: Effectiveness, Responsiveness, Politeness and Personalization. Each discussion was carefully read and each line from the text-based chat data was placed underneath a suitable category. Delays and lengths were calculated and the appearance of analysis elements was quantified as 0 (not existing) or 1 (existing).

For a deeper understanding, the service elements were divided into subcategories, with help of which the qualitative data was modified in a quantified form, which enables to better distinguish the connection between the elements and customer satisfaction.

Effectiveness included two sub-categories: length of delay in minutes and information on whether the customer was informed of the delays. *Responsiveness* refers to service agents' response and action, and whether the discussion fulfilled the expectations and solved the problems of the customer. Also, during the analysis of data, two extra subcategories for analysis of Responsiveness arose. These were "Giving alternatives and links" and "Providing the customer further contact information". *Politeness* was studied based on phrases the service agent used. Phrases like greeting and thanking and apologizing were interpreted as polite. *Personalization* was analysed based on whether the service agent asked further questions to find out the needs of a customer and whether he showed effort for fulfilling the needs.

Visit Helsinki did not have any satisfaction measurement system in place in their online chat. To define the outcomes of the customer discussions were analysed and 19 cases where the customer praised the encounter or the customer service agent at the end of the encounter (see Example 1) were identified. These cases were coded as great

customer service encounters and the differences between these and the other encounters were analysed using statistical methods (Table 1). Even though it is possible that in some additional cases customers experienced great service, the 19 cases selected surely belonged to that category as customers took additional actions to praise the service. The quantified topics in the discussions were based on the framework presented in Fig. 1.

Example 1.

10:47:20 | Visitor Heippa! Onko siellä joku paikalla? :) /Hi! Anyone there? 😊
 10:47:50 | XX Moikka! Täällä ollaan :) / Hello! Here we are
 10:47:54 | Visitor Mahtavaa! Hei, minulla on tällainen kysymys: / Great, I have this kind of question
 ...
 11:17:51 | Visitor OHHHHH <3 <3 <3 <3
 11:17:59 | Visitor täydellistääää / Perfect
 ...
 11:30:02 | Visitor Mihin voin kannella tästä erinomaisesta palvelusta :D / Where can I tell about excellent service?

3.3 Findings

In total there were 123 discussions from 22 days in June 2020. The majority of the discussion was in Finnish (83) and the rest (41) in English. Most of the discussions concerned topics like events (20), opening hours (15), activities (18), cooperation with Visit Helsinki (10), attractions (11) and cooking places (7).

The first element of service quality (Table 1), *Effectiveness*, shows that in great service, the customer service agents (SA) kept the customer better on track about what is happening by informing them about delays and wait times. Delay times and lengths of discussions were longer in services resulting in a great service experience. It could be that long delays in a discussion can be alleviated by keeping the customer on track with what is happening. With longer delays, the discussions took longer in great online service encounters than in other discussions. In these great customer encounters the SAs used considerably much more lines than in other discussions, even though the customers messaged equally much in both cases.

Responsiveness analysed whether the customer's problem was solved and whether the customer expectations were fulfilled. Based on our analysis, 67% (83) of discussions solved the problem and 28% (35) fulfilled expectations. All the customer encounters resulting in customers praising the service were coded as fulfilling expectations and solving problems, as these encounters probably even exceeded expectations.

When analysing *Politeness*, we can see that in great service encounters SAs greeted and thanked the customers more than in normal customers encounters. Also, SAs used more emoticons in encounters resulting in great experiences compared to normal encounters.

Table 1. Comparing effects of service elements on great online customer service

Variables	Normal service (n = 104)	Great service (n = 19)	Statistically significant difference
Effectiveness			
<i>Informing of delays and waiting</i>			$X^2 = 12.03$, $df = 2$, $p = 0.002$
0 times	51.9%	36.8%	
1 time	44.2%	36.8%	
2 or 3 times	3.8%	26.3%	
<i>Prompt answers</i>			
Delay in minutes	8.2 min (SD = 6.8)	14.7 min (SD = 10.4)	Mann-Whitney U-test $p = 0.003$
Length of discussion in minutes	20.0 min (SD = 21.7)	27.1 min (SD = 16.0)	Mann-Whitney U-test $p = 0.013$
<i>Number of SA lines in the discussion (mean)</i>	6.9 (SD = 3.6)	16.0 (SD = 11.0)	Mann-Whitney U-test $p < 0.001$
<i>Number of customer lines in the discussion (mean)</i>	4.9 (SD = 5.5)	5.0 (3.2)	n.s.
Responsiveness			
<i>Fulfilling expectations</i>	15.4%	100%	
<i>Solving problems</i>	61.2%	100%	
<i>Customers repeating themselves in discussion</i>	4.8%	0%	n.s.
Politeness			
<i>SA greeting the customer</i>			$X^2 = 9.44$, $df = 2$, $p = 0.009$
1 time	19.2%	5.3%	
2 times	49.0%	26.3%	
3 or 4 times	31.7%	68.4%	
<i>SA thanking the customer</i>			$X^2 = 10.45$, $df = 2$, $p = 0.005$
0 times	46.2%	21.1%	
1 time	46.2%	47.4%	
2 times	7.7%	31.6%	
<i>SA apologising from the customer</i>			n.s.
0 times	93.3%	94.7%	
1 time	4.8%	5.3%	
2 or 3 times	2.0%	0%	
<i>Number of emoticons used by the customer (mean)</i>	1.6 (SD = 0.8)	1.9 (SD = 1.3)	n.s.
<i>Number of emoticons used by the SA (mean)</i>	1.6 (SD = 0.8)	3.7 (SD = 2.4)	Mann-Whitney U-test $p = 0.015$

(continued)

Table 1. (continued)

Variables	Normal service (n = 104)	Great service (n = 19)	Statistically significant difference
Personalization			
<i>SA asking for further information</i>	22.1%	57.9%	Fisher's Exact Test p < 0.001
<i>SA giving an effort for finding the best solution</i>	11.5%	52.6%	Fisher's Exact Test p < 0.001
<i>Links per discussion in average</i>	1.2 (SD = 1.2)	3.3 (SD = 2.6)	Mann-Whitney U-test p < 0.001

In *Personalization*, the results show that the efforts SAs put into the service encounter matters significantly. The more information they find and the better the solution solves the customer problems, the more likely it is that the customer encounter is great from the customer perspective.

4 Discussion and Conclusions

The purpose of the research was to find out how service quality elements are represented in online chat discussions and how they support achieving a great service experience. A framework for elements was created based on the literature [17–22] and divided into four main elements: Responsiveness, Effectiveness, Politeness and Personalization. The framework was partially adapted from the traditional service quality literature. In the data analysis, some elements were added and also customer response part was included. The four elements with added customer response information are suitable to analyze online discussions. Naturally, the online environment adds specific elements like emoticons and sending links to the service encounters, which were also included in this study.

Based on the data, we can see great customer service online is provided with the same elements as it is in a live situation. Solving the customer's problem and even exceeding his expectations is the key in an online chat environment [6]. While lacking mimes, tone of voice and gestures of face-to-face encounters, online customer encounters have other ways to create great service experiences.

It is important to inform them about changes and what is happening. This concerns as well the delays as the change of service agent. The findings of this study are in accordance with Meuter et al. [33] and van Dolen et al. [34] and indicate dissatisfaction among customers when delays were long without any notice. It might also indicate distrust when a customer is facing a new person without warning. The results show that taking a long time to answer questions does reduce the quality of online service if the customer is updated with what is happening and gets the information they seek in the end. This is also supported by Jayawardhena [19] and even mentioned in the traditional framework [17]. When customers do not see what is happening on the other side very few customers wait or respond to the delayed answers, which can be considered as a sign of dissatisfaction [6].

Also, the style of communication was important in data. Personalized, polite and trustful experiences do not include mass messages. Thanking the customer is essential.

Based on these elements, we can provide an answer for Bitner and Wang's question "What precisely is good service in micro-level conversations in technology-mediated encounters?" It is caring about the customer and showing him that with elements from politeness like thanking, greeting, using emoticons and asking questions. Great customer service is also created when the service agent invests in the customer and goes to great lengths to solve his problem. This does not happen by merely posting links or giving telephone numbers and email addresses, it requires more personal touch and more extensive communication of information.

To conclude, service quality is always the customer's subjective experience. To provide superior service, a company must think and act from the customer perspective [7]. However, experiential customer service needs still some sharpening. From the destination marketing point of view, this is most likely something in common for many destinations. Great customer service needs resources to allow customer service agents to spend enough time to craft detailed, personalized and effective communication. It is possible to solve customer problems with fewer resources, but great service encounters typically need more time and effort. This is also the managerial implication of this paper.

Since the literature on online customer service quality and experiences in service encounters is more concentrated on technical and structural elements of service, this study elaborates on the complexity of achieving a competitive advantage in online customer service. It also tests the elements from the literature and brings some deeper understanding to them. The results demonstrate that many caveats can result in non-satisfied customers. Satisfaction can be considered as the minimum level to achieve and to build upon. The next step would be to create unique, experiential customer service to gain a competitive advantage, i.e. to have great customer service. However, more research on this topic is needed.

Figure 1 demonstrates that experiential aspects of online customer service are still missing from the literature. The findings of this study demonstrate that tourism organizations can have difficulties in reaching satisfactory customer service levels. As a result, cases, where online customer services can be considered experiential, are difficult to find and analyse. For further studies, it is important to deepen the research to the emotional state and thus analyse the discussions with the emotional and sentimental elements. It is also worth studying the customer point of view to ensure the proper interpretations.

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Using Machine Learning Methods to Predict Demand for Bike Sharing

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Abstract. We applied four machine learning models, linear regression, the k-nearest neighbors (KNN), random forest, and support vector machine, to predict consumer demand for bike sharing in Seoul. We aimed to advance previous research on bike sharing demand by incorporating features other than weather - such as air pollution, traffic information, Covid-19 cases, and social economic factors- to increase prediction accuracy. The data were retrieved from Seoul Public Data Park website, which records the counts of public bike rentals in Seoul of Korea from January 1 to December 31, 2020. We found that the two best models are the random forest and the support vector machine models. Among the 29 features in six categories the features in the weather, pollution, and Covid-19 outbreak categories are the most important in model prediction. While almost all social economic features are the least important, we found that they help enhance the performance of the models.

Keywords: Machine learning · Data mining · Bike sharing · Demand prediction · Seoul

1 Introduction

Over the past two decades sharing economy has not only revolutionized the organization of economic activity but also unleashed the consumption and production potentials of a variety of tourism and hospitality businesses. These businesses include but are not limited to sharing accommodation exemplified by Airbnb, sharing transportation pioneered by Uber and Lyft, as well as various online booking platforms such as Booking.com and OpenTable. There are even more localized sharing businesses, such as bike sharing provided by private enterprises or governments as an alternative to the so-called “last-mile” public transportation. Bike sharing has been popular in many countries, due to the fact that environmental proception organizations proposed environmental sustainability transportation methods such as electric vehicles and bicycles [13]. Bike sharing provides benefits in various aspects and is achieving world-wide popularity [20]. For instance, the number of renters in US was larger than 28 million in 2006 [33]. All these businesses share one commonality, for which consumer demand is upon request. Namely, suppliers need to immediately, if not instantaneously, deploy

goods and services as soon as demand is generated. On the one hand, the success of sharing economy lies at such on-demand features; on the other hand, this requires supplies to predict consumers demand on various occasions as accurately as possible in the first place, thereby diverting goods and services to consumers as efficiently and timely as possible.

One telling example is Uber's surge pricing. Uber is capable of striking immediate balance between demand and supply through detecting riders' request in different periods of time, especially when demand fluctuates drastically in small geographical region [8]. In this case and many others, conventional econometric modeling in predicting demand would become less useful because it relies on predictors that usually do not change in the short run. For instance, it is extremely rare, if at all, to model consumer demand on a daily or hourly basis through using social or economic indicators. Of course, both economic indicators, such as income and price and a wide range of social demographics have compelling explanatory power in predicting long-term demand because they are grounded on sound economic theories. They would become useless in predicting instantaneous demand, such as in the case of Uber's surge pricing in which demand changes in a course of a few hours. The reason is that these predictors are constant on a daily basis not to mention on an hourly basis, which renders conventional economic modeling and forecasting obsolete. For this reason, machine learning has gained momentum in predicting demand in these contexts.

While studies using machine learning techniques to predict consumer demand are proliferating in tourism and hospitality, there are very few devoted to predicting demand for bike sharing. A wealth of studies that indeed addressed bike sharing are primarily from the field of computer sciences [5, 14, 26, 27, 34]. In fact, modeling tourism demand is disproportionately devoted to predicting tourist arrivals using either machine learning or a combination of machine learning and search query data [3, 9, 10, 23–25, 30]. However, sharing economy has not only changed the way we model tourism demand but also extended what is modeled to reflect the nature of sharing economy in various areas. In this regard, we aim to use machine learning techniques to predict consumer demand for bike sharing. We also aim to advance previous research on bike sharing by incorporating a wide range of features other than weather to increase prediction accuracy.

2 Literature Review

Machine learning and big data have been increasingly applied to model and predict tourism demand in various domains. This strand of research bifurcates evidently between enhancing the performance of econometric models through incorporating machine learning techniques and using search engine data in prediction algorithms [1, 3, 6, 9, 10, 30, 35]. As a matter of fact, tourism research has focused on predicting tourist arrivals through using both conventional econometric models and machine learning techniques [1, 3, 9, 10]. For instance, Akın [1] used Neural Network models to predict tourist arrivals in Turkey while using conventional econometric techniques, such as autoregressive integrated moving average (ARIMA), as a benchmark. Claveria et al. [9] used machine learning algorithms such as the support vector regression,

Gaussian process regression, and neural network models to predict tourist arrivals in Spain. Similar to Akin [1], they found that machine learning methods improved forecasting performance against the autoregressive moving average (ARMA) model as a benchmark.

On the other hand, researchers have started to realize the importance of big data in predicting tourism demand. In particular, search engine data provides researchers a viable substitute for conventional economic variables as predictors in modeling and forecasting tourism demand. In this respect, search engine data have been extensively used to predict tourism demand and tourist arrivals in particular [23–25, 30, 35]. Sun et al. [30] used kernel extreme learning machine (KELM) models and search results generated by Google and Baidu to forecast tourist arrivals in China. Xie et al. [35] fed search query data (SQD) generated from Baidu to a least squares support vector regression model with gravitational search algorithm (LSSVR-GSA) to predict cruise tourism demand. Many studies concluded that using machine learning coupled with search query data increases the forecasting performance and robustness of the models [25, 30, 35]. This perhaps explains why various search engine data were also used to model and predict tourist arrivals [23, 24], which used to be addressed in conventional econometric models.

One of the advantages of using machine learning is to predict micro-level tourist demand and the facet of demand, such as network effects on the Internet, that cannot be accounted for by conventional economic indicators. This advantage also enables researchers to narrow down the prediction horizon, thereby modeling short-term demand patterns. However, demand modeled in many studies is conventional tourism consumption, such as park attendance, cruise demand, and tourist arrivals [23, 24, 35]. The overriding objective was to improve prediction accuracy through using machine learning techniques. Hence the focus is a matter of model selection while having little to do with modeling on-demand economy, such as car or bike sharing. In fact, bike-sharing modeling entails short-term even almost instantaneous demand prediction. On the other hand, machine learning models need to take into account station-level variance in bike demand, which would allow suppliers to deploy bikes efficiently across destination to ensure supply. Such deployment requires modeling and forecasting demand across different docking stations on an hourly basis depending on the degree of demand fluctuation.

There is a great deal of research devoted to forecasting bike demand in various cities [5, 27]. A majority of these studies modeled bike demand on an hourly basis, aiming to provide policy implications for deploying bikes in a timely manner [14, 32]. For this reason, the features that were used to predict bike demand were exclusively weather conditions, ranging from precipitation, humidity to wind speed and temperature in the course of 24 h. We aimed to predict bike demand by extending the scope of features on a daily basis. Indeed, some studies have shown that the geography of bike-docking stations has impacts on bike demand, which has a lot to do with social and economic situations in which these stations are located. Obviously, hourly-based models with weather conditions as the primary predictors are insufficient to account for such difference. Insofar as policy is concerned, this study can provide implications for the supply of bikes in different districts and the deployment of bikes across stations.

3 The Data

We retrieved the counts of public bike rentals in Seoul of Korea from January 1 to December 31, 2020 from Seoul Public Data Park website [21]. This data set consists of hourly bike rentals recorded from 2,148 docking stations in 25 districts of Seoul. Note that 55 stations that were not functioning in the study period were discarded from the analysis. We ended up identifying a total of 2,093 stations that were active during the whole study period. We aggregated hourly data to compile daily rental counts, giving rise to a total of 9,111 observations, with a daily average of 2029 bike rentals in Seoul in the year 2020.

To predict bike rentals in Seoul, we identified a total 29 features in six categories: (1) weather, (2) air pollution, (3) traffic accidents, (4) Covid-19 outbreak, (5) social and economic factors, and (6) seasonality. These data are retrieved from the website Seoul Open Data [21]. These 29 features are the potential features influencing bike sharing demand. When weather or air quality is bad, people might be reluctant to rent a sharing bike. On the other hand, when traffic is bad, renting a bike will be more efficient. We also suspect that Covid-19 cases and other social economic factors might also influence the demand of bike renting. Note that Covid-19 confirmed cases and deaths were analyzed with a one-day time lag since their influence on bike demand, if any, would take at least one day to emerge. The reason that we delayed one day confirmed and deaths cases is that residents need time to process the news information produced. They might not realize the disease cases immediately after the release of the news on media, and they need some time to process the information. Since the new cases counts updates each day, the case number delayed by one day is more applicable. We aimed to pinpoint the most important features that can accurately predict bike demand.

4 Methods

We performed four machine learning algorithms to predict bike rentals, which are linear regression, the k-nearest neighbors (KNN), random forest, and support vector machine. All of these models were performed on R studio. Since these four models were developed based on different assumptions for identifying the relationships between independent and dependent variables, it is a convention in machine learning to use them complementarily for prediction.

4.1 Algorithms

Linear regression. Linear regression is the most widely used and simplest method to predict demand in various contexts. Due to its simplicity and straightforward economic intuition in explaining the relationship between predictors and the outcome, we use linear regression as a benchmark against which other more advanced models are compared for their predictive power. The linear regression model is given as

$$y = \beta_0 + \sum_i^n \beta_i x_i + \varepsilon \quad (1)$$

where β_i is the coefficient of feature x_i , β_0 is the constant, and ε is the random error [28].

K-Nearest Neighbors (KNN). The k-nearest neighbors (KNN) is a machine learning algorithm used for both classification and prediction. The KNN is a nonparametric technique which provides solution for the curve fitting of unknown shape, and has an advantage for data mining, because it does not assume specific forms of regression functions [2]. For both classification and prediction, explanatory variables take into account the k (a positive integer) closest instances. The parameter k needs to be tuned before modeling and it is crucial for non-parametric regression performance [2]. The calculations of the KNN are based on distances between an instance to its neighbors. The distances used for continuous variables are the Euclidean distance. The Euclidean distance d between two n -dimensional vectors (p_1, p_2, \dots, p_n) and (q_1, q_2, \dots, q_n) is given by:

$$d = \sqrt{\sum_i^n (p_i - q_i)^2} \quad (2)$$

The prediction of an observation is the mean of the values of k neighbors that are the nearest when implementing the KNN as the regression model in prediction.

Random Forest. Random forest is a almighty tool which ensembles decision trees and bagging [4]. The base learner of random forests is a binary tree constructed by recursive partitioning (RPART) and then developed using classification and regression trees [7]. Binary splits of the parent node of a random forest splits data into two children's nodes and increases homogeneity in children nodes compared to parent nodes. Note that a random forest does not split tree nodes based on all variables; instead, it chooses random variable subsets as candidates to find the optimal split at every node of every tree [7]. Then the information from the n trees is aggregated for classification and prediction [7]. Random forests also provide the importance of each feature by accumulated Gini gains of all splits in all trees representing the variable discrimination ability [19]:

$$impor_j = \frac{1}{\#trees} \sum_{v \in x_j} Gain(x_j, v) \quad (3)$$

where $Gain(x_j, v)$ is the gain of the Gini index of feature x_j combined with node v [32].

Support Vector Machine. Support vector machine (SVM) is a machine learning technique for classification and regression [11]. SVM is suitable for general relationships between explanatory variables and responsive variables. The basic idea of SVM is to map nonlinear explanatory vectors onto a high dimensional space in order to find a linear decision hyperplane. The solution of SVM regression is given as:

$$f(x) = \sum_{i=1}^n (\alpha_i - \alpha_i^*) K(x_i, x) + b \quad (4)$$

where $K(x_i, x)$ is the kernel function that satisfy Mercer's conditions, where α_i and α_i^* are the dual variables larger than or equal to 0 and smaller than or equal to the hyperparameter C [31]. We use the radial basis function (RBF) kernels with the corresponding Kernel equation of

$$K(x_i, x) = \exp(-\gamma \|x - x_i\|^2) \quad (5)$$

in which γ is the kernel parameter. The RBF kernel provides solutions when the relationship between features and responsive variables is nonlinear and is computationally easier than polynomial kernels [12].

4.2 Feature Selection

We split the 9,111 observations into a training set with 75% of the cases, or 6,235 observations, while 25% as a test set, or 2,276 observations. The training set was used for feature selection, hyperparameter tuning, and prediction. The test set was used for evaluation and prediction for bike rentals. Prior to selecting features, we explored the Pearson correlation coefficients between the number of bike rentals and the features in each of the six categories. Major findings are summarized here. Most of the pollution features except CO are positively correlated with bike rentals. Covid-19 cases and deaths are negatively correlated with bike rentals. All but two social economic factors, namely the number of markets (-0.09) and number of stores (-0.06), are positively correlated with bike rentals. The population in a district has the strongest correlation with bike rentals (0.35). The number of traffic accidents is positively correlated with bike rentals (0.20). Visibility and humidity are most correlated with bike counts (0.29). Visibility is positively correlated to the number of bike rentals, while humidity, precipitation, and wind speed are negatively correlated with bike rentals.

We proceeded to use Boruta and recursive feature elimination (RFE) to select features. Boruta is a wrapper approach to determine the relevance of features through implementing a random forest classifier. A shadow attribute is created for each feature, and classification is performed based on the feature importance by using all attributes and shadow attributes. These shadow attributes help reduce the distracted impact of random fluctuations [22]. Even though Boruta uses random forest as the base algorithm, this will not increase the accuracy of random forest since the testing set was never exposed to the algorithm. Figure 1 shows the result of the Boruta feature selection on all 29 features but districts and rented bike counts because it is the dependent variable. The blue boxes represent the shadow attributes, green ones are the accepted or confirmed attributes while red attributes are rejected. Thus, the number of deaths in the category of traffic accidents is rejected, so this feature will not be entered in the regression models. Binary variables of traditional holidays and leisure holidays

are not as important as expected, and this result indicates that bike renting demand was not strongly influenced by the indicator holiday. We suspected that most residents rent bikes for many other reasons instead of holiday leisure activities.

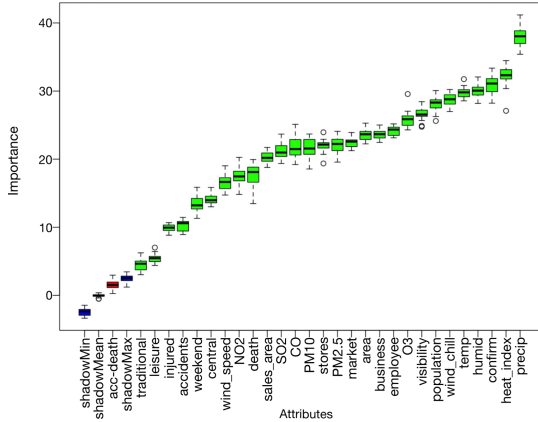


Fig. 1. Boruta feature selection.

While the Boruta algorithm can indicate what features will be accepted or not based on their performance, it does not state the variable’s root mean squared error (RMSE). To retrieve lower RMSE, we further used the recursive feature elimination (RFE) to select features that can minimize the RMSE [15]. Like Boruta, RFE is also based on random forests in terms of method of implementation. RFE was implemented along with cross validation repeated three times for training to increase prediction performance. Like Boruta, no testing set instances had been exposed to the RFE algorithm. We identified the threshold number of features with the lowest RMSE is 25. Thus, the first 25 confirmed features are selected, and the excluded features are the number of injuries in the category of traffic accidents and holidays in the category of seasonality.

4.3 Model Development

We used hyperparameter tuning to optimize the performance of each of the four models. Hyperparameters are crucial to the result of machine learning algorithms and can affect the performance of the models [34]. There are several hyperparameter tuning methods, such as manual tuning, random search, and grid search, which can be applied in different contexts. We performed grid search for it is widely implemented and requires less experience and computational efforts. Grid search iteratively assesses over potential hyperparameter values, which are the number of neighbors (k). Figure 2 shows that a search on k value between 1 and 30 is computed, and the optimal k value with the highest coefficient of determination (R-squared) is 12. We identified two hyperparameters: n_{tree} and m_{try} of the random forest. n_{tree} is the number of trees to grow in the model and m_{try} is the number of variables that are selected as candidates at

liberty during each split [18]. We set *n*tree as the default value of 500, which is large enough to produce stable models and *m*try in the range from 1 to 15 in the tune grid. Figure 3 shows that 10 is the optimal value of *m*try.

The support vector machine (SVM) has two essential hyperparameters, sigma and cost, to be tuned. The tune grid of cost ranges from 0 to 120 with the step of 10. The tune grid of sigma uses 0.1, 0.01 and 0.001 as these three values are the conventional learning rate of SVM models. Figure 4 shows that the optimal combination with the highest *R*-squared is a cost of 120 with sigma equal to 0.01.

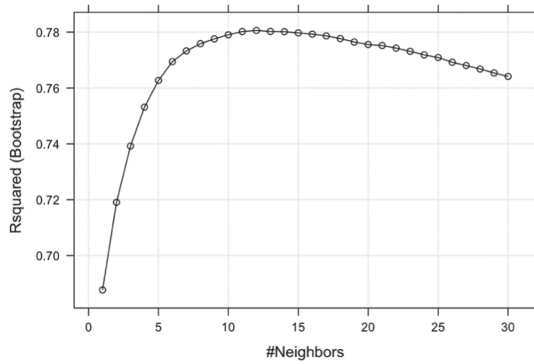


Fig. 2. Grid search of KNN.

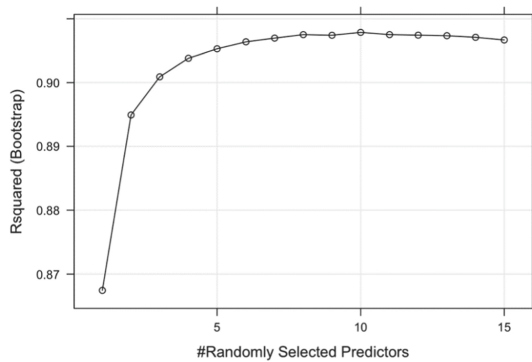


Fig. 3. Grid search of random forest.

5 Results and Discussion

All prediction models were implemented using 10-fold cross-validation process repeated for three times during training, which generated a total 30 results for each model. Cross-validation is an approach to increase the performance of the proposed models [29]. The *K*-fold cross-validation separates the data set randomly into *k* subsets and one

subset is used for testing while the other $k-1$ subsets are used for training. The whole process of randomly separating, splitting, training, and testing is repeated several times and the optimal one is identified as having the minimum RMSE.

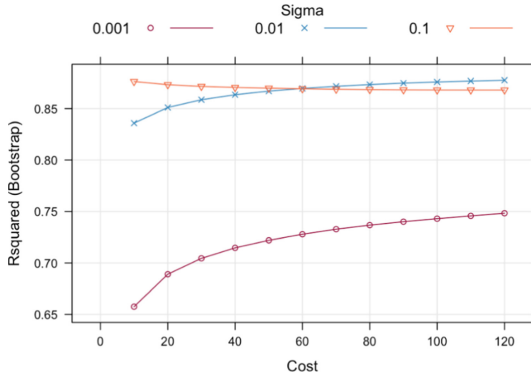


Fig. 4. Grid search of support vector machine.

5.1 Model Performance

We use the R-squared, RMSE, and the mean absolute error (MAE) to evaluate the performance of each of the four models. R-squared is a statistic measure (also called coefficient of determination) of the variation proportion in the responsive variable predicted by the explanatory variable [16]. Higher R-squared suggests better model performance in predicting dependent variable [17, 19]. Model with the highest R-squared, lowest RMSE and MAE is considered having the best predictive power. Table 1 shows that SVM yields the highest R-squared and the lowest RMSE and MAE in the training set. While RF has the same R-squared in training set (0.92), SVM outperforms RF due to its lower RMSE and MAE. However, when it comes to the testing set, RF outperforms SVM in terms of both R-squared and RMSE and MAE values. RF performs slightly better in the testing set than in the training set. Comparing prediction performance in the training and testing sets, RF’s R-squared in the testing set is 0.93 while 0.1 lower in the training set. This result suggests that the RF model performs even better in the testing sets. The R-squared of KNN in the testing set decreases by 0.4 than in the training set which is the largest decrease compared with other models. The LM has the worst performance in both the training and testing sets, indicating that the relationship between bike rentals and the explanatory variables is nonlinear.

Table 1. Results of regression algorithms.

Models	Training			Testing		
	R^2	RMSE	MAE	R^2	RMSE	MAE
LR	.48	1065.12	778.87	.46	1062.37	796.30
KNN	.85	589.95	408.74	.81	641.82	448.22
RF	.92	442.25	274.04	.93	399.21	264.40
SVM	.92	415.45	252.40	.90	457.88	306.21

Note: LM = Linear regression, KNN = k -nearest neighbors, RF = Random Forest, SVM = Support vector machine, R^2 = R -squared, coefficient of determination, RMSE = Root mean squared error, and MAE = Mean average error.

5.2 Feature Importance

As shown, the random forest model performs the best in terms of R -squared, RMSE, and MAE. Figure 5 shows the feature importance of the RF model. As we can see, precipitation is the most important feature in predicting daily bike rentals, followed by Covid-19 confirmed cases and the O₃ level of air pollution. Heat index and the levels of PM₁₀ and PM_{2.5} are also strong predictors. The least important predictor for bike rentals is the number of traffic accidents. The most important social-economic feature is population while the rest are not salient. Table 2 shows the average of the feature importance in different categories of variables for the RF model. The category with the highest average feature importance is Covid-19 (50.37) while the lowest average feature importance category is traffic accidents (14.56). Air pollution and weather have similar average feature importance.

Table 2. Average feature importance by category of RF

Feature category	Average importance of features
Weather	40.31
Air pollution	41.70
Covid-19 outbreak	50.37
Traffic accidents	14.56
Social economic	21.86

Although the SVM has lower performance than RF, the evaluation matrices of SVM is also superior. The SVM in this study implemented RBF kernel. Unlike linear kernel, since RBF does not directly provide feature importance, the relative feature importance is composed by the weight of weight vectors. Features with higher weights indicate higher importance. Figure 6 shows the feature importance generated by the SVM model. The level of O₃ has the highest weights, followed by wind chill temperature, visibility, temperature, and population. The feature for the number of stores in

the district has the least weight. The level of PM10, weekend or not, the number of business and number of employees in the district also have low weights. It is worth noting that the features that are important in RF are not necessarily important in the SVM model, for instance PM10 level and heat index. The number of markets, business and employees are not the strong indicators in both RF and SVM models.

We also calculated the average feature importance in each of the six categories of the variables. Table 3 shows that weather has the highest weight, followed by Covid-19 outbreak and traffic accidents. Social economic features have the lowest weight. Comparing the feature importance of the RF model and SVM model, features in weather and Covid-19 are important in both models. Features in the Social-economic category have less importance in the RF and SVM models. In the RF model, the category of air pollution is more important than traffic accident, while in SVM model, air pollution is less important than traffic accidents. In both models, the level of O₃ ranks top 5 for the feature with high importance or weights.

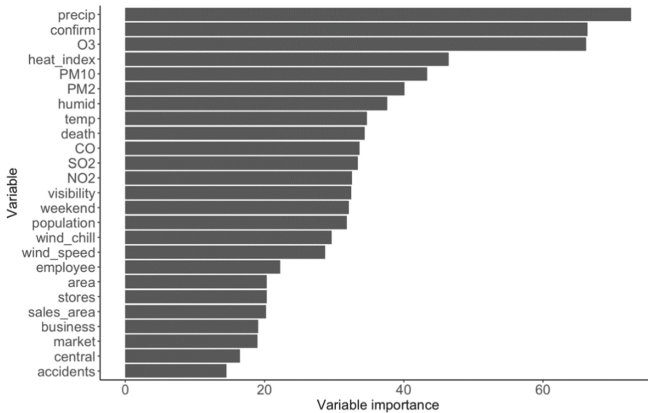


Fig. 5. Random forest model feature importance.

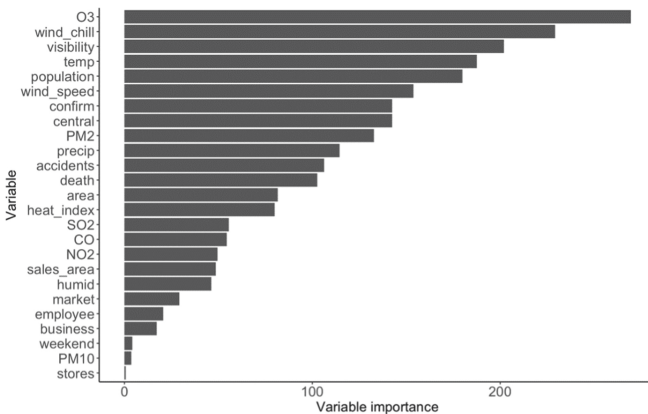


Fig. 6. SVM model feature importance.

Although social-economic features are not important, they did increase the predictivity of both the RF and SVM models. A subset without social-economic features was taken from the data set and implemented in RF and SVM models. Table 4 shows that the RF and SVM models without social economic factors have substantially lower evaluation matrices. For the RF model, the R -squared of the model without social economic features decreased by 0.39 in the training set and 0.38 in the testing set compared to the evaluation matrices with the features. As for the SVM model, the R -squared of the model without social economic factors also decreased drastically in both the training (0.34) and testing sets (0.37). This result suggests that social economic features are crucial to increase prediction accuracy, even though they may not have high feature importance values on their own right.

Table 3. Average feature importance by category in SVM

Feature category	Average importance of features
Weather	144.77
Air pollution	94.30
Covid-19 outbreak	122.58
Traffic accidents	106.33
Social economic	53.93

Table 4. Results of the RF and SVM models with and without social economic factors

Models	Training			Testing		
	R^2	RMSE	MAE	R^2	RMSE	MAE
RF	0.92	442.25	274.04	0.93	399.21	264.40
RF w/o	0.53	1019.77	722.62	0.55	972.90	693.26
SVM	0.92	415.45	252.40	0.90	457.88	306.21
SVM w/o	0.58	982.13	615.05	0.53	1018.03	649.37

6 Conclusion

While machine learning models are completely data driven, we have attempted to incorporate social economic variables in the models to predict bike sharing demand. Despite the fact that these variables are barely useful in explaining and predicting short-term bike demand because they are constant, they did reveal demand differences between docking stations that are characterized by different social economic conditions. The roles that these variables play are to reveal population and economic activity that may differ across districts where bike docking stations are located. In this regard, bike sharing demand at the station level could perhaps be divided into basic demand, which is determined by social economic factors and induced demand, which changes with weather, pollution as well as a wide range of features that vary in the short term or

even instantaneously. We advanced studies conducted by V E et al. [32] and E and Cho [14] in predicting bike demand in Seoul in the sense that they only addressed the induced demand for bike sharing on a daily basis.

The best model is the random forest model in our study, and the most important features are precipitation, the number of Covid-19 cases, the level of O₃, heat index, and the level of PM₁₀. The most important categories of features for the random forest model are Covid-19 outbreak, followed by air pollution and weather. Almost all social economic features are the least important, however they played a role in enhancing the performance of the models. The SVM is also an acceptable model. The features in the categories of weather, Covid-19 outbreak and traffic accidents have highest average weights. These results indicate that weather features such as precipitation, temperature, heat index, wind chill temperature as well as Covid-19 outbreak have huge impacts on bike sharing demand in Seoul. Further research can focus on many other potential features that influence bike sharing demand and many other machine learning algorithms such as Multilayer Perception Model.

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A Framework of Resilience for Peer-to-Peer Accommodation Hosts Under COVID-19

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Abstract. The pandemic has hit the tourism industry in various ways. P2P accommodation (P2PA) is one of most disrupted sectors. Different types of P2PA hosts are confronting different levels of challenges. From an angle of social equity, the study adopted a resilience model to examine the resilience of P2PA hosts' business during the first COVID outbreak in Florida, USA. Statistical results show P2PA hosts' business resilience negatively associates with their housing liability and hosting experience. Social superiority in owning more assets can be a defect in coping with COVID crisis. P2PA operators need to maintain an appropriate level of financial flexibility when faced with the threat of COVID outbreaks. We suggest the government and industrial organizations to distinguish the types of P2PA operators when carrying out rescue plans for the industry.

Keywords: P2P lodging · Financial resilience · Social equity · Pandemic recovery

1 Introduction

With the ongoing COVID-19 pandemic and the emergence of new variants of the virus upgrading the unpredictability of the global lodging market, recovering from the constant outbreaks and strengthen financial resilience of accommodation business has become one of the most urgent topics in hospitality industry.

Compared with corporational hotel businesses, small lodging establishments like Peer-to-Peer accommodations (P2PA) experiences a higher level of operational vulnerabilities and business fragilities [1]. While traditional “sharing economy” assumes the sharing of personal idle resources for non-essentially profit purpose, the burgeoning professional P2PA hosts own multiple properties and operate their business in a similar way as full-time hoteliers. Who are more resilient and adaptive in the pandemic disturbing? These professional players fully dependent on accommodation investment for living, or those with only individual listed property? Given the potential government subsidies for small establishments in the hospitality industry, there is an urgent need to understand the mechanism of resilience and examine the resilience status of different types of hosts in the P2PA industry.

The study is first to testify to an adapted resilience model to examine financial resilience in P2PA industry; Second, we aim to examine the level of resilience among different types of P2PA hosts based on our proposed model.

2 Theoretical Background

Resilience was defined as the ability of a system to return to equilibrium after a shock [2]. Despite the variability in definitions of social/human-related resilience, many address the interplay between social vulnerability and the adaptive ability, and how the human network reorganizes and transforms during disturbances and shocks. Briguglio et al. [3] proposed a risk model which distinguished the character of vulnerability and resilience in an economic context, where vulnerability was considered as an inherent factor, while resilience played as a nurtured factor that can ease the risk. The subtraction between vulnerability and resilience equals the risk. This static model refers “risk” as the endogenous odds of being exposed to external shocks, rather than an external factor that is independent from the entity under observation. As a result, it is difficult to operationalize the “risk” factor and evaluate its effect in empirical cases.

Martin [4] proposed a spatial-economic resilience model to describe socio-economic system’s adaptive power to regional economic hysteresis. The conceptual model put that how much a system can absorb depends on its intrinsic vulnerability and resilience features. Based on Briguglio’s and Martin’s work, we proposed our framework to measure resilience as in Eq. 1:

$$\text{Resilience} = \text{Adaptability} - (\text{Vulnerability} + \text{Shock}) \quad (1)$$

Three research questions were consequently developed from the research goals:

Question 1: How could the pandemic shock affect the resilience of P2PA business?

Question 2: How could adaptability affect the resilience of P2PA business?

Question 3: How could vulnerability affect the resilience of P2PA business?

The concept of social equity has been widely used in tourism and economy domain [5], especially to explain the dynamics in the interactions between hosts and tourists [6]. Yet another possible dyadic inequity, the imbalance and contradiction between smaller operators and large asset owners, is equally noteworthy but has been largely neglected. During the pandemic, small operators may have suffered disproportionate challenge because of their financial inelasticity [1]. The supply side of hospitality industry has long been dominated by perspectives of industrial development, and there is an urgent call for a scrutiny of the possible imbalance among different scales of P2P accommodation hosts.

Based on the discussion of social equity, the last research question was developed:

Question 4: Do hosts with social superiority possess higher business resilience?

3 Research Design

3.1 Conceptual Framework

We proposed a model to measure the financial resilience of P2P accommodation during the pandemic (Fig. 1) based on the abovementioned resilience framework.

The severity of the COVID represents the level of external shock, which is operationalized as the number of COVID-19 infected cases. We used both **Overall Shock (OS)** (monthly new reported case number of Florida) and **Local Shock (LS)** (reported cases on county level, weighted by the room scale of the property situating within the county) for measurement.

Adaptability is represented by a series of variables regarding host capability, business scale/feature and operational experience, including **Host Experience (HE)** (the length of a host’s experience in P2PA business), **Property Scale (PS)** (total number of operating properties under one host), **Room Scale (RS)** (total number of available bedrooms under one host) and **Business Level (BL)** (average room rate from January 2008 to February 2020, indicating the targeted market of a host’s P2PA properties).

Vulnerability is gauged by the financial liability in maintaining the properties. **Maintenance Cost (MC)** is the monthly housing expense including utilities, property tax, and mortgage; **Housing Burden (HB)** is the ratio calculated by the MC over regional household income.

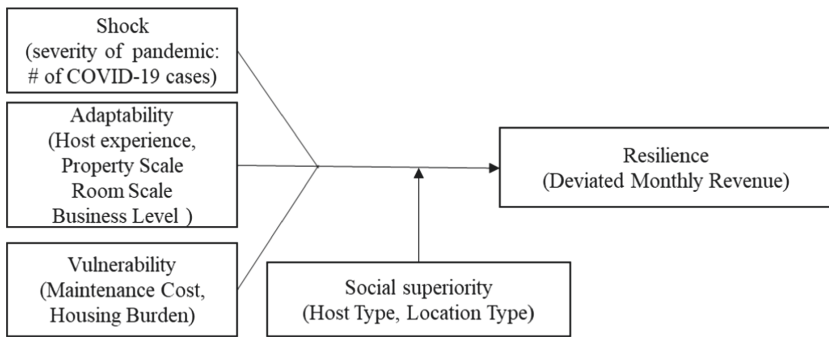


Fig. 1. Conceptual model

The Dependent Variable (DV), resilience, is represented by **Deviated Monthly Revenue (DMR)**. It is calculated by the difference between the monthly revenue year-on-year, where month ranges from March 2020 to September 2020. A positive DMR indicates vigorous performance and strong resilience of the business hosts, and vice versa.

Finally, we introduce two Control Variables (CVs) to represent the construct Social Superiority. **Host Type (HT)** reflects hosts’ individual social superiority based on their owned properties scales. HT is an ordinal variable with “Single” represents hosts with one property, “Small” for two to three properties, “Medium” for four to five properties),

and “Large” for over five properties. *Location Type (LT)* reflects the social superiority of a host’ neighborhood. It was calculated by the median housing value of the community where the properties are located.

3.2 Data Preparation and Preprocessing

We took the State of Florida as the study site for the research. The primary data was purchased from AirDNA (www.airdna.co). The time span of the data ranged from early 2008 to September 2020. The reported COVID case data was retrieved from the New York Times (NYT) Coronavirus Data in the United States. The financial cost data for vulnerability-dimension were obtained from American Community Survey (ACS) data. The NYT and ACS datasets were later integrated to the primary dataset by either zip-code or county labels.

The completed dataset was structured by monthly entries of host performance during the COVID pandemic. We finally collected 138,138 entries from 43,935 hosts after data preprocessing. During the observed period, 4,550 hosts shutdown their business and the remaining 39,385 survived at the end of September 2020. We further removed the data points with missing values and outliers, retaining a final dataset of 112,597 monthly entries from 29,114 hosts for analysis.

4 Preliminary Results and Conclusion

The conceptual model was tested with OLS linear regression with a decent explanation power ($R^2 = 0.24$) (see overall model in Table 1).

Both overall shock (OS) and local shock (LS) are significant factors influencing host resilience. OS (standardized beta = -0.46 , $p < 0.01$) has an overwhelmingly negative impact, arguably the strongest, on revenue performance. This indicates that the majority of the P2PA business suffer from the external shock of the pandemic. Interestingly, LS has a slight positive effect (beta = 0.03), albeit largely overshadowed by the powerful negativity from OS. The plausible explanation is that the hotspots of the first peak of the pandemic in Florida concentrates on those top tier destinations with crowds of visitors and likely better revenue performance, yet inevitably causing a higher number of infected cases at the local level. Regardless of the positive effect from LS on DV, the overall travel flows to Florida have shrunk significantly, as the OS has devastatingly influenced tourists’ willingness to travel and play a more crucial role in the performance of P2PA industry during the pandemic.

Adaptability variables like host experience (HE) (beta = -0.08), room scale (RS) (beta = -0.04), property scale (PS) (beta = -0.27) and business level (BL) (beta = -0.12) turned out to be significant negative impact factors on resilience. Contrary to our assumptions, this result means that P2PA hosts with more properties/rooms and higher business levels were not as flexible as smaller practitioners in terms of adaptation to the COVID. This finding resonated with the result from control variable host type (HT), where medium operators were fiercely strained in recovery (beta = -0.50), while single operators and small operators were not as significant.

Both vulnerability variables, maintenance cost (MC) (beta = -0.13) and housing burden (HB) (beta = -0.02) were a significant hindrance to resilience performance. Hosts with higher liability or debt level were more vulnerable in the pandemic and might struggle to make ends meet in maintaining their properties.

Finally, the control variable location type (LT) indicated that hosts with properties in more affluent communities were more likely to recover.

Table 1. Regression model results

Constructs	Variables	Overall model	Model (Mar–Jun)	Model (July–Aug)
	Constant	0.02* (-0.01)	-1.00*** (-0.02)	-2.02*** (-0.08)
Shock	Overall shock	-0.46*** (0.00)	-1.98*** (-0.03)	0.39*** (-0.04)
	Local shock	0.03*** (0.00)	0.05** (-0.02)	0.03*** (0.00)
Adaptability	Host experience	-0.08*** (0.00)	-0.08*** (0.00)	-0.07*** (-0.01)
	Room scale	-0.06*** (0.00)	-0.06*** (0.00)	-0.19*** (-0.02)
	Property scale	-0.10*** (-0.02)	-0.10*** (-0.02)	-0.02 (-0.02)
	Business level	-0.12*** (0.00)	0.01*** (0.00)	-0.38*** (-0.01)
Vulnerability	Maintenance cost	-0.13*** (-0.01)	-0.11*** (-0.01)	-0.17*** (-0.02)
	Housing burden	-0.02*** (0.00)	-0.03*** (0.00)	0.0037 (-0.01)
Social superiority	Host type [Single]	0.01 (-0.01)	-0.08*** (-0.01)	1.00*** (-0.04)
	Host type [Small]	0.01 (-0.01)	-0.08*** (-0.01)	0.63*** (-0.04)
	Host type [Medium]	-0.50*** (-0.01)	-0.34*** (-0.02)	0.23*** (-0.03)
	Location type	0.07*** (-0.01)	0.06*** (-0.01)	0.08*** (-0.02)
	Adjusted R-square	0.24	0.17	0.26
	Observations	112597	68354	30350

Dependent Variable: Deviated Monthly Revenue

Standard errors in parentheses

* p < 0.1, ** p < 0.05, ***p < 0.01

5 Discussions, Limitations and Future Directions

Linking back to our proposed resilience model, the following constructs agreed with our assumptions: 1) vulnerability negatively associates with the resilience of revenue. Housing Burden (HB) turns out to be a valid indicator to examine vulnerability of

households. 2) the level of overall shock exhibits a negative relationship with the resilience of revenue, while the county-level local shock shows a positive relationship. This interesting paradox may be explained by spatial heterogeneity. This indicates the existence of spatial variances in the P2PA resilience at a regional level. Adopting a spatial approach can help explain the pattern of local variance in resilience.

Two of the constructs exhibit different results compared with our assumptions: 3) adaptability shows a negative association with resilience. Using host experience (HE) to represent hosts' resourcefulness in dealing with crisis may be reasonable, but the statistical results remind us that there could be disturbance when using HE. The longer experience a host has, the higher odds that the P2PA investment as their major income. Such over-dependency on tourism-related industry has leveraged hosts' financial vulnerability. 4) Social superiority shows negative associations with resilience. This can be explained by the hosts' level of dependency on P2PA business. In addition, owning more P2PA properties during a crisis can cut short the cash flow of a host, thus reduce hosts' marketing and operational budget. This may be the cause for the downshift of revenue among those hosts with higher social superiority.

When faced with the threat of COVID outbreaks, P2PA operators should maintain an appropriate level of financial flexibility. We suggest the government and industrial organizations to distinguish the types of P2PA operators when carrying out rescue plans for the P2PA industry. The periodic outbreak and remission of COVID indicates the necessity to examine the pattern of P2PA hosts' business in a temporal perspective. Models in separate stages have been conducted, yet the results have not been fully addressed in the short paper. Ideally, a lengthened observation timeframe is encouraged to detect temporal patterns with robustness and carry out a potential time-series model. Extended data collection and analysis are expected in the full-paper version to complement current findings.

Theoretically, this paper examined an adapted resilience model and operationalized constructs like adaptability, vulnerability, and shock in different ways in P2PA industry. However, further examinations are needed to improve the reliability of this framework in tourism field.

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Platform Stress in Hospitality – Focusing on the Technology dimension

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Abstract. For the emergence of platform business, it is important to manage the stress that hosts receive from the business. Considering the characteristics of the platform business, stressors arise from social and technology dimension. In the global platform business (e.g., Airbnb), social dimension stressors mostly arise from the relationships among stakeholders, and technology dimension stressors arise from the system they utilize. This research aims to define this combination of social and technology stress as “Platform Stress.” Especially focusing on the technology dimension, this research empirically verified the relations of techno-stressors, burnout, and switching intention. Further, mediating effects of burnout in between the relationships demonstrates the importance of investigating the hosts’ stress. Exploring the platform stress from the technology-usage perspective, this research provides theoretical and managerial implications.

Keywords: Platform stress · Platform business · Technostress · Airbnb

1 Introduction

Disruptive development of Information Communication Technologies (ICTs) over the last decade generated the new type of business model: platform business [1]. Among the various platform businesses in overall industries, Airbnb is a typical example in the hospitality, especially accommodation industry [2].

Much research has been conducted regarding the platform businesses focusing on the relationship in it [3, 4]. However, most of these studies aim at guests whereas insufficiently aimed at hosts [5]. Furthermore, although the platform businesses have been growing fast in various industries, few research has investigated the strain hosts go through. Particularly, stress from the platform business is unique in that it is caused by both social and technological issues considering the peer-to-peer service-providing and at the same time technology-based characteristics of the business.

This work was supported by the Ministry of Education of the Republic of Korea and the National Research Foundation of Korea (NRF-2019S1A3A2098438)

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J. L. Stienmetz et al. (Eds.): ENTER 2022, *Information and Communication Technologies in Tourism 2022*, pp. 304–309, 2022.

https://doi.org/10.1007/978-3-030-94751-4_27

2 Literature Review

2.1 Platform Business and Its Complaints

Platform business is made upon the relationships between stakeholders (e.g., in case of Airbnb, guests, peer hosts, and employees of the platform company) who make transactions and the ICTs that make the online transactions possible. It can be said that platform is composed of two dimensions: social dimension and technology dimension.

In the social dimension, hosts may perceive the relationship with the headquarters, customers, and peer hosts as stressors [6]. In addition, hosts may feel the transformations relatively abrupt and perceive it as stressor since individuals have to learn such things by themselves.

Against this backdrop, we define this specific stress that occurs from the social and technology dimensions of the platform business as “platform stress.” In this research, we focused on the technology dimension and the further will be discussed below.

2.2 Platform Stress in the Technology Dimension - Technostress

Technology gave pressure to users, in our research hosts, who are not accustomed to the technology and thus have difficulty in handling it. This adaptation problem “caused by and inability to cope with the new computer technologies” was coined as “technostress” [7]. From the various previous study, researchers categorized these stressors mentioned above into 5 types: work-overload, complexity, uncertainty, job-insecurity, and job-invasion [8]. In this research, we focused on the first 3 factors since the platform business is far from job-insecurity and job-invasion, and rather created the opportunity on the basis of technology (Table 1).

Table 1. Definition of independent variables

Variable	Definition
PTC	The state which technology makes users feel inadequate and forces them to spend time and effort in learning and understanding it [8]
PTU	The state which technology continues to changes and upgrades and makes users unsettle and create uncertainty [8]
PWL	The state which the technology force users to work faster and longer [8]

Meanwhile, the technology dimension from platform stress is not the same with technostress. Platform stress is the specific burnout that service providers in the P2P platform business experience due to the relational and technological issues. Therefore, the former indicates the burnout that platform service providers (e.g., Airbnb hosts) experience and it may be the trigger for service providers to leave the platform whereas the employees experiencing the latter might not leave their organization since they are not individual business runners.

3 Research Model and Hypotheses Development

Technology as a stress factor causes hosts to feel burnout, which may ultimately make them leave the platform. Thus, we hypothesized as following:

H1a-3a: Platform technology complexity, -uncertainty, and -work overload is positively related to burnout.

H1b-3b: Platform technology complexity, -uncertainty, and -work overload is positively related to switching intention.

When employees feel a sense of strain, they no longer want to stay in the organization and instead hope to leave, which can be interpreted that the employees’ burnout affects their switching intention [9]. Accordingly, people who work in stressful conditions are more likely to undergo burnout, and this burnout arises switching intention [10]. Therefore, we hypothesized as following (Fig. 1):

H4: Burnout is positively related to switching intention.

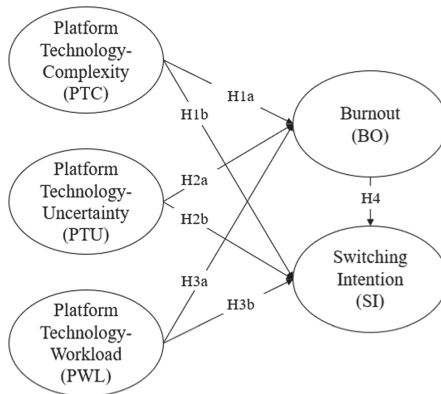


Fig. 1. Research model

4 Research Methodology

4.1 Data Collection

Measurement items were taken from prior literature, and content validity was checked to identify ambiguous definitions or questions that are difficult to answer. The survey was conducted through the online survey platform Qualtrics to the members of Airbnb hosts’ internet community (Feb 23, 2021–Mar 07, 2021). Considering the statistical technique employed, the sample size was checked based on G*Power [11]. According to this, testing the proposed model required a minimum sample of 110 individuals for a statistical power of 0.95. Therefore, it can be safely concluded that the sample size used (157) was acceptable for the purposes of our research. Descriptive details such as

gender (Male 47.13%, Female 52.87%) and age were almost equally distributed, whereas in location Seoul, the capital city, took half of the percentage (51.6%).

4.2 Results

Through partial least squares SEM (PLS-SEM) analyses using SmartPLS 3.0 [12], Cronbach's alpha and composite reliabilities all exceeded the threshold value of 0.70, all indicator loadings and all AVE values exceed each threshold value of 0.60 and 0.50 cut-off, supporting convergent validity. Fornell and Larcker criterion and the factor loading were confirmed supporting discriminant validity.

As Table 2 shows, hypotheses regarding the relations of each stressor and burnout are all supported, whereas relations of switching intention are all rejected. In addition, the relations of burnout and switching intention is supported. It demonstrates that stressors do not directly provoke platform switching intention but do indirectly provoke when burnout mediates in between. Further, the R^2 values for dependent variable burnout and switching intention were 0.53 and 0.32, respectively.

Table 2. Result of hypotheses testing

Hypothesis	Path	β	P	Result
H1a	PTC \rightarrow BO	0.284	0.001**	Supported
H1b	PTC \rightarrow SI	0.029	0.788	Rejected
H2a	PTU \rightarrow BO	0.243	0.003**	Supported
H2b	PTU \rightarrow SI	0.161	0.184	Rejected
H3a	PWL \rightarrow BO	0.352	0.000***	Supported
H3b	PWL \rightarrow SI	0.220	0.062	Rejected
H4	BO \rightarrow SI	0.274	0.013*	Supported

4.3 Mediating Effects

To further examine the mediating effects of burnout, our research conducted VAF analysis through PLS-SEM bootstrapping technique [13]. Table 3 shows the result that burnout has partial mediating effects on the relationships between each of PTC, PTU,

Table 3. Result of mediating effects testing

Path	Coeff of P1	Coeff of P2	Coeff of P3	VAF	Result
PTC \rightarrow BO \rightarrow SI	0.284**	0.274*	0.029	0.729	Partial mediation
PTU \rightarrow BO \rightarrow SI	0.243**		0.161	0.293	Partial -
PWL \rightarrow BO \rightarrow SI	0.352***		0.220	0.305	Partial -

Note: P1 = independent variable(iv) \rightarrow mediator(m), P2 = mediator(m) \rightarrow dependent variable(dv), P3 = independent variable(iv) \rightarrow dependent variable(dv); VAF = $(\beta_{iv-m} * \beta_{m-dv}) / (\beta_{iv-m} * \beta_{m-dv} + \beta_{iv-dv})$, More than .80 = full mediation; .20-.80 = partial mediation; Less than .20 = no mediation.

PWL and SI. It can be interpreted that while stressors of platform technology complexity, -uncertainty, and -work overload do not directly arise switching intention, it merely does when mediated by burnout.

5 Conclusions

We tried to explore the new type of stress and newly defined it as “Platform Stress.” This research especially focused on the technology dimension, reflecting the dependency technology dimension, and highlighting the importance of it. Theoretical implication is provided by extending the understanding of technostress and proposing the concept of platform stress. Managerial implication is provided by suggesting that not only stressors themselves, but also controlling burnout is essential to keep hosts from leaving the platform. Limitations of the research are found in restricted platform (Airbnb), market (South Korea), and industry (accommodation). Future research is expected to be conducted in more diverse platform, market, and industry.

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Window to the Destination: Tourists' Local Experience via “Online Experiences” on Airbnb Amid the Pandemic

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Abstract. This study aims to explore the composition of virtual guided tour experience on Airbnb and to develop a formation process of virtual guided tour experience. A case study based on the qualitative analysis was conducted with a dataset of online reviews towards an Online Experience in Beijing, China. A three-stage process of virtual guided tour experience was concluded, including experience encounter, experience evaluation, and behavioral intention. Experience encounter describes the experience composition from four dimensions: interpretation quality, host credibility, tourist-host social contact, and peer interaction; Experience evaluation is involved with benefits mainly gained from the enhanced understanding of local culture and the satisfaction attributed by the sense of telepresence; Further, behavioral intention covers both online and offline willingness to recommend or repurchase the virtual tour, or visit the destination in person after the pandemic. Theoretical and practical implications in navigating tourism recovery were discussed.

Keywords: Local experience · Staycation · Airbnb · Online experiences · Tourist-host social contact · The COVID-19 crisis

1 Introduction

Due to the restrictions on travel especially international air travel, staycations are becoming the alternatives for travel to the destinations amid the COVID-19. Despite that, the changing travel patterns generate new growth opportunities to independent service providers [1]. For instance, to navigate the business recovery, Airbnb released the “Online Experiences” program as the virtual tour activities without leaving home, switching the engaging activities designed by the locals to online tours or classes. Understanding the new growth space in sharing economy for coping with the pandemic crisis is therefore essential since adversity breeds innovation. The composition and its consequences of the virtual guided tour experience, however, are still ambiguous. Although sharing platforms such as Airbnb have attracted increasing attention in the industry and academics, the majority focus in previous studies is still limited in the issues of short-term rentals. On the other hand, researchers have confirmed the role of Airbnb in creating authentic tourism experiences by connecting the tourists directly with the locals [2, 3]. Yet how tourists understand and evaluate their experience in

virtual tours guided by the locals remains unknown. To address the knowledge gaps, two research questions were raised: 1) what is the composition of consumer experience in virtual guided tours hosted by the locals? and 2) what is the formulation process of consumer experience of virtual guided tours?

2 Consumer Experience and Virtual Guided Tour

Consumer experience framework in hospitality and tourism was developed by [4] based on the diverse theoretical underpinnings of consumer experience. It postulates that consumer experience is formed by the core experience values (emotive, cognitive, extraordinary, ordinary) with the impact of the peripheral factors related to physical and human interaction dimensions (individual characteristics, physical experience, human interaction, and situation factors). Accordingly, the composition of virtual guided tour experience can be multidimensional and can transpire as the peripheral factors elicit the core experience values. However, given the contextual nature of consumer experience, there is still much to know about tourists' local experience through the involvement of virtual tours guided by the locals in the specific times of the pandemic.

Virtual tour guided by the locals is a new type for users on sharing platforms to share their underutilized services (i.e., information or knowledge of the destination). Scholars have extended the research on local experience to food-sharing services and advanced our understanding of meal-sharing experiences with local foods [5, 6] and peer-to-peer dining experiences [7]. For instance, [5] identified a five-component construct of street food experience in local-guided tour, including "local guide's attributes, perceived food authenticity, local culture, perceived cleanliness, and novelty." They further found social interaction, awe, and servicescape can also be the key components of meal-sharing experience with local foods [6]. Such forms of tours are unique with more authentic engagement in the destination because the local experiences are cocreated by the residents (hosts) and visitors [7]. That is, social interaction is at the heart of consumer experience to the tours designated and organized by the locals. However, the standstill of traveling brought by the COVID-19 prevented these peer-to-peer social interactions, leading the industry and tourists to embrace the alternative models of traveling such as virtual tourism and online experiences [8]. Although it was noted that consumers' experience in virtual tours amid the pandemic significantly increase their visit or purchasing desire [9], a critical gap exists in the understanding of consumer experience in the new service, virtual tour guided by the locals.

3 Methodology

A qualitative approach following the interpretive paradigm was utilized because the phenomenon can be understood from the perspective of individual experiences. Tourists' online reviews about their virtual tours were adopted for the sake of generating primary and insightful data. Three selection criteria were employed to confirm the eligible virtual tours: organized by the locals, available during the pandemic, merge the experience with the local culture. Finally, one of the most popular Online Experiences

uploaded in August 2020 and led by a Beijing native on Airbnb was selected. It is focused on experiencing Great Wall from its different sections and history and the host has visited Great Wall for many times. This 45-min activity costs 120 CNY (per tourist) with maximum bookings of 10 persons each time. The listing of the reviews from August 2020 to July 2021 was ordered based on relevance, helpfulness, and length. 190 reviews were obtained and read through, among which 39 reviews in Chinese or other language were translated into English. 21 reviews that have no meaningful units or cannot form a complete sentence were filtered out. The qualitative data selection was ended when no new meaningful understanding on the virtual local experience was read. Finally, 135 reviews (11–150 words) were collected for further analysis.

The narrative information was interpreted with a thematic and paradigmatic data analysis approach. The multidimensional framework of consumer experience proposed by [4] guided the procedure. Given the contextual nature of consumer experience, the distinction in contexts (online vs. offline) and situations (normal vs. non-normal) were particularly addressed when capturing the meaningful units and formulating key themes about tourists' local experience via the virtual tour amid the pandemic. NVivo 12 was applied to code and examine the texts. Trustworthiness of data analysis was confirmed after being checked by an expert in the field of sharing service.

4 Findings and Discussion

Three stages embedded in tourists' local experience via virtual tours were concluded, delineating experience encounter, experience evaluation, and behavioral intention (Fig. 1). Experience composition covered four dimensions of the virtual tour experience, namely interpretation quality, host credibility, tourist-host social contact, and peer interaction. Each dimension was further determined by particular factors. Interpretation quality was composed of information quality, orchestration quality, and display quality of the virtual guided tour. A successful interpretation was mainly characterized by informative and insightful understanding of the destination, well-designed orchestration based on story, culture, and gamification, as well as the immersive audio-visual enjoyment; Host credibility was understood through five factors, among which aptency and ardent love to local culture were revealed as the unique reasons that bring praise to the hosts; Tourist-host social contact was qualified by instant Q&A, relationship maintenance, service recovery, and special care from the hosts before, during, and after the virtual tour; Peer interaction mainly occurred between friends or families members and was enhanced by the increasing intergenerational conversation and social bond.

Experience evaluation came from tourists' benefits and satisfaction gained from the virtual tour. Besides the educational function similar to other tourism types, virtual guided tours could offer unique tips to navigate tourist trips after the pandemic, bond their social network during the staycation time, and could also make some tourists recall the wonderful past visits to the same destinations. Tourists' satisfaction was assessed through the comparison to their expectation and their feeling in the past visits

in person. It is worthy to note that tourists' sense of telepresence, "feeling like visiting the destination for real with the hosts," became the majority motive of their satisfaction.

Tourists' behavioral intention illustrated behavioral tendencies both online and offline. Tourists tend to recommend or repurchase the virtual tours organized by the same host, or plan to attend other virtual tour activities in the future. The virtual tour experience can also catalyze tourists' offline tour after the pandemic by facilitating them to visit the destination in person whether guided or not guided by the host.

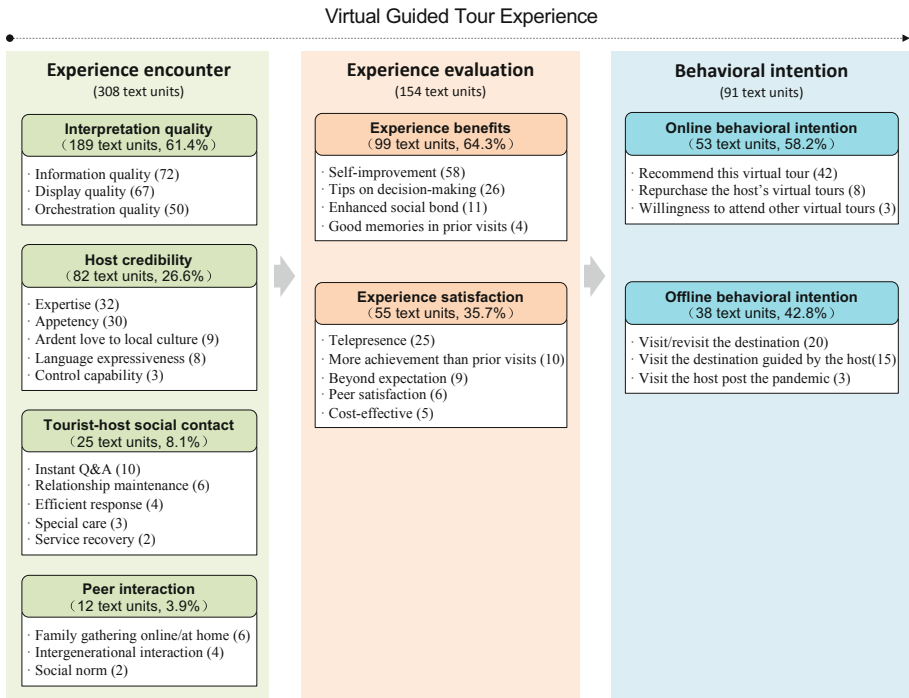


Fig. 1. Conceptual framework of virtual guided tour experience process

Findings of this study revealed that tourists can feel a solid space beyond the plane screen through the immersive experience based on culture and story-based interpretation supported by the local hosts. The consequences of such experiences can accelerate tourists' willingness to recommend or repurchase online experience activities, which may further switch into a real visit or revisit the destinations after the pandemic. Accordingly, a formation process of the virtual guided tour experience for tourists is developed by identifying the constructs and stages of consumer experience (Fig. 1). This process suggests that sociability and interactivity of the virtual guided tours, to a certain extent, satisfy the consumers' desires for travel amid the pandemic and induce the travel desire post-COVID-19. Despite that virtual guided tour is less likely to be substitutes of conventional travel, it can advance the innovation of travel activity by designing high-quality local experiences with the wisdom of the locals.

5 Implications

This study enriched the knowledge on virtual tours and sharing economy by developing a conceptual framework of tourists' local experience via virtual tour guided by the locals; it accounted for determinants and consequences specific to the immersive experience of the destination with experience encounter, experience evaluation, and behavioral intention. It also identified the factors constituting tourists' online local experience, which provides a comparison agenda to distinct and understand the differences between virtual tours guided by the locals and conventional tours. More importantly, this study contributed a marketing strategy to navigate tourism crisis recovery by co-creating values between the sharing platform and the locals, which will be helpful for destination marketers, small tourism operators, especially for the small independent operators. Also, it suggested that the virtual tour providers should pursue an immersive experience combining their understanding of the local culture with a high level of interactivity and sociability in designing.

6 Limitations and Future Research

Considering virtual tours' diversity, findings in this study are necessary to be further examined in other themes of experience activities guided by the locals, such as online classes about cooking, writing, dance, or other arts. Quantitative approach is need in future to test the feasibility of the proposed virtual guided tour experience process.

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Special Track on Big Data and Smart Tourism



Data-Supported CRM as a Lever for DMO Success: A Social Exchange Relationship Approach

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Abstract. Customer relationship management (CRM) is proving to be one of the most promising business strategies. However, in the field of destination marketing literature, a problem exists as to how data-supported CRM can be established. While customer data management has already been well exploited in other industries, DMOs lack customer proximity and data sovereignty. The aim of this paper is to fill this research gap and show how a data-based CRM can be deployed by DMOs based on the principles of social exchange theory. In 13 expert interviews, these aspects were examined from the DMO's point of view. The results show that the exchange relationship must be established taking into account the DMO's extraordinary conditions and critical success factors. In order to stimulate guests' desire for dialogue or the willingness to disclose personal data, DMOs should offer high-quality customer benefits. A combination of hedonic and utilitarian benefits are found to be the most effective stimuli. In return, only the most necessary customer information should be requested and subsequently built passively. Only if the cost and benefit ratio of the exchange relationship is positive for both parties, a database for the CRM can be built in order to foster long-lasting relationships with potential and returning guests.

Keywords: Data-based customer relationship management · Social exchange theory · Destination management

1 Introduction

Every day companies lose customers unconsciously [28]. Therefore, customer relationship management (CRM) serves to "... encompass the development and consolidation of long-term profitable customer relationships through coordinated and customer-specific marketing, sales and service concepts with the help of modern information and communication technologies." [35] Due to an even stronger trend for individualization in travel, companies need to know about travelers' needs and wishes. This topic is becoming increasingly important also in view of the current COVID-19 crisis. Customers' wishes and requirements thus become the focus of every company and all its business areas [27]. The fundamental basis for maintaining customer relationships is customer data, which is condensed into customer profiles. These must be aggregated, classified and stored in a customer data platform [60]. The profiles then

serve for databased CRM to derive tailored offers and communication [37] based on the individual information such as demographic data or psychographic data. Building a database should be seen as a profitable investment, as customer information significantly increases the efficiency of marketing activities [17, 43, 57] and allows companies to generate a higher return on investment [33]. Early approaches in CRM application in community-based tourism analyzed the degree of CRM implementation in destinations [20]. Other authors stressed the importance of cooperation between various service providers and the DMO in community-based tourism for an integrated CRM [21, 22]. DMOs were defined as “enablers of integrated electronic CRM” and an adoption framework for this cooperation was developed [21]. Also, the visitor relationship marketing orientation among DMOs was researched and a model to operationalize DMO visitor relationship orientation developed [42, 46]. Results showed that DMOs were often “responsive and reactive rather than proactive” [42]. Another author analyzed data-driven CRM for airline and travel agency industries [10] and coffee shops [11] in Taiwan. While bigger companies are already quite successful in strategically collecting customer data, the tourism industry lacks behind in this topic. A study amongst Austrian and Swiss DMOs showed that there is a huge gap between data availability and the strategic use of this data due to legal, know-how and financial constraints [4]. Data is very often still not made available online, not collected systematically, if so stored in silos by other service providers and links between databases are often missing. They can neither process data of guests staying in the regions nor of their activities. As tourism destinations are complex systems [3], they are not in command of data sovereignty [25]. While this field of research is not new for the tourism and hospitality industry [6, 38], the majority of tourism businesses still rely completely on the success of the development of the touristic offer. Their lack of understanding of customer orientation and their dismissive attitude towards modern approaches to creating competitive advantages are to blame [56]. Even the DMOs have resisted the demands of digitalization for too long [36]. Considering the increasing global competition, the trend shift towards short breaks and the decreasing number of regular guests, intelligent approaches such as CRM are immediately required in destination marketing in order to maintain the competitiveness of destinations [2, 36]. Therefore, it is up to DMOs as strategic competitive entities to drive CRM for the benefit of the destination and all its touristic stakeholders [53]. Following the literature on CRM in the tourism and hospitality industry [49], this paper addresses various research gaps: “The majority of published research articles are in the area of hospitality, with a specific focus on hotels and restaurants. (...) Future research in the tourism area, especially at the destination level is also required.” [49] Indeed, in literature CRM has gained a foothold in tourism research [49], but unlike the numerous research contributions in the hotel sector [17, 57], CRM in the context of DMOs is discussed in fewer recent publications [2, 36, 46]. “In examining the three components of CRM, the technology aspect has received the most attention, whereas the roles of people and process have been widely neglected” [49]. The general marketing research fields like database marketing, permission marketing, marketing automation, online marketing or data privacy issue aspects of building a database for CRM, focus either on technological aspects [28] or on behavioral aspects [30]. A holistic view on both crucial aspects has not yet been issued. This is the reason why this paper combines both

technological and behavioral aspects and stresses the social interaction of both supply and demand side. “The topic of e-CRM is widely researched in the marketing, management and IT fields. However, there is a need for H&T scholars to focus on e-CRM” [49]. Digitalization has become one of the main fields in tourism as an information-intensive, globally-oriented, but locally-delivering industry. Technological advancement is transforming tourism value chains. Whereas technological innovations are doubtless possible, the problem remains in implementing digital services and marketing within the mainly small-structured tourism industry [15]. There is thus still a long way to go for the digital transformation of tourism businesses. Therefore, when establishing a destination-wide CRM, also the interests of service providers as well as their level of digital literacy need to be taken into consideration [50]. In order to also take into account both the DMO’s role and the necessary cooperation with local service providers from the supply as well as the customer side of this relationship, this paper focuses on how to establish a balanced relationship between the DMO and the potential or existing guests and tries to answer the following research question: How can social exchange promote the generation of dialogue-ready customer contacts for data-based CRM in DMOs to create a win-win situation for both sides? Which key factors are decisive for the success of this social exchange relationship? The aim of this paper is to show how a data-based CRM can be developed by DMOs from a holistic perspective as well as to consider the challenges of the digital transformation for both DMOs and service providers.

2 Building a Customer Database for CRM

This paper addresses technological aspects for both DMOs and small-scale tourism providers as well as the lack of the social dimension of the relationship between guests and the DMO.

2.1 Technological Aspects from the Supply Perspective

The instruments for building up a customer database for CRM are primarily located in acquisition management by addressing the target market, identifying interested parties and converting them into customers [16, 51]. It includes the stimulation of interest in the target market, the identification of prospects as well as their processing until the conclusion of a purchase. Through the sales funnel, prospects should be transformed into customers [51]. At the end of the funnel, it is important to bind these customers to the company through the subsequent customer loyalty management [43]. Along the sales funnel, different information about the customer is generated at various touch-points of the customer journey. This data flows into the company’s database, is classified and clustered by predefined segmentation attributes and is condensed into a unique customer profile [17]. The basic motive of creating a customer profile is to present the customer in a holistic picture, because the generated customer profiles are used to initiate, maintain or rebuild customer relationships [4]. Hence, the more data is generated from a customer the better the picture of a customer gets. Which customer information a customer profile should contain depends on the respective objective of a

company [32]. Name and email address were identified as the most important and lifestyles as the second most important variables for customer acquisition [58]. Today, the checkbox for obtaining marketing permission also counts as a target variable for lead generation, because personal data may only be stored, processed and analyzed with the explicit consent of the data subject [47]. Therefore, every European company needs to consider the General Data Protection Regulation (GDPR) to initiate and maintain business relationships [23]. While these processes work well for other industries, DMOs mainly are not in direct contact with the customer, as guests usually directly interact with accommodation or other service providers. On the other hand, the small-scale tourism providers often have neither the personal and financial resources, nor the know-how to establish such customer databases. This makes the technological requirements for a databased CRM of a DMO even more challenging.

2.2 Behavioral Aspects from the Demand Perspective

Major data leakages and misuse in the past have had a negative influence on the trust of customers in handling personal information [9, 14]. Therefore, from the perspective of customers, also behavioral aspects have to be taken into consideration. Privacy concerns imply a perceived sensitivity to the preservation of one's own privacy and manifest themselves in concerns about storing, using, sharing and publishing personal data [1]. In addition, direct marketing is often leading to customer annoyance [4]. The cause-privacy concern impact model (APCO) explains the emergence of privacy concerns and their influence on customer behavior [55]. Beside experience, awareness, personality, demographics and culture as the drivers of privacy concerns, plenty of authors studied the privacy paradox. It describes the contradictory contrast of personal attitudes to displayed behavior [29], which influences the behavioral intention and is the main cause of contradictory behavior patterns [55]. Thus, customer behavior only partially reflects the conventional assumptions of behavioral psychology, according to which human behavior is based on rational considerations. In fact, customer behavior is based on the outcome of a privacy calculus or a personal cost-benefit comparison [34, 39]. To impact customers' privacy calculus and hence consumer behavior positively, the use of incentives has widely been discussed in literature [30]. Discounts and free products or services are considered as monetary incentives due to their measurable value [41]. Non-monetary incentives include hedonic incentives, which are described as a psychological benefit component [30] and utilitarian incentives, which are characterized by their functional utility character [44]. All those incentives can be combined in crystallization points [7] such as bonus schemes [26], applications [13], customer clubs [12] or loyalty cards [45]. It is also important to think about where to place these incentives within the customer journey. The cost variable of the privacy calculus includes all risks and negative consequences that arise from data transmission [59]. If the expected benefits exceed the costs, customers are willing to allow data transfer [34]. The cost and benefit calculation in the privacy calculus is based on the principles of social exchange theory [34, 39] as one of the oldest, but still most popular theories to explain social behavior [48]. Parties are mutually interdependent and impose costs and rewards on each other through their behavior [18, 24]. Thus, the least costly, most rewarding option is chosen

[54]. While this topic has been studied in CRM in general, studies on guests' behavior as an application to the tourism industry are still scarce [49].

3 Method

Given the need for insights into more complex structures of economic and social relationships within the field of data-driven CRM in DMOs, a qualitative research method was applied [8]. In this course, the topic was examined empirically from the alpine community-based DMO's point of view conducting 13 semi-structured guided expert interviews [19]. An interview guideline was developed based on the literature review. The main focus areas were: 1. how can DMOs successfully establish an exchange relationship for databased CRM; 2. what type of customer data must be generated in the initial contact and 3. what type of benefits must be offered in exchange; 4. how would the ideal cost benefit ratio for DMOs and guests look like 5. in which phase of the customer journey must the data generation be located. Experts were chosen, as they are highly qualified to answer the research question. They are seen as "crystallization points" of practical insider knowledge and therefore can be interviewed instead of a large number of subjects [5]. All interviews were held online during spring 2020 and lasted from 40 to 90 min. The following selection criteria of interviewees were established [19]: professional qualification, knowledge of the functions of DMOs and touristic behavior, and a close relation with alpine community-based destinations in the German-speaking area. The sample comprises 13 participants of which four are CEOs in consulting companies for strategic and digital matters of DMOs, two of them professors in tourism marketing management on a collage of higher education, two chief digital officers in DMOs, four marketing employees responsible for CRM in DMOs, one chief marketing officer in a cable car company and leader of a CRM project launched together with a DMO. Not having focused on gender nor on nationalities, the sample resulted in seven male and six female participants, with two of them living in Switzerland, four in Germany and 7 in Austria. All participants fulfilled the qualification criteria. For data analysis, a summarizing content analysis was chosen [40], as it is ideally suited for evaluating expert knowledge in a narrow field of research [52]. The interviews were transcribed [16]. MAXQDA, a common software solution for qualitative data analysis [31], was used to develop a codebook. This was done by paraphrasing relevant text passages from the interview transcripts, generalizing their messages and reducing them to their point of meaning [40]. This method allows to extract expert knowledge from the generated qualitative data and to derive inductive categories in which this coded information is compound. The resulting categories of this research include: important frame conditions of DMOs and key success factors for the establishment of exchange relationships; required customer data to create a customer profile and effective customer benefits in exchange. Based on these categories the experts research results have been discussed. As there is no significant difference between the DMO's managers or employees compared to other experts' perspectives, the results of this research must not be discussed from the different expert group's points of view.

4 Results

The research results show that the establishment of an exchange relationship with tourists must be considered in the context of the DMOs' frame conditions and key success factors as well as consider the design of the exchange relationship.

4.1 Establishment of the Exchange Relationship

DMOs suffer from a lack of customer proximity as guests usually directly interact with service providers in the destination. Thus, the DMO often has few to no touchpoints with guests who have already been to the destination. Even though all experts view DMOs as an important source of inspiration for guests, they are by nature in an unfavorable position for data generation. Other key players in the destination however, such as accommodations, gastronomy, shops, touristic service providers are in an ideal position for data generation as they are in a legal economic relationship with guests. Therefore, experts refer to establishing networks with services providers within the destination. By means of stakeholder management DMOs have to convince all key players and involve them in the process of data generation for a CRM system. With them bridging the contact between the DMO and tourists, valuable data pools within the destination can be channeled. In addition, a number of key success factors for the establishment of exchange relationships could be identified. These are classified as strategic, conceptional and methodological factors. The strategic key success factors are based on a strategic approach of why data and what data is generated, and how it is going to be used by the DMOs. Otherwise, data is generated randomly and may lack specific insights or it is too broad to be structured usefully. Also, know-how in the field of databased CRM must be implemented in the organizational structures of the DMO to create marketing efficiency to the destination's benefit. The conceptional success factors include facilitators of the exchange relationship. For DMOs it is essential to know that the less data is requested from tourists in exchange for a benefit, the more likely is their willingness for data disclosure. Also, the relevance of the offered benefits must be maximized and exactly meet customers' needs at the specific touchpoint in the customer journey. Even though the inspiration and consideration phases (pre-booking phase) are already targeted by many DMOs, all touchpoints along the whole customer journey should be addressed. All experts see a high and so far not claimed potential for exchange relationships during the stay in the destination. In order to exploit potentials, it is suggested that DMOs become innovative in terms of creating intelligent customer benefit offers. Experts underline the necessity of making best use of the DMOs' frame conditions, rather than emulating common sales funnel strategies of usual single player businesses. The methodological success factors include that DMOs need to guarantee high customer experience at all touchpoints and interact with customers in a very simple context as complexity leads to high drop-off rates even before the actual exchange takes place. In general, experts urge DMOs to act in a helpful and trustful way towards tourists in order to minimize data privacy concerns and to create more confidence by tourists.

4.2 Design of the Exchange Relationship

In order to motivate the guests' desire for dialogue, as little data as possible should be requested in an initial active contact. The e-mail address as identity carrier and point of contact, the name, and the marketing permission for the legitimacy of the data use as well as the defined interests that give meaning to the identification data represent the ideal starting point for the creation of a basic customer profile. Experts stress that extending customer data is gained through further touchpoints. Many of these customer data can be tracked passively, without affecting the customer's data privacy concerns and therefore without causing social costs. Findings suggest that for creating a customer profile relevant for CRM, DMOs must at least add the customer's interests. Less but also relevant are preferences or origin. In exchange for customer data, rewards become essential. Results suggest that rewards should include a versatile combination of incentives. There is a clear preference for hedonic and utilitarian incentives to stimulate the willingness to engage in dialogue. Information before or during the journey emerges as one of the most significant incentives as it creates high benefits for customers at low costs for DMOs. Information of this type is classified as hedonic incentive as it provides profound travel experiences. Moreover, tourist communities with options for digital exchange on the DMO website or possibilities to express recommendations and reviews during the post stay phase are considered effective. Hedonic incentives cause low costs for DMOs. Utilitarian incentives provide a more convenient travel experience. Experts claim that assisting technologies generate extraordinary customer benefits in all phases of the customer journey. Also booking systems for tickets, experiences or other services of touristic interest are highly beneficial. Assisting tools or systems cause moderate costs, as licenses or development costs are predictable and limited. While hedonic and utilitarian incentives are considered to generate high customer benefits, five of thirteen participating experts dissuade DMOs from offering monetary incentives as the quality of generated leads is expected to be very low in terms of higher opt-out rates as customers are not really interested in a lasting exchange relationship but rather seek for one-time saving opportunities. However, receiving gifts such as free services, goodies or consumption goods during the journey, appears to have positive effects. For the exchange relationship to be successful, it is important that the cost-benefit-ratio is balanced. This means that guests should not have to disclose an unnecessary amount of personal data and DMOs should not suffer from disproportionate project costs. Therefore, incentives causing low or flat-rate cost for DMOs such as information and assisting technologies are the best option to keep the exchange relationship balanced. Gifts on the other hand, may in high quantities get too cost-intensive.

5 Conclusion

The research results show that DMOs are in an unfavorable position for establishing an exchange relationship for databased CRM on their own, due to lacking customer proximity. Even though the DMOs' booking platforms would in fact be an important touchpoint for establishing exchange relationships with tourists, OTAs hold most of the

market share while DMOs count few bookings on their own platforms. Nonetheless, DMOs are still in the ideal position to bridge the gap using their networking capabilities and power in the destination. If they successfully collaborate with key players in the destination, they could establish a data-based CRM. DMOs may convince accommodation providers to communicate the DMOs benefits to their guests by linking directly to the DMOs landing pages or registration forms. Thus, the DMO potentially creates touchpoints with all guests in the destination. Solutions of this kind would be game changing, as mediation is an effective and legal way to get in touch with all tourists coming to the destination, no matter whether they booked their holiday on the site of third parties such as OTAs. It is also suggested that DMOs clearly define their goals of a databased CRM system before establishing an exchange relationship. Depending on the goals, relevant touchpoints, customer data, customer benefits and lead quality may differ. For the goal of tailored marketing communication and offers based on customers' needs, a basic customer profile must at least contain the customer's email address, his or her name, the marketing permission and very important – his or her interests. It may be however suggested that customer's interests are gained passively during further touchpoints, because the more data is requested at an initial touchpoint, the higher the dropout rate will be. In exchange for data disclosure, DMOs must offer extraordinary customer benefits at acceptable costs for the DMO in order to keep the benefit-cost-ratio balanced for both parties. As the results show that monetary incentives may lead to high costs or even negative effects, DMOs must channel the power of hedonic and utilitarian incentives. Experts consider information, communities together with systems for holiday administration and planning most effective. Yet it appears that efficiency may be even increased by consolidating all benefits into one crystallization point. This could be a destination app or travel guide, which assists customers along all phases of the journey. It may provide information on activities and individual programs based on the customer's interests, scheduling and booking before the journey. During the journey it offers orientation, while after the journey it allows customers to review their activities. Such a travel guide which includes accumulated hedonic and utilitarian benefits and maybe even - if still cost effective - free services, stimulate the willingness for exchange as they provide high value for tourists and low costs for DMOs.

6 Limitations and Implications

This research involves some critical limitations as technical aspects are only addressed in rudimentary form and thus remain largely unsolved. Furthermore, staff of DMOs formed the biggest group within the sample which might cause a bias in the results. Another bias might arise from the time of interviews falling within the COVID-19 crisis. Future studies should take into account the demand side to prove the actual effect of the incentives on the willingness to engage in dialogue as well as on the actual perceived data privacy concerns from the demand side. Another essential aspect would be a holistic analysis of the exchange relationship over a longer period. In addition, surveys should also be carried out outside of the German-speaking area. Based on this research, Ötztal Tourism in Austria used these findings to establish a databased CRM

system. As a solution for the problem of data sovereignty through various destination stakeholders, the DMO exploited its stakeholder proximity and built a destination-wide partner network of approx. 1,000 accommodation and 30 service providers, who mediate the contact between the DMO and the tourists. This practical example shows how a DMO can overcome the lack of customer proximity and achieve data sovereignty by creating a network platform amongst service providers, which offers valuable benefits for both existing and potential guests. By applying a combination of mainly hedonistic and utilitarian benefits and creating a customer profile gradually, a balanced social exchange relationship can be developed. This research contributes to the knowledge of alpine community-based DMOs as to how a databased CRM can be established to fully contribute to the destination's marketing efficiency. It shows that not only technical but also behavioral aspects have to be considered and how the principles of social exchange effectively facilitate a win-win relationship for all involved parties.

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Towards a Strengths-Based Personal Informatics Framework for Transformative Tourism Experiences: A Phenomenological Study on Serious Leisure Practitioners

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Abstract. Personal technology plays an integral role in shaping people's quality of life which includes leisure and tourism experiences. A number of personal informatics tools can support people in performing their activities by collecting biometric and environmental data; however, little is known regarding the use of psychological data to enrich leisure and tourism experiences. To address this research gap, this study aims to propose a conceptual framework that fosters memorable and meaningful leisure experiences (MMEs) based on theories from serious leisure and positive psychology. In particular, this study probes into the MMEs of serious leisure practitioners who put their efforts and resources into pursuing intrinsically rewarding leisure activities. Excelling at these activities, which may draw upon participants' character strengths, yields sustained fulfillment which fosters personal transformation. The idiosyncratic nature of MMEs demands a phenomenological inquiry that involves in-depth interviews concerning the character strengths used and their development trajectories. Using theory triangulation from both positive psychology and serious leisure allows researchers to gain a holistic view of participants' well-being. Character strengths were found to be the integral factors that contribute to MMEs at different stages of leisure activities. The result identified three aspects of strengths used: strengths well spent, reflection and introspection, and anticipation of the future self, which informs the development of a strengths-based personal informatics framework for leisure and tourism.

Keywords: Positive psychology · Character strengths · Serious leisure · Meaningful experience · Conceptual framework · Personal informatics

1 Introduction

Technology plays an integral role in supporting the tourism experience. Recent information and communication technology innovation highlights include the emergence of smart tourism, which is characterized by the widespread adoption of personal technologies, big data, and networked devices in tourism settings. Future development may offer travelers new social and experiential dimensions by personalizing the provision of memorable and meaningful experiences (MMEs) [1] that are personally significant [2]. More importantly, the attainment of these goals requires technology that is specifically designed and strategically implemented [3]. Compared to mundane experiences, MMEs are vivid and explicit autobiographical memories that arise from exquisite, remarkable, and valuable events characterized by high emotional involvement and frequent rehearsal [4]. Besides tourism activities, serious leisure [5] can be the source of MMEs because practicing serious leisure often involves one's commitment and self-development. This study investigates how people's character strength and serious leisure activities contribute to MMEs, then proposes a conceptual framework for technology-mediated experience that could support people to gain MMEs in their leisure journeys.

2 Literature Review

2.1 MMEs Through the Lens of Positive Psychology and Serious Leisure

Positive psychology such as character strengths has been recognized as the personality traits that contribute to people's meaningful lives [6]. The values in action (VIA) classification of character strengths [7] proposes six main virtues and 24 related character strengths (see Table 1). Character strengths are conceptualized as a pre-existing capacity for a particular way of behaving, thinking, or feeling that is authentic and energizing to the user and enable optimal functioning, development and performance. They are behaviorally based unique personality traits; each individual is affiliated with their own bundle of strengths (top five) known as signature character strengths. The strength-based approach suggests that recognizing and making good use of one's inherent character strengths are the channels through which people generate positive experiences, find meaning and ultimately flourish [8]. One of the most reliable ways to identify MMEs is through the pursuit of intentional activities that match one's personal character strengths [9]. These activities should be intrinsically rewarding and interesting and, when engaged in them, individuals may feel a sense of purpose, curiosity and fulfilment [10].

Serious leisure (SL) [5] can be the activity which allows people to develop their character strengths [11]. SL is regarded as the systematic pursuit of an amateur, hobbyist or volunteer activity sufficiently substantial, interesting and fulfilling for a participant to find a (leisure) career there in acquiring and expressing a combination of its special skills, knowledge and experience [5]. SL delineates six characteristics which describe its inherent quality: 1. the need to persevere with the activity; 2. possibility to develop a leisure career; 3. the need to put substantial effort into gaining skills and

knowledge; 4. unique ethos and community; 5. identification with the pursuit; and 6. gaining valuable outcomes and benefits. Despite practitioners often being confronted with difficulties and challenges in their pursuit, serious leisure activities are intrinsically rewarding and interesting, and when engaged in them, individuals may feel a deep sense of purpose and fulfillment leading to self-transformation [12]. This study uses the two bodies of knowledge to probe into how people gain MMEs through their character strengths development in their serious leisure pursuits.

Only recently MME has gained traction in tourism research for its enduring well-being benefits [13] which lead to self-transformation [14]. Also, eTourism study [15] has called for a transformative research agenda that incorporates transparency, plurality and creativity to foster sustained well-being to be developed for the tourism industry.

Table 1. Values in action classification of character strengths and virtues [7]

<i>Virtues</i>	<i>Character strengths</i>	<i>Virtues</i>	<i>Character strengths</i>
Wisdom	Creativity, Curiosity, Judgment, Love of learning, Perspective	Transcendence	Appreciation of beauty & excellence, Gratitude, Hope, Humor, Spirituality
Courage	Bravery, Perseverance, Honesty, Zest	Temperance	Forgiveness, Humility, Prudence, Self-regulation
Humanity	Love, Kindness, Social intelligence	Justice	Teamwork, Fairness, Leadership

2.2 Potential of Using Technology to Support MMEs

Personal technology plays an integral role in shaping people's quality of life which includes leisure and tourism experiences. It refers to a class of tools that help people to collect personally relevant information for the purpose of self-monitoring and self-reflection [16]. Tourism researchers [17] have suggested that the ubiquitous nature of technology gives it the potential to create MMEs via individual empowerment [3]. For instance, wearable devices support people to perform their activities by capturing and analyzing biometric, environmental, and social data. However, little is known on using psychological data, such as character strengths, to enrich leisure and tourism experiences. Wan and his colleagues [18] demonstrated a strengths-based digital diary which allowed people to journal and savor memorable and meaningful tourism moments with photos and texts provided by users. The journal platform supports users to reveal meaning by making implicit psychological dimensions of MMEs explicit. As such, the incorporation of psychological dimensions in personal informatics could foster transformative tourism experiences. The goal of this study was to propose a conceptual framework that incorporates character strengths into informatics that may foster MMEs in leisure and tourism. Especially, this study explored how the system of smart things can be used as a mediator to nurture people's character strengths. This study addressed the following questions:

RQ1: How do individuals draw upon their character strengths in their sustained pursuits of leisure activities to generate memorable and meaningful experiences during their travels?

RQ2: What opportunities are there for personal informatics to foster MMEs using the themes identified in RQ1?

3 Research Methodologies and Methods

This study acknowledged that individual sense-making and experience of SL are highly contextual and influenced by the complex and ever-changing social phenomena encountered [19]. Using an idiographic approach, the research objective was to determine how character strengths contribute to the generation of MMEs through the pursuit of SL activity in the context of tourism. The data collection involved a questionnaire and one-on-one thematic in-depth interviews. The questionnaire introduced character strengths literacy to the participants so that they could recognize their signature character strengths through self-nomination [20]. The in-depth interviews, on the other hand, invited the participants to introduce their serious leisure activities and explain why their activities are attractive, engaging, and meaningful to them. Also, the participants were invited to associate their character strengths with key memorable and meaningful moments of their leisure practices. Interpretative phenomenological analysis (IPA) [21] was performed to identify the participants' meaning and sense-making from their personal standpoint at the idiographic level. The analysis drew upon the fundamental principles of phenomenology and hermeneutics and captured the participants' memorable and meaningful SL experiences through their use of character strengths as personal resources. In a hermeneutic phenomenology-informed framework, researchers must explore, describe, interpret, and identify the means by which participants make sense of their own experiences [21]. The IPA process defines five interconnected stages, from transcription to theme generation, based on the recorded interviews. In this study, stage one consisted of becoming familiar with the transcript to gain a keen sense of the SL world of the participants. Then, based on the transcripts, we generated codes and made notes on our observations and reflections about items that may have potential significance. In stage three, these codes and notes were transformed into emerging themes and were connected with positive psychology conceptualizations. Then relationships and patterns among the identified emerging themes were identified. Lastly, based on representative interview data, we generated case narratives featuring these themes. The result supported the development of a conceptual framework for a strengths-based informatics system.

3.1 Sampling, Data Collection, and Analysis

This exploratory study considered the sample to represent the breadth of the SL landscape. This study used non-probability and purposive samples and considered that SL can be practiced regardless of age, educational background, household composition, or profession. Although people's sense-making may have cultural influence, this study

examined the process of sense-making by making their character strengths explicit. Therefore, the participants deemed suitable for this study had to fulfill two criteria: they were to be SL practitioners in any of the domains identified by Stebbins and they must have practiced their SL, either partially or entirely, on one or more of their journeys. The participants were recruited through social networks using convenience and snowball sampling methods to connect with different SL communities. Seven participants were involved in this study, who engaged in different SL genres and demonstrated varying degrees of commitment. All participants were of Chinese ethnicity and lived and worked in Hong Kong at the time of the interview. Each interview lasted for around 90 min, and the interview sessions were audio-recorded, translated, and then transcribed into verbatim English transcripts for further data analysis. The following are questions from the interview protocol:

- “The assessment showed that these are your signature strengths. Do you think that these strengths describe you well?”
 “Can you share with me what made you devoted to your serious leisure?”
 “What are your most memorable and meaningful experiences? Do you see that any of your character strengths take part in these experiences?”
 “What do you enjoy most in your pursuit?”
 “What motivates you in your serious leisure activity?”
 “Why is that experience valuable to you? Can you see any of your character strengths in that experience?”
 “What are the turning points in your pursuit? How did you overcome these challenges? How does it relate to your character strengths?”
 “What did you learn from that experience?”
 “Do you think that your serious leisure activity made you a better person? How?”

Table 2 lists the participants’ backgrounds, SL activities, years of experience and personal statements regarding their pursuits.

Table 2. List of participants, activities, and signature strengths regarding their serious leisure pursuits

<i>Pseudonym</i> ^a	<i>Domain</i>	<i>Activity</i>	<i>Exp. (year)</i>	<i>Signature strengths</i> ^b
Emily	Natural science	WWOOF ^c	1	Zest, Humour, Kindness, Love of learning, Curiosity
Kelly	Entertainment	Swing dance	7	Social intelligence, Kindness, Zest, Love of learning, Curiosity
Sofia	Art & Culture	Documentary photography	10	Creativity, Love of learning, Judgment, Appreciation of Beauty and Excellence, Curiosity
Shane	Sport	Rock climbing	8	Creativity, Judgment, Prudence, Honesty, Self-regulation

(continued)

Table 2. (continued)

<i>Pseudonym</i> ^a	<i>Domain</i>	<i>Activity</i>	<i>Exp. (year)</i>	<i>Signature strengths</i> ^b
Evan	Sport	Dinghy racing	13	Zest, Perseverance, Bravery, Perspective, Judgment
Orion	Spirituality	Theravada meditation	7	Honesty, Hope, Forgiveness, Humility, Perspective
Andy	Volunteer	Volunteer on education project	7	Judgment, Perspective, Kindness, Teamwork, Gratitude

^aName and details of the participants are changed to preserve confidentiality.

^bStatements were formulated based on the data collected in the interviews.

^cWWOOF refers to Worldwide Opportunities on Organic Farms, a network of organizations that facilitate overseas work placements on organic farming.

4 Results

4.1 Different Roles of Character Strengths in the Generation of MMEs

In response to RQ1, three core themes and six sub-themes were identified (Table 3). The results show that MMEs are multidimensional. As a measure of their credibility, all themes were supported by at least five participants [21]. Below, each theme is elaborated upon with a detailed description, and examples in the participants' own words are provided along with the researchers' interpretations. Discussions are offered at the end of each theme.

Theme 1: Strengths Well Spent. This refers to the purposeful use of one's character strengths in the creation of specific and distinctive experiences during one's journey. The experience must be specific enough for the person to have a clear goal they wished to achieve and character strengths are purposefully used for the person to achieve a desirable outcome, even though the final outcome may not fulfill the initial expectation. Two sub-themes were identified: on producing positive experiences (i.e., seeking sustained fulfillment) or on problem-solving (i.e., pain avoidance). Emily's story helped to illustrate how character strengths were well spent for realizing sustained fulfillment. Since Emily loves to connect with nature, WWOOFing trips allow her to dedicate herself to this connection. To make her experience more intellectual, she once took a butterfly guidebook with her:

I bought a butterfly field guidebook to take with me so I could learn how to distinguish between various species of butterfly from the tiny differences I observed... sizes and patterns... I really enjoyed the self-learning process. (Emily)

The excerpt highlights Emily's character strengths (i.e., curiosity and love of learning) used for the purpose of seeking positive experiences (i.e., seeking autonomy and knowledge). In contrast, Shane's experience is characterized by solving immediate

problems. Shane connects creativity with her experience at the rock-climbing site in this way:

You need to be creative in everyday life situations because you must do things with very limited resources at your disposal. For example, using the same piece of cloth as a dress one day and as a tablecloth another. (Shane)

Lastly, character strengths are used for both problem solving and sustained fulfillment in the context of competition and performance. Evan's dinghy racing showed that bravery, self-control, and perseverance were needed in one of her offshore competitions:

The wind was unexpectedly strong! I really felt in danger when racing in such conditions. I also felt the pressure of being the pilot... For that competition, I required medical treatment every day because my whole body was so tense and overworked... But participating in competitions is what I like in this sport. (Evan)

The experience is comparable to flow, for which a balance of skill and challenge can lead to an optimal experience. Evan's experiences illustrate that character strengths can play a part in people's skill development in the pursuit of excellence. Nevertheless, the participants had divergent attitudes and behaviors toward their pursuits of excellence.

These anecdotes also highlight how one's affect and emotional responses play a role in formulating these MMEs. Furthermore, MMEs are not purely subjective; they are the result of constant interactions between the participant (i.e., strengths, affects, and emotional responses) and his/her surroundings (i.e., other people, objects, the environment). Moreover, these MMEs are significant to the participants, even when their initial goals are not (totally) fulfilled. These goals can be explicit and well-defined, as in Evan's dinghy racing (i.e., be the first past the finish line), or they can be implicit and not clearly defined (or even improvised) as in Shane's story (i.e., creative use of cloth has no limits). To conclude, this theme describes how people draw upon their character strengths to have MMEs.

Theme 2: Reflection and Introspection. This refers to the integration of the MMEs in one's life. These experiences can be either positive or negative and the related character strengths are not always obvious. The experience can emerge from one particular event (as shown in theme 1), an aggregation of multiple events, or as an overall impression of the experience. Through reflection and introspection, individuals try to make sense of these experiences by analyzing and interpreting them as valuable and meaningful in their lives—whether by learning a new aspect of life, gaining perspective on one's life, personal growth, or enriching one's life experience as a whole. Two sub-themes have been identified—savoring positive experiences [22] and reappraising negative experiences [23]. Andy shared an account of a mentally handicapped child who lived in the village where a school construction project was taking place. The child was unable to take care of himself and the villagers mostly ignored him or, at worst, bullied him. He worked in that village for two consecutive years and what he encountered this year was a personal epiphany:

Last year, I found the child annoying because he often disturbed us at the construction site. This year, we have a volunteer who is a mother and a social worker in a special education school. Instead of ignoring him, she welcomed him with open arms and spent time with him. The child

became happier than ever before, and her kindness was spread throughout the volunteer group. This experience inspired me in many ways: first, love and care are contagious. Second, problems can be solved in positive ways... the child was only seeking love and care. In fact, this is what we are all looking for. (Andy)

Through the savoring of a positive experience, Andy's illumination is rooted in connecting a particular experience with his past experience and with the wider scope of life. This became one of the most profound experiences in his years of volunteer work.

MMEs are not always positive; painful experiences, difficult times, and failure are all common aspects of serious leisure pursuits. Our interviews showed that the participants had managed their negative experiences by finding them to be beneficial and rewarding aspects of their lives. This process is known as the positive reappraisal of negative experiences [23], which helps individuals to transcend negative experiences and to transform them into something meaningful and purpose-filled such that they contribute to personal growth. Orion shared how her chronic illness (i.e., negative experiences), which impeded her further meditation practice, had been transcended into something worthwhile and personally significant.

I felt completely disorientated after my diagnosis. I lost my goal because I was totally devoted to meditation at that time... but my sickness also made me somewhat more positive-minded because I realized that I needed to accept my sickness. I have to get through it with mindfulness and to learn how to build awareness in everyday life. (Orion)

These anecdotes illustrate how remarkable experiences, as a result of character strengths well spent, become meaningful, worthwhile, and purpose-filled by their integration into individuals' life experiences and beliefs. The savoring process focuses on cherishing, enjoying, and relishing positive experiences and elevates the experience of pleasure to a higher order of awareness. It allows people to appreciate their experience as involving something deeper than the immediate personal reactions and sensations. The positive appraisal of negative experiences, on the other hand, transforms an outcome previously perceived as negative into a meaningful and growth-promoting outcome that helps one to build resilience, act positively, and overcome adversity.

Theme 3: Anticipation of Future Self. This refers to the seeking out and planning for experiences that are congruent with the individual's personal interests [24] and that fit into the individual's development trajectory [25]. Here, character strengths also play a role in identifying such experiences. This anticipation allows individuals to pursue activities that foster eudaimonic growth. Two sub-themes were identified: seeking commitment and seeking alternatives. Over the course of our interviews, the participants shared their experiences in their development trajectory. Those with the intention to seek commitment are likely to connect their pursuits with a career path. Kelly shared her experiences of finding her future self in connection with her potential career development:

I wanted to integrate swing dance somehow into my performance and to be a swing dance teacher for college students. Swing dance can help them to build a dynamic social network. (Kelly)

However, Orion reacted to situations differently when attempting to project her future self:

I need to find an activity that allows me to meditate and develop my awareness. I recently began running, an activity in which I previously had no interest. By integrating self-awareness and setting up small challenges, I was able to better enjoy running. I hope to develop myself as a runner with the same approach and attitude as I did in meditation. (Orion)

In contrast to the other participants, Orion wanted to explore alternative activities in which their personal interests and character strengths are valued. Instead of deepening her commitments, she wanted to broaden their fields of activity and experience new things. This attitude is somewhat echoed in the broaden-and-build theory [25] in which positive emotions allow people to be open to new experiences and, thus, build enduring personal resources by undertaking new challenges. The difference may be that meaning and self-worth, in addition to positive emotions, are motivators for their decisions.

Table 3. Summary of themes and sub-themes

Theme	Sub-theme	Description
Strengths well spent	Producing valuable experiences	Using signature strengths purposefully in the production of valuable and significant experiences
	Solving immediate problems	Using signature strengths for problem-solving
Reflection and introspection	Savoring positive experiences	Reminiscing about good characters, and valuable and significant experiences as being memorable and meaningful in one's life
	Reappraising negative experiences	Transforming negative experiences into positive personal development
Anticipation of future self	Seeking commitment	Cultivating character strengths to further one's personal development trajectory
	Seeking alternatives	Identifying other opportunities in which personal strengths and interests are valued

4.2 Towards a Strengths-Based Personal Informatics Framework

In response to RQ2, this study proposed a strengths-based personal informatics framework (Fig. 1) that supports individuals to generate, appreciate, and pursue MMEs in their leisure and tourism activities based on the themes identified. The framework focuses on personally relevant characters which could facilitate a self-reflection process through breaking down memorable and meaningful experiences, inquiring about the character strengths involved and fostering self-transformation with strengths interventions. The framework is compatible with current studies [3, 18] on digital well-being informatics systems. The following provides recommendations for developers to implement strengths-based personal informatics. Above all, building awareness of character strengths should be an important step for strengths-based personal informatics in order to make users familiar with character strengths (e.g., definition and

characteristics). It can be achieved by introducing users to character strengths literacy, establishing a strength profile, and using character strengths as the system language.

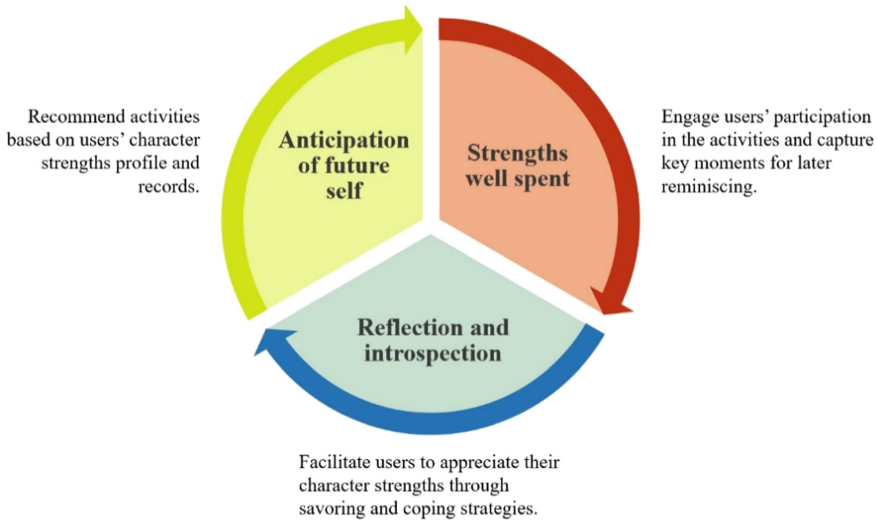


Fig. 1. Conceptual framework for strengths-based personal informatics

Guideline 1. Living in and exploring the present moment. This aspect of informatics systems is to support users to immerse themselves in the present moment and capture the moment for later reminiscing. Technology can take account of the user’s character strengths and combined with situation-awareness technologies support users’ immersion in their experiences [26]. Technologies may also collect onsite data relevant to the activity for users to savor the moment.

Guideline 2. Appreciating one’s character strengths through reflection and introspection. This is probably the easiest way for people to connect their strengths with external stimuli (e.g., people, activities, environments, etc.) and their internal psychological states (e.g., values, goals, feelings). Reflection and introspection can be an effective way to allow users to recognize the character strengths they draw upon in gaining valuable experiences [18]. Reflection allows people to bring unconscious aspects of experience to conscious awareness, and thereby gain self-knowledge.

Guideline 3. Anticipating one’s future self with character strengths. Being aware of one’s implicit character strengths may also inspire one to cultivate them [27]. Technology may provide strengths-based recommendations to users so that they can broaden their perspectives or deepen their commitment to the activities. The system may facilitate users to generate goals that are valuable and meaningful to them.

5 Limitations and Future Research Direction

This study has a few limitations. First, the idiosyncratic nature of MMEs limited this research by requiring it to start with a small sample size. Future research can consider using a larger sample size and a diverse user group. The proposed framework suggested directions for a developer to incorporate character strengths into an informatics system. Nevertheless, this study demonstrates that character strengths are a necessary but not sufficient condition for generating meaningful experiences. Interview data showed that, in addition to the purposeful use of strengths, the participants garnered meaningful experiences through constant interaction with a complex network of activities, environments, objects, and people. Also, further investigations on managerial and ethical implications are necessary even if the informatics system can support people's well-being. After all, the strength-based approach is as yet little explored in tourism studies. More research is needed to incorporate the framework into personal informatics applications.

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Destination Image of DMO and UGC on Instagram: A Machine-Learning Approach

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Abstract. Social media plays a key role in shaping the image of a destination. Although recent research has investigated factors influencing online users' perception towards destination image, limited studies encompass and compare social media content shared by tourists and destination management organisations (DMOs) at the same time. This paper aims to determine whether the projected image of DMOs corresponds with the destination image perceived by tourists. By taking the Austrian Alpine resort Saalbach-Hinterglemm as a case, a netnographic approach was applied to analyse the visual and textual posts of DMO and user-generated content (UGC) on Instagram using machine learning. The findings reveal themes that are not covered in the posts published by marketers but do appear in UGC. This study adds to the existing literature by providing a deeper insight into destination image formation and uses a qualitative approach to assess destination brand image. It further highlights practical implications for the industry regarding DMOs' social media marketing strategy.

Keywords: Machine learning · Instagram · Destination image

1 Introduction

The rise of social media has changed the process of information creation and communication, which affects consumer behaviour, marketing strategies, and brand image [1]. Social media further fosters the production of user-generated content (UGC), referring to any content created by consumers online [2]. Meanwhile, UGC has become a more critical source of information for consumers due to its richness, diversity [3], and authenticity [4] compared to traditional advertising and official sources. One industry that relies heavily on communication technologies is tourism. Since UGC can influence brand image creation and consumer behaviour [3, 5], social media is earning a leading role in the multiphase travel stages, from pre-, during-, to post-travel experiences, for information gathering and sharing [1]. Recent literature further reinforces that a destination's online image positively affects consumer behaviour in increasing one's intention to visit, revisit, or recommend the destination [5–7]. Notably, destination image has become a multifaceted concept by considering both the attributes of a destination as well as the sum of beliefs and impressions a tourist has [8]. Seeing

that official information provided by destination marketing organisations (DMOs) no longer has absolute control over image creation [5], DMOs are suggested to be aware of tourists' perception of the destination in order to develop quality marketing campaigns [2]. This can be determined through UGC analysis, which enables marketers to view destinations from tourists' perspectives and discover what they are most interested in [9]. Yet, despite the importance of image congruence [10], scholars in the field of destination marketing mainly analyse the image created by tourists [2] or DMOs [11] rather than comparing both contexts at the same time [12].

To close the aforementioned research gaps, this study aims to identify destination image on social media by analysing both UGC and content published through official tourist board channels. With a particular focus on Instagram, one of the many channels heavily used by (young) tourists [3], this study adopts the destination Saalbaach–Hintergellm in the Alpine region of Austria as its research context. Specifically, through the use of netnography supported by machine learning approaches, this paper evaluates whether tourists' image of the destination corresponds to the image the DMO attempts to promote. Meanwhile, this study also examines how UGC can be used to plan and develop social media marketing activities for DMOs. Shaping destination image is vital for official institutions in order to attract tourists, consumers, events, and investors [2]. This study advances methodological approaches by using machine learning techniques to shed light on the differences between projected and perceived destination image on Instagram. By outlining the textual and visual content analysis, this research contributes to tourism marketers optimising social media storytelling and marketing strategies.

2 Literature Review

The ubiquity of communication technologies and social media has changed users' attitudes and behaviours, and provides everyone with an opportunity to generate online content. Social media platforms such as Instagram, Facebook, and Snapchat involve common instances of UGC in tourism, where users can create their own content in the form of texts, images, comments, or messages [10]. In the tourism industry, UGC not only reflects the preferences, beliefs, and emotions of tourists regarding their travel experience [13], but it also shapes the image of a destination. As tourists actively look for inspiration and explore other users' experiences, the association of images delivered through pictures or texts on social networks plays an important role in influencing visitor satisfaction and future behaviour [14].

Due to globalisation and increasingly fierce competition, various branding strategies are now being developed in most destinations [15]. One way to position a destination better is to adapt to the development of online communication tools. More specifically, seeing that social media has weakened the traditional role of DMOs as a leading source of information for visitors [16], marketers nowadays are inclined to include social platforms in their marketing activities. In doing so, DMOs can co-create content with tourists so as to maintain competitiveness and gain online visibility [17, 18]. The significance of DMOs' social platforms is evidenced by the fact that it is embedded in tourist activities' planning processes [19]. The delivered content can support visitors during their travel [18], thereby reinforcing the need for DMOs to optimise social media marketing strategies and to face high competition in the tourism industry [20].

Amongst the various available channels, Instagram has not only been embraced by tourists as a trendy platform [4] but is also well-liked by marketers to create compelling marketing strategies [11, 21]. Characterised as a highly visual platform, approximately 1 billion monthly active users and 95 million photos shared per day on Instagram were recorded, as of 2020 [22]. In tourism marketing, the implication of online photography is to shape a positive perception of a particular destination. Moreover, this platform offers a space where the projected and perceived destination image are intertwined. The UGC as an agent of perceived destination image formation is a key factor in the destination choice process. Thus, it is crucial to consider the effect of UGC on the destination image when setting up marketing strategies.

A number of studies focus on comparing the destination image positioned by official sources with the destination image perceived by users of various kinds of social media, by applying content analysis. For example, the studies conducted by Stepchenkov and Jean [23] and Tussyadiah [24] compared images gathered from the DMO website and Flickr, while Song and Kim [25] contrasted the image of Guangzhou, positioned by the DMO on Twitter, with its image on Pinterest. The relevance of the comparison between the promoted destination image and the destination image revealed from the UGC has been proved by Jiménez-Barreto et al. [6] and Chang J-H, Wang S-H [26]. These studies confirmed that congruence between the projected and perceived destination images decreases the possible deviation of expectation from reality, thus affecting brand credibility, tourist satisfaction, and visit intentions.

Despite the fact that the destination image has been the subject of debate since the last century [27], content analysis for destination image marketing insights is fairly novel. The current study complements the body of work on this topic by applying content analysis combined with the use of machine learning.

3 Methodology

To explore destination image presented by DMOs and tourists on Instagram, this study applied netnography as a research method. Additionally, the Alpine resort Saalbach–Hinterglemm in Austria was chosen as the research context. The following section outlines the data collection and analysis procedure.

3.1 Data Collection

Data was collected from public posts shared on Instagram using *Phantombuster*, an automated data crawling software. Figure 1 outlines the data collection process. For the collection of UGC, posts captioned with the hashtag #saalbachhinterglemm were extracted. Although the destination Saalbach–Hinterglemm has a notable summer and winter season, this study was narrowed down to include solely the posts from the 2019/2020 winter season so as to compare the posts published by users and the DMO within a defined time frame. In addition, only posts written in English were considered. The language recognition was performed in Python using the *langdetect* module.

Next, *Phantombuster* was used to obtain publicly available information about Instagram users who published the collected set of posts. This step was to filter out

business accounts, whose posts might have been of commercial nature. The filtering process included the removal of profiles with the words “*saalbach*”, “*hinterglemm*”, “*leogang*”, and “*feieberbrunn*” in the profile name or the bio, and the removal of profiles with an enlisted business email. Because the neighbouring villages Leogang and Fieberbrunn are parts of the same ski resort, those keywords were included. Ultimately, the filtering process resulted in a final set of 1,448 posts. A similar procedure was performed to obtain the Instagram posts published by the DMO in which a total of 2,091 posts shared via the official Tourist Board Saalbach-Hinterglemm account (@saalbach_com) were retrieved. Likewise, the posts were filtered to include the winter season and posts written in English, reaching a final number of 85 posts.

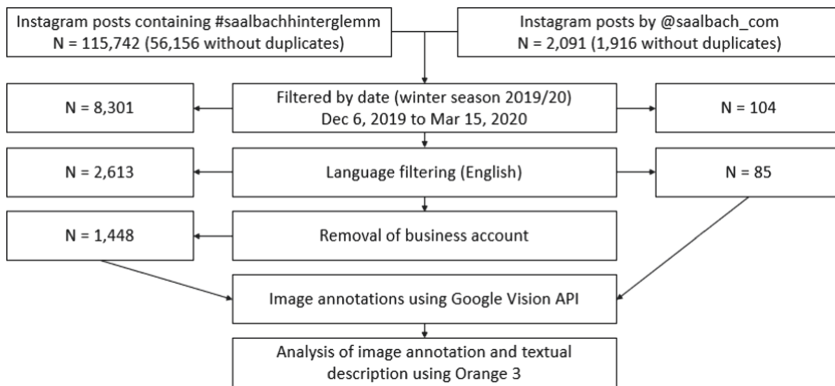


Fig. 1. Data collection process for UGC (left side) and DMO (right side) Instagram posts.

3.2 Data Analysis

For further analysis, both the DMO’s and the users’ Instagram posts were split into two elements (*images* and *textual description*), and the data was organised into four data-sets: (1) DMO image annotations, (2) UGC image annotations, (3) DMO textual description, and (4) UGC textual description. The textual description refers to the caption of a post. To analyse pictorial content, Google Vision API was used to retrieve textual annotations of the images.

The annotations and the textual description were analysed with *Orange 3*, an open source machine learning software that enables textual data to be converted into features (i.e., vectors) [28]. In this research, the textual description and annotations of the images were treated as documents. As such, document embedding, which generates a vector for the document by embedding the words in the document [29], was applied using the pre-trained *fastText* model [31]. K-means clustering was then applied to group similar data points (vectorised annotations or vectorised textual descriptions) into clusters [32]. This method in particular was chosen to examine whether the posts could be divided into distinct clusters according to their content.

When applying the k-means algorithm, silhouette scores were calculated to identify an optimal number of clusters and to assure the reliability of the content analysis results. After obtaining the clusters, t-SNE dimensionality reduction was used for cluster visualisation in a scatter plot. The scatter plot thus presents the size and layout of the clusters in addition to which DMO posts overlap with the ones published by tourists, and, more importantly, where the DMO lacks posting coverage. The entire process was performed in the same manner for each of the four datasets mentioned above.

Subsequently, content analysis was carried out to identify emerging themes amongst the posts. A classical NLP pipeline [33] with lowercasing, removing stop-words, lemmatizing etc. was applied to pre-process the corpus. It included naming and categorising all the obtained clusters for both DMO and UGC annotations and textual descriptions based on TF-IDF (term frequency–inverse document frequency) weighting. Although state-of-the art NLP approaches such as BERT are available for text representation, studies show that for simple classification and clustering tasks conventional methods such as TF-IDF provide equivalent results [34]. Specifically, TF-IDF quantifies a word in the documents that implies the significance of a word to a document in the corpus. The results of each cluster were visualised with word clouds to gain a better understanding of data interpretation. Finally, the cluster categories were compared to find similarities and differences between the DMO and UGC Instagram posts. In this way, it was possible to assess the extent to which the DMO presentation on social media matched those of the users’ destination image.

4 Results

4.1 Comparison of the DMO and UGC Image Annotations

The results suggest 8 clusters for the DMO image annotation and 3 clusters for the UGC annotation according to the silhouette scoring. Each of the 8 identified DMO clusters were named and categorised based on TF-IDF (i.e., words contributing to a cluster the most) as the following: *Mountainous winter landscape (5 clusters)*; *Winter sports (1 cluster)*, and *People and events (2 clusters)* (see Table 1). However, the clusters vary in size; clusters 1, 2, and 3 are more extensive than other clusters. Thus, the primary number of images represents the *winter mountain setting and the slopes*, whereas a smaller number of images portray *a person or a group engaged in winter activities*. Therefore, it can be concluded that the DMO concentrates mostly on creating a *winter mountain ambience*.

The same procedure was conducted for UGC annotations. Although UGC images’ sample size is larger, the content seems to be more homogeneous. Thus, only 3 clusters were obtained. The clusters were named as follows: *People enjoying winter sports*; *Winter sports*; *Mountain landscape* (see Table 1). Compared to the amount of nature represented on the DMO images, the UGC images feature mainly *people*.

Table 1. Categorisation of clusters for DMO and UGC annotations.

Cluster	Words with the highest TF-IDF	Name	Category
<i>DMO image annotations</i>			
1	Snow Winter Sky Mountainous Landforms Mountain Geological Phenomenon Freezing Slope Mountain Range Glacial Landform	Mountainous landscape	Mountainous winter landscape
2	Snow Sky Winter Nature Geological Phenomenon Tree Cloud Freezing Atmospheric phenomenon mountain	Winter atmosphere	Mountainous winter landscape
3	Snow Winter Mountain Mountainous landforms Piste Hill station Geological phenomenon Slope Ridge Atmospheric phenomenon	Winter slopes	Mountainous winter landscape
4	Cable car Snow Cable car Winter Transport Geological phenomenon Sky Slope Hill station Vehicle	Cable car	Mountainous winter landscape
7	Sky Blue Pink Purple Cloud Red Winter Snow Violet Evening	Magical winter colours	Mountainous winter landscape
5	Skier Winter sport Recreation Slalom skiing Speed skiing Skiing Ski Ski Equipment Sports equipment Para-alpine skiing	Ski equipment	Winter sports
6	Crowd People Performance Rock concert Sky Concert Light Music venue Event Stage	Events / Crowd of people	People and events
8	Red Crowd Font Event Recreation Graphic design Team Art	Promotional posters	People and events
<i>UGC image annotations</i>			
1	Cool Friendship Selfie Fun Snapshot Black hair Photography Music venue Night Party	People enjoying winter sports, happy faces, ski wear	People and events
2	Skier Snow Freestyle skiing Sports Skiing Ski Winter sport Recreation Winter Sports equipment	Winter sports	Winter sports
3	Snow Mountainous landforms Mountain Winter Sky Mountain range Alps Hill station Cloud Recreation	Mountain landscape (nature, ski resort and infrastructure)	Mountainous winter landscape



Fig. 2. Scatter plot of DMO and UGC overlaying images.

Next, this study visualises cluster layout/overlays (see Fig. 2) to which the scatter plot revealed 4 clusters. The cluster marked in red refers to the DMO image annotations, whereas the other 3 clusters reflect the UGC annotations. The plot indicates that the red dots representing the DMO posts overlap across the 3 UGC clusters, suggesting that the photos from the DMO match pictures posted by tourists. Yet, because several DMO photos in the orange and the green cluster do not overlay with UGC, further analysis was conducted to see which photos posted by tourists are not covered by DMO.

Cluster 4 (orange) represents the UGC content of *People at the ski resort*. Since the area involving cluster 4 does not overlay with cluster 2 (red colour), this was analysed further. The findings show that these photos refer to *leisure, entertainment, and people*, with the most prominent annotations being *selfie, eyewear, helmet, smile, equipment, drink, beverage, clothing*, etc. In other words, this sub-cluster represents the photos of people in their ski clothing taking pictures during their refreshment break at the restaurants and ski-huts on the slopes (see Fig. 3).

Cluster 3 (green) relates to *winter sports*, with photos depicting people during their skiing activities or engaging in other winter sports. The analysis of the DMO photos has similar categories (*Winter sports; Ski equipment*), meaning that the DMO posts also encompass this category. This is confirmed by the overlaying cluster 2 (DMO) and cluster 3 (UGC). However, the scatter plot implies that the photos in this category are represented to a far lesser extent by the DMO posts than the UGC posts.

Cluster 1 (blue) represents the UGC posts that overlay the most with those from the DMO (see Fig. 4). These photos represent the *mountain landscape* and show mostly mountainous panoramas and skiing resorts in a winter setting. The sub-clusters with no overlaying DMO posts are mostly photos of the *Alpine village* or the *property and accommodation*, especially during the night hours, as well as *snowboarding and selfies*, or photos of the *people on the slopes* in the *skiing equipment* doing *winter sports*.



Fig. 3. Examples of UGC images not overlaying with DMO images.

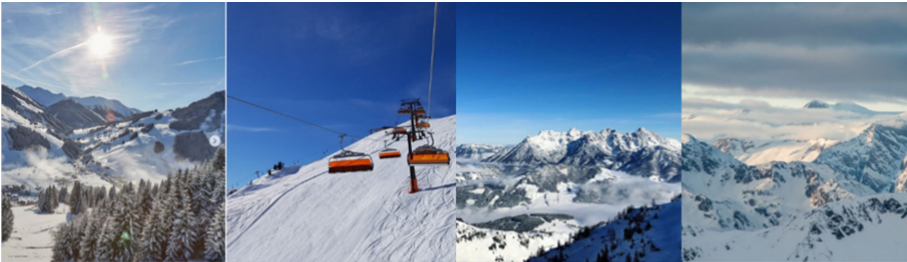


Fig. 4. Examples of overlaying UGC and DMO images.

5 Comparison of the DMO and UGC Textual Image Description

The comparison of DMO and UGC textual image description was conducted in the same manner as described for DMO and UGC annotations. Overall, key topics for the DMO include *winter* and *snow*, the promotion of *Salzburgerland* and *Skicircus* areas, the slogan ‘*Home of lässig*’, and the events *FIS Alpine World Cup* in Saalbach and the *Freeride World Tour*. UGC has a broader topic of *a winter wonderland and the mountains*, *snowboarding* and *skiing activities*, and a seemingly well-accepted slogan of the ski resort ‘*Home of lässig*’. Overall, the results reveal a 5-cluster solution for the DMO and a 2-cluster solution for UGC. Similar to image annotations, there is a lower number of clusters for UGC textual content than DMO’s, implying that UGC is more homogeneous and random, whereas the DMO posts are rather structured and planned.

The following categories for the DMO clusters were revealed: *The view from the local mountaintops*, *Nice conditions & invitation to come*, *Promotion of the FIS World Cup* and *the Freeride World Tour*, *A perfect day* (see Table 2). Cluster 2 (*Nice conditions & invitation to come*) is the largest and represents most of the DMO’s content when it comes to textual descriptions. Cluster 3 contains a single post with no significant difference in the content; thus, it was assigned to cluster 2.

The two clusters from the UGC textual descriptions are approximately equal in size with the following categories: *Appreciation of nature and the winter activities during the winter holidays at the destination* and *Fun with friends and family* (see Table 2). Similar to the analysis with the image annotations, the DMO textual descriptions highlight nature and landscape, while UGC focuses more so on activities and people.

Table 2. Categorisation of clusters for DMO and UGC textual description.

Cluster	Content example	Cluster name
DMO textual description		
1	Today's view from the Schattberg down to Saalbach #saalbach #homeoflässig	The view from the local mountaintops
2	"Simply unbelievable what the @freerideworldtour athletes showed at yesterday's competitions in the @skicircus! We have some highlights for you. 📸 #saalbach #homeoflässig #skicircus #fiebersbrunn #fwt20 #freerideworldtour 📷 fwt ddaher/jbernard"	Nice conditions, invitation to come, featuring a part of the ski resort; promotion of the destination and the events
3	The Audi Fis Ski World Cup in Saalbach Hinterglemm is on. 🏂🏂🏂 We wish all the best for the racers! 🏂🏂 #saalbach #worldcupsaalbach #homeoflässig #fisalpine	Promotion of the FIS World Cup and the Freeride World Tour
4	morning rides 🌄 the perfect start into a beautiful day on the slopes #homeoflässig #saalbach #hinterglemm #skicircus @skicircus	A perfect day
UGC textual description		
1	Happiness is first tracks in fresh snow 🌄🏂 #travel #happiness #saalbachhinterglemm #wintervacay #ski #travel diary #travelgram #saalbach #austriaAT #skislife #skyphotography #saalbach_com #saalbachhinterglemmleogangfiebersbrunn #snow #winterwonderland #travelphotography #tagsforlikes #instadaily #instalike #photooftheday #naturelovers #photography📷 #skicircussaalbachhinterglemmleogangfiebersbrunn	Appreciation of nature and the winter activities during the winter holidays at the destination
2	"Back at the slopes of #saalbachhinterglemm. Sunny weather and good company. 🌄🏔️🌞❤️ #lovethemountains #skiing #fun #outsideisfree #austria 📷"	Fun with friends and family

6 Discussion

This study aims to compare the extent to which the marketed destination image corresponds to tourist experiences on Instagram. Specifically, UGC suggests topics such as *fun*, *social interaction*, *casual environment*, *outdoor activities*, and *winter sports*. These themes indicate that tourists perceive the resort as a relaxing and casual destination. In comparison, some other ski resorts build an image of a high-end resort, party destination, or family resort.

This study presents congruency between the projected and perceived destination image. Hence, this research affirms the importance of tourists' destination brand image, as mentioned in previous literature [6, 10, 12]. If tourist experiences correspond to the stories delivered by DMO, the brand credibility increases and consequently, user intentions to visit, revisit, or recommend the destination also increase [6]. Moreover, tourists create an emotional bond with a destination according to its personality by choosing the brands or destinations that fit their own style [18]. Destination personality is usually described using human characteristics based on the brand experience, such as *cool* or *exciting* [35].

This research reveals tourists' acceptance of the destination's logo *Home of lässig* [Home of *cool*]. The critical aspect of the DMO's social media activities is communicating the values that determine the destination's personality and thus facilitating this emotional bond with the visitors [30]. In this case study, the communication of the destination's personality can be seen in the DMO's activity and posts. Moreover, the positive response of the users to such communication can be witnessed. Thus, this research confirms the impact of destination's personality communication so that visitors can identify with a destination.

Furthermore, the comparison of the DMO with users' posts reveals that the DMO generally delivers mostly *nature* and *landscape*-related content, whereas tourists tend to include both *nature* and *people* in their posts. The images for both UGC and DMO could be categorised into three themes: *winter mountain atmosphere*, *winter sports*, *people*. However, the majority of the DMO posts presented the *slopes* and the *snowy mountains* in the first category. A great deal of UGC posts relates to images of *socialising*, be that either selfies, people during winter activities, or people at a restaurant, bar, or in the street. Such content could be interpreted the following way: tourists come to the resort not only to enjoy winter sports but to also experience the immersion into a warm and cosy environment; to enjoy social activities with friends and family, take selfies, enjoy contemporary accommodation facilities, and visit trendy restaurants where they can talk about various topics and try delicious dishes. Undoubtedly, the main reason to visit a ski resort is to engage in winter sports, but without these add-ons, customers would be missing out on a peak experience [36].

7 Conclusion

This work provides deeper insights into destination image creation and user behaviour on social media and contributes to understand the effect of social media on DMO marketing strategy development. According to existing literature, social media marketing efficiency has been measured by user involvement: their interaction, influence, and intimacy [6]. DMOs most commonly measure the return on investment of social media effectiveness by counting the number of 'followers', 'likes', and the rate at which those numbers increase [1, 6]. Typically, netnographic research provides no insights on how the brand positioning strategy should be conducted. Thus, this study incorporates a qualitative analysis instead of the measurements mentioned above, thereby offering an alternative approach to the destination brand image assessment. This attempts to provide an in-depth insight into consumer behaviour on social media.

The findings suggest values and beliefs embedded in the posts instead of the quantifiable interacting aspects. In that case, market research, such as a visitor survey combined with a netnographic study, might be helpful.

Furthermore, this study provides several implications for DMOs by analysing similarities and differences between the Instagram posts created by tourists and the DMO. Although the projected image highly matches tourist experiences, not all the UGC posts' themes are covered by marketers, and vice versa. Such insights indicate opportunities for the improvement of a DMO's marketing strategy regarding their storytelling. A DMO could utilise the study's findings and adjust their marketing strategy by promoting the services and content appearing in the visitors' posts. For instance, an image of a cup of coffee amidst a winter scenery with an attractive caption could influence a prospective visitor by creating anticipation of fulfilling this desire [9].

Including and highlighting additional activities the destination has to offer aside from primary ski activities would be a strategic decision regarding the DMO's marketing activities promote the destination. For example, an additional offer may refer to ski huts, local dishes or activities such as night tobogganing.

Further managerial implications include promoting properties on the DMOs social media channels. The importance of a professional marketing strategy lies in the fact that DMO's social media activities influence the destination image and the intention to visit [7]. Essentially, this research presents deeper insights into tourist experiences at the destination and confirms their impact on adding value to the destination image.

However, this research is, naturally, not without its limitations. First, the analysis was not incorporated through the most commonly used performance indicators (e.g., user engagement), nor did it provide quantifiable data (e.g., the exact percentage to which the perceived user image corresponds to the projected destination image). For future research, we encourage an assessment of user engagement in regard to DMO and UGC matching content. Similarly, a quantitative measurement of destination image perception and intention to visit regarding content congruence is recommended. Saalbach-Hinterglemm has a clear, one-dimensional profile as a ski destination. For more diverse destinations, future studies could perform multilingual text analysis utilizing BERT in order to provide deeper insights. Despite its exploratory nature, this study offers valuable insights into the role of UGC on destination brand image.

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Topic Modelling of Tourist Dining Experiences Based on the GLOBE Model

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Abstract. The needs of travellers vary across cultures. When it comes to culinary aspects, there is a strong connection between gastronomy and culture. To optimise service offerings, investigation of the essential aspects of dining experiences in relation to cultural backgrounds is of great importance. In the age of digitalisation, tourists share their dining experiences throughout their multi-phasic travel journey via online platforms. By considering nine distinct cultural backgrounds, this research aims to investigate tourist experiences based on TripAdvisor restaurant reviews through topic modelling, using the city of Salzburg as its study context. Depending on one's cultural circumstances, the findings demonstrate that the most important aspects include staff, food-menu items, value for money, restaurant physical appearance, food authenticity, overall service, menu offers, food quality, atmosphere, and recommendations. This study advances the state-of-the-art knowledge of societal culture as a variable in the target market analysis of restaurant customers. Findings allow restaurant owners, other tourism service providers, and destination management organisations to analyse and adapt their service offerings and strategies accordingly.

Keywords: TripAdvisor · Dining experience · Societal culture · GLOBE

1 Introduction

Visitors from different countries vary in their service expectations and travel behaviours due to cultural backgrounds, which subsequently influences their travel experience [1, 2]. Thus, identifying those needs is essential in order to contribute to up-to-date services and products [3]. Literature has provided insights on service quality and customer satisfaction in a restaurant setting based on widely used models such as SERVQUAL [4] and DINESERV [5, 6]. However, in this process, guests fill out a predefined questionnaire before and after the service, leading to mostly small sample sizes caused by the challenge of persuading guests to participate [7].

Seeing that the rapid development of information and communication technologies allows visitors to share their experiences in the form of user-generated content (UGC) on various online platforms [8], researchers and marketers can take this as a valuable opportunity since these technologies facilitate deeper access to a broad range

of insightful data [9]. For instance, existing studies have examined TripAdvisor reviews to define the sentiment of customers' feelings towards dining experiences [10] and online ratings on Yelp to uncover different motivations as well as the satisfaction of customers coming from the USA and China [11]. Such investigations refer to predefined themes from existing service quality models to unveil customers' feelings, satisfaction, or perception of a dining experience and then correlate it to countries or continents. A worldwide cross-cultural comparison is, however, widely missing. Hence, this research seeks to contribute to the field of dining experiences by analysing online reviews from a bottom-up approach in order to discover which aspects of the dining experience are critical for visitors in relation to their cultural backgrounds.

To achieve the stated objectives, this study adopted the city of Salzburg as its research context for the following reasons: Salzburg ranked first on the "Best in Travel 2020" list of the world's most attractive cities thanks to its historical sightseeing spots and local cuisine [12]. In the summer season of 2019, nearly 2 million arrivals and more than 3 million overnight stays were recorded in the city of Salzburg. In addition, Salzburg attracts international visitors from a wide variety of countries, including Germany, followed by the Netherlands, Arab countries, Czech Republic and USA [13], currently gaining momentum again after the COVID-19 pandemic. In this study, we apply a mixed method approach by conducting data visualisation, data mining, and topic modelling techniques, to transform unstructured online reviews into interpretable patterns.

2 Literature Review

2.1 Tourist Dining Experience

During this era of the experience economy [14], businesses should design their products and services while also taking into consideration the full range of effects that can be evoked from an interaction between consumers and service offerings [15]. This is particularly important in the tourism and hospitality industry, which is heavily based on experiences [16]. In the context of restaurants, scholars have established different service quality models to identify elements that are influential to customers' satisfaction and experiences, among which the SERVQUAL instrument represents the most widely used model [4]. More specifically, service quality is evaluated based on five dimensions, namely, reliability, responsiveness, assurance, empathy, and tangibles [4]. Despite its popularity, the SERVQUAL model was primarily developed for banks as well as credit card, repair, maintenance, and telephone companies [4]. Therefore, since scale items should be adjusted to fit specific industries [17], scholars subsequently developed the DINESERV model so as to investigate visitors' expectations of quick-service, fine-dining, and casual-dining businesses [18].

A modified version of the DINESERV model showcases further factors of customers' expectations and perceptions at restaurants. The implementation of the overall categories, price and satisfaction, explains customers' thoughts on paying more than expected and the price of food items, while the satisfaction of the dining experience can be confirmed through customers revisiting the restaurant and in the recommendation

itself. Other tangible factors include a clean parking area and nice building exterior, restaurant decoration, easily readable menu, comfortable seating, clean dining area, and neat staff [7]. Concerning the environment, evaluation of physical and human surroundings in a restaurant emphasises the aesthetics of the facility, ambiance, table setting, lighting, and the service staff [19]. Moreover, current literature reinforces that, in order to achieve high customer satisfaction, the interaction between customers and employees should not be overlooked [20]. In addition to the service itself, beverage and food attributes are also found to be critical factors in relation to customer fulfilment and post-dining behavioural intention [21]. Today, tourists have more opportunities to share their holiday experiences on social networks [10], allowing individuals to express their thoughts and opinions and make them accessible to the online global community [22] via review platforms such as TripAdvisor. Not only do these review platforms play a key role in tourists' decision-making processes [23], but they also provide managers with a tremendous amount of data that can be used to better understand customers [10] through advanced text mining techniques [24]. A recent study, for instance, explored customers' feelings shared on TripAdvisor when dining in local restaurants [10]. The importance of location and service quality was explored using topic modelling; however, such experiences cannot be standardised, nor do they apply to everyone. Albeit the significance of acknowledging that expectations regarding food, environment, and interpersonal interaction vary across cultures [11], understanding customer experiences from different countries remains scarce.

2.2 Cultural Dimensions and Clusters

To classify people with different cultural backgrounds, one of the most common approaches is based on Hofstede's cultural dimensions theory [25]. This cross-cultural communication framework covers the dimensions of individualism-collectivism, uncertainty avoidance, power distance, masculinity-femininity, and long-/short-term orientation. Subsequently, other researchers modified and transformed the Hofstede model into the GLOBE model [26, 27], with the dimensions uncertainty avoidance (fear of ambiguity), power distance (acceptance of an unequal distribution of power), institutional collectivism (more validation of broad societal interests than of individual goals), in-group collectivism (loyalty towards families and organisations), gender egalitarianism (equal treatment of genders), assertiveness (level of directness, forcefulness, or aggression), future orientation (planning, delaying gratification), performance orientation (appreciation for setting and reaching goals), and humane orientation (fairness, generosity, kindness) [26, 28, 29]. In order to make the GLOBE model applicable for practical use in multinational societies, a model of regional clusters across the world was developed as well. The clusters and their characteristics [28] are outlined in Table 1 below.

Table 1. The GLOBE model.

Cluster	Country	Characteristics
Anglo	Canada, USA, Australia, Ireland, England, South Africa (white sample), and New Zealand	High in performance orientation; low in in-group collectivism
Confucian Asia	Singapore, Hong Kong, Taiwan, China, South Korea, and Japan	High in performance orientation, institutional, in-group collectivism
Eastern Europe	Greece, Hungary, Albania, Slovenia, Poland, Russia, Georgia, and Kazakhstan	High in assertiveness, in-group collectivism, gender egalitarianism; low in performance orientation, future orientation, uncertainty avoidance
Germanic Europe	Austria, The Netherlands, Switzerland (German speaking), and Germany	High in performance orientation, assertiveness, future orientation, uncertainty avoidance; low in humane orientation, institutional, and in-group collectivism
Latin America	Ecuador, El Salvador, Colombia, Bolivia, Brazil, Guatemala, Argentina, Costa Rica, Venezuela, and México	High in in-group collectivism; low in performance orientation, institutional collectivism, future orientation, uncertainty avoidance
Latin Europe	Israel, Italy, Switzerland (Francophone + Italian speaking), Spain, Portugal, and France	Mostly moderate scores in dimensions, low in humane orientation and institutional collectivism
Middle East	Turkey, Kuwait, Egypt, Morocco, and Qatar	High in in-group collectivism, low in future orientation, gender egalitarianism, and uncertainty avoidance
Nordic Europe	Denmark, Finland, and Sweden	High in future orientation, gender egalitarianism, institutional collectivism, and uncertainty avoidance; low in assertiveness, power distance
Southern Asia	Philippines, Indonesia, Malaysia, India, Thailand, and Iran	High in humane orientation and in-group collectivism
Sub-Saharan Africa	Zimbabwe, Namibia, Zambia, Nigeria, and South Africa (black sample)	High score in humane orientation

3 Methodology

3.1 Study Context

The city of Salzburg thrives from the tremendous amount of income generated by the gastronomy branch, with over 3,502 culinary businesses currently running in Salzburg [30]. Thus, with highly concentrated tourists, this destination offers sufficient data for

this study to explore tourists' perceptions of dining experience from different cultural backgrounds by mining their content with regards to travel expectations, motivations, and satisfaction on TripAdvisor.

3.2 Data Collection, Pre-processing, and Analysis

The web scraping software *Octoparse* was used to collect restaurant reviews and attributes from TripAdvisor. Restaurant attributes include names, review content, restaurant URLs, published dates and reviewers' locations. All available restaurant reviews, written in English, from the city of Salzburg were scrapped, resulting in 27,626 reviews. This study selected only reviews published between May 1 and October 30, 2019, leading to a total of 1,901 reviews. This timeframe was chosen because of school holidays within and around Austria, where high tourism activities take place, and to view data before the outbreak of the COVID-19 pandemic. Afterward, based on reviewers' nationalities, all reviews were classified into different cultural clusters according to the GLOBE model. Customers who did not disclose their locations on TripAdvisor were removed, resulting in a final dataset consisting of 1,461 reviews.

Next, *Orange 3*, an open-source machine learning toolkit, was applied for data pre-processing and analysis. To transform unstructured reviews into structured forms for analysis [31], the following three steps were conducted: (1) tokenizing texts and turning all the text into lowercase, (2) removing punctuations, numbers, stop words, and, in addition to general stop words, a list of custom stop words specifically developed for this study, and, lastly, (3) normalising words by removing suffixes.

In order to discover hidden topics in online reviews, this study applied Latent Dirichlet Allocation (LDA), one of the most popular topic modelling techniques in tourism and hospitality [32]. LDA was conducted on each of the cultural clusters so as to uncover a corresponding set of attributes or themes through the corpus-based guest reviews. To determine the number of topics in each cluster, multidimensional scaling was applied to analyse each topic's distance between each other and to investigate duplicate or recurring topics. Thus, different clusters yielded various numbers of topics. Finally, a list of keywords, which represent a topic in the topic modelling process, was used as a reference for labelling its representative topics. Subsequently, the extracted keywords of the respective geographical areas were vectorised using document embedding (fastText), followed by a dimensional reduction using tSNE (Perplexity = 15, Exaggeration = 1, PCA components = 25, Normalised Data, and preserved global structure) in order to visualise the GLOBE spaces. The optimal tSNE hyperparameters were chosen after a visual inspection with the Tensorboard Embedding Projector.

4 Findings

4.1 Overview of the Topic Modelling Results

Table 2 outlines the ten identified topics generated from LDA for a total of nine cultural clusters, as the Sub-Saharan Africa cultural cluster was dropped due to scarce data sampling.

Table 2. Identified topics per cultural cluster.

Cluster	n	Identified topics
Anglo	924	(1) Staff, (2) Food Menu Item, (3) Restaurant Physical Appearance, (4) Recommendation
Confucian Asia	34	(1) Value for Money, (2) Staff, (3) Food Authenticity
Eastern Europe	68	(1) Staff, (2) Food Authenticity, (3) Food Menu Item, (4) Value for Money
Germanic Europe	153	(1) Restaurant Physical Appearance, (2) Staff, Menu Offers, (3) Food Quality
Latin America	21	(1) Food Authenticity, (2) Menu Offers
Latin Europe	73	(1) Value for Money, (2) Overall Service, (3) Food Menu Item
Middle East	32	(1) Food Menu Item, (2) Staff, (3) Recommendation
Nordic Europe	45	(1) Overall Service, (2) Food Quality, (3) Menu Offers, (4) Atmosphere
Southern Asia	111	(1) Restaurant Physical Appearance, (2) Food Menu Item, (3) Value for Money, (4) Overall Service, (5) Staff

The naming of the topic was based on a list of keywords contributing the most to a specific topic. Additional topics/themes were also added due to a prevalent theme, which had not been previously found via topic modelling, being discovered in the reviews. Yet, it is important to note that the number of reviews was not equally distributed and may have influenced the number of the extracted topics. Overall, *Staff*, *Food Menu Item*, and *Value for Money* presented themselves as the top aspects when tourists shared their dining experience.

4.2 Topic Modelling Results per Cultural Cluster

The topics per cultural cluster shown in Table 2 are based on up to 5000 keywords. Figure 1 shows the topics per cultural cluster after tSNE dimensionality reduction and locates them on a map. Interestingly, the word embeddings of these keywords reflect the proximity of the individual GLOBE spaces very well. As such, the two Asian clusters can be seen grouped very close to each other on the left side, while the Middle East is strongly separated from all other areas on the bottom left, and the Anglo-

American area on the opposite top right is also entirely homogeneous. In between, Latin Europe and Latin America are separated but in close proximity, and the European regions are somewhat mixed but still clearly recognisable. This confirms that the cultural features described in detail below can indeed be clearly teased apart from each other and can be perceived as their respective typical characteristic.

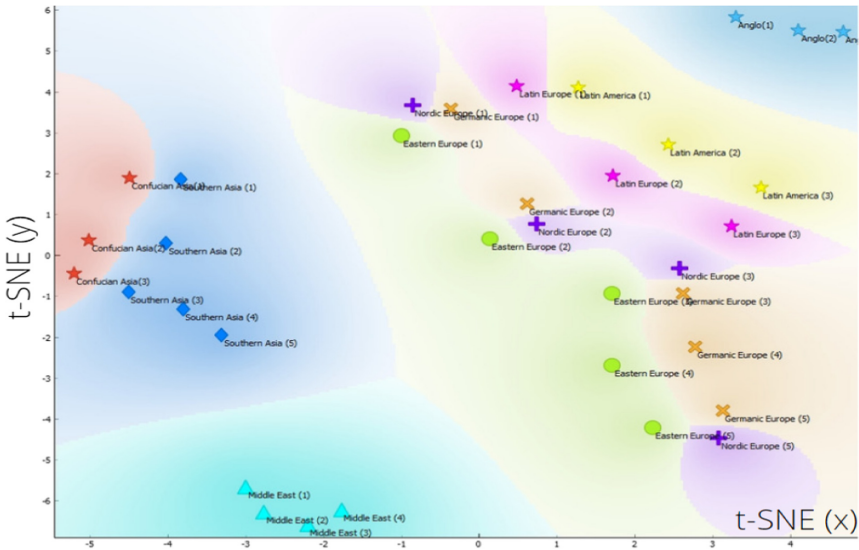


Fig. 1. Topic keywords word embedding across GLOBE cultures

Anglo

For Anglo cluster, the staff plays an important role which can be seen from several comments (e.g., “*The chef was very accommodating to our gluten free needs*” and “*The staff was friendly and attentive*”). Food menu items display a high degree of significance and seen to be followed with critiques and recommendations such as “*Choice of 3 dishes, had the sardine pasta, and it was fantastic*”. This observation is consistent with the GLOBE Model findings of the Anglo cluster which possess a high-performance orientation, showing appreciation for an achieved standard. This cluster is attentive to a restaurant’s physical setting which shares similarities with the Southern Asian cluster. Different from the Southern Asian cluster, the Anglo finds the restaurant setting and location more important than the décor, which is represented by (e.g., “*We ate outside and had a delightful dinner*” and “*Not too far from the centre of the city*”).

Confucian Asia

For this cluster, value for money is an important aspect, observed in “*We think the pricing of the food was reasonable*”. This characteristic is similar to the Southern Asia cluster, where the price paid outweigh the food portion. Also, Staff is considered an integral part, proved by “*The owner is very friendly*”. Congruent with the GLOBE model, the performance orientation, more specifically, their deliberate expression of

appreciation to the staff seems up to par. Meanwhile, food authenticity is another prevalent factor, which can be observed in the excerpts: “*We went there for dinner and food is good traditional Austrian*” and “*Very authentic and delicious Korean food!*”. It is worth noting that, interestingly, Confucian Asian tend to search for their own culture’s cuisine, and it should also meet their authenticity expectation. This is consistent with the GLOBE model’s high score of institutional and in-group collectivism, by showing loyalty to their own origins despite being outside of their home country.

Southern Asia

This cluster considers the physical restaurants appearance most important, emphasising on the decor or interior, as seen in “*richly decorated*” and “*friendly US-style diner*”. Food menu items are another prevalent topic which can be seen from the specific mentions of food, such as “*Dal Tarka*”, “*Beef Pho*”, followed by a recommendation to visit, echoing this culture’ humane orientation nature. “*Reasonable rate*” and “*value for money*” represent value for money aspect, which is also mentioned by the Confucian Asia, Latin Europe, and Eastern Europe. Interestingly, not only the attitude of the staff, but also on the appearance and facial expression is important, (e.g., “*Served by a bearded guy with several tattoos*” and “*The owner around with a very unhelpful angry expression*”). Lastly, several dissatisfied expression emerge, “*lousy service*” and “*aggressive staff*” in addition to positive experience reviews such as “*comfort*”, “*the service was very friendly*”, and “*humble servings*”.

Eastern Europe

Interaction with the staff and their friendliness is crucial for this cluster, as seen in: “*The waiter in the lounge was very grumpy*” and “*That manager was very impolite*”. Notably, the presence of negative reviews towards the staff are in line with the characteristics of assertiveness given in the GLOBE model. Nevertheless, this cluster appreciates food authenticity, “*I would recommend it for anyone visiting Salzburg and wants to enjoy a traditional Austrian dish*”. Food menu items with implicit reference for or against recommending the place also emerge, as seen in: “*Very nice options for platters to have with your wine*” and “*If you are looking for a great schnitzel off the beaten path, this is the place*”. Finally, value for money is a vital aspect for the Eastern European contrasting with the Asians where price sensitivity outweighs portion generosity, proved in “*It’s a little pricey but, given the rest of the prices in Salzburg*”.

Latin America

For Latin Americans it is important for businesses to deliver their brand promise in terms of (food) authenticity, for example, “*Make sure you go to this typical Austrian restaurant. Serve good Austrian food*” and “*The food is really good. Austrian dishes and drinks*”. Another salient aspect is the menu offers, e.g. available options, types of drinks, and cuisine types (e.g., “*The menu was excellent- it was hard to decide what to order*” and “*All kind of seafood and in any possible way*”). The findings show consistency with GLOBE model in terms of the low score in performance orientation (whether people are rewarded for delivering good performance) due to the fact that important dining aspects revolve around the food itself rather than the staff.

Germanic Europe

The appearance and location of restaurants are evidently important aspects for this cluster, as seen in *“One of the most modern restaurants in Salzburg”* and *“The restaurant has a very good flair”*. This implies that this culture appreciate the comfort and pleasant atmosphere. Concerning the staff, attentiveness and attitude are the most appreciated traits, for instance, *“We were greeted by a nice waiter who showed us to our table”* exhibiting deliberate expression of appreciation which is congruent with their high performance orientation’s GLOBE characteristic. Moreover, menu offers and food quality (e.g. *“Excellent meat dishes. Good selection of drinks”*) are important but inconsistent food availability is not appreciated, as seen in *“Limited menu”*. The quality of the food served in terms of flavour, presentation, and ingredients are also notable, *“The creamy spinach was so good and the meat had a high quality”*.

Latin Europe

Value for money is the most important aspect, as seen in *“Good service at a reasonable price”* and *“Pizzas are really huge, tasty and at a very good price”*. Although this is consistent with the Southern Asian and Eastern Europeans, the Latin Europeans emphasise price points rather than the food generosity. Food menu items are mostly followed with a critique, for instance *“Burger was good though not amazing”* and *“We chose white asparagus which was excellent”*. This cluster recognises service as a significant factor, encompassing larger spectrum of a dining experience: staff-, food-, and restaurant-related, seen in the generality of review contents such as, *“The place is nice and the court is a great place, but the food was mediocre (restaurant- and food-related)”* and *“The staff is very friendly and the wiener schnitzel was one of the best we’ve had (staff- and food-related)”*.

Nordic Europe

The overall service (e.g., *“service is immaculate”*, *“super service”*, and *“quick service”*) with a strong focus placed on services provided by the staff emerge, as seen in *“The two women who run it are super kind and really cares about their food”*. The flavour, ingredients, and the presentation thereof are key factors for this cluster, for instance *“Traditional food with lots of flavour!”*. Moreover, menu offers are equally important, proved by frequent references to modern Austrian kitchen, vegetarian food, local wines, home-brewed beer, and gluten-free beer, e.g. *“Amazing little beer garden with solid food and amazing home-brewed beer”* and *“Nice place for some typical Austrian food, gluten-free beer available and a few but very tasty food options”*. Lastly, the atmosphere is proved to be as important, as seen in *“historical environment”* and *“hidden gem”*, which is congruent with the GLOBE model’s uncertainty avoidance characteristic, since authentic local atmosphere meets this cluster’s expectations.

Middle East

Food menu items are of great significance for this cluster (e.g., *“Shrimp pizza at the bar, and it tastes lovely”* and *“Beautiful wholesome food”*). The interaction with the staff is as influential, as seen in *“The host has been the perfect one in all way”* and *“The owner of the restaurant and staff are friendly and accommodative”*. Recommendations are significant for the Middle Eastern cluster, for instance *“We went to this restaurant on recommendation”* and *“We found this restaurant from TripAdvisor”*. This finding

transpires the common practice among Middle Eastern tourists to go to places upon recommendation and correspondingly recommend places to others upon dining satisfaction. In line with the GLOBE model, this aspect displays a certain degree of consistency for high in-group collectivism since, by giving honest opinions about their experiences, this behaviour shows loyalty towards their own family or organisation.

5 Discussion

Seeing that various aspects of touristic experiences, such as dining or visiting sights, can be sourced from online review portals, and connections to a place of origin or culture can be drawn from the differences in behaviour [33], this study analyses online restaurant reviews so as to make generalisations regarding different cultures. In this way, when addressing and catering to a certain country or culture, one can resort to a set of recommendations on what specific aspects they tend to pay attention to. Overall, the most important aspects related to customer dining experiences are staff, food menu items, value for money, restaurant physical appearance, food authenticity, overall service, menu offers, food quality, atmosphere, and recommendation.

The study's findings partly differ from the literature in that food was mentioned regularly in reviews, with food even being considered the most important factor for those who enjoy dining. Unlike the dimensions in the SERVQUAL and DINESERV model, which focus more on the interaction between customers and employees rather than the products themselves (e.g., food items), this research is consistent with other scholars who emphasise that attributes of food, regarding the quality, freshness, tastiness, and temperature, are seen as the most influential criteria among customer fulfilment and post-dining behavioural intention [20, 21].

Yet, notably, the priority of these aspects varies across cultures. This study shows that societal cultures can provide valuable insights, e.g., for gastronomy businesses when trying to target a certain market. Moreover, it might aid in guiding employee training, especially in regard to the specific treatment of certain target groups (grooming recommendations, welcoming rituals, etc.). The analysis further reveals that societal culture might be a new variable in market research, especially in target market analysis, in addition to established ones such as demographics and lifestyle milieus. Finally, this study supports results from recent literature, suggesting that machine learning can give valuable insights by processing large amounts of UGC from review sites [33].

To conclude, this study is novel in that cultural background was incorporated, using an established scientific concept, namely, the GLOBE clusters. Different from previous literature focusing on limited cultural groups [33], the findings of this research allows for the generalisation of all regions within a given cluster. By using machine learning and drawing connections to the culture of customers, this study concludes that analysing online restaurant reviews can give valuable insights for professionals in the field.

6 Conclusion

This research contributes to the tourism industry through the use of machine learning techniques, thereby showcasing the possibilities of transforming UGC into structured patterns so as to reveal tourist experiences shared online. As such, the revealed insights provide restaurant managers with the exact gastronomical preferences of their target groups, which, in turn, can be used to optimise business strategies and service offerings. On a wider scale, this study is also beneficial for destination management organisations to promote gastronomy in foreign countries. More specifically, destination marketers now have the opportunity to check the exact aspects of a dining experience that a certain cultural cluster may be interested in and tailor promotional texts, images, and videos accordingly. Ultimately, this research expands upon the existing knowledge of the use of text mining and machine learning to process and analyse large amounts of user-generated data in tourism contexts.

Regardless, this study is not without its limitations. First, the sample was narrowed down to include English reviews only, and the city or country of residence was taken from TripAdvisor. As such, the assumption that a reviewer belongs to a particular cultural cluster is solely based on his/her stated place of residence. Whether or not that region represents their “true” culture, or if they were merely expatriates living in a certain place at that time, cannot be validated. For future research, it is recommended to investigate the preferences of the cultures from where large data density, that represent all 10 GLOBE cultural clusters, can be obtained, for instance major cities e.g. New York or Tokyo. This will increase the robustness of the cultural cluster analysis. Moreover, further studies could explore other aspects of tourism, such as accommodation or attractions, that can benefit from this approach in similar ways.

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Content-Based Recommendations for Crags and Climbing Routes

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Abstract. Climbing is a popular sport for active tourists and recreational sportsmen. Alpine climbing areas, such as the Alps, can attract tourists from all over the world. Various websites, mobile applications, and books are used by climbers to obtain information on important aspects of the available climbing routes, including their properties, location, and especially their difficulty. Considering this large amount of information and options, it is in reality difficult for climbers to properly select which routes to climb. Hence, we propose recommendation technologies aimed at supporting climbers in this decision task. The developed system prototype constructs a climber's profile with preferences derived from climber's logbook data collected by a mobile app. Then, the system can recommend suitable crags and climbing routes within the selected crags. The designed interface and the basic computational models for such a system prototype are presented. The proposed technology aims at complementing existing electronic climbing guidebooks and providing decision support to climbers.

Keywords: Climbing tourism · Difficulty assessment · eTourism · Recommender system · Outdoor tourism decision support

1 Introduction

Nowadays, there is a growing interest in sport climbing. Specifically, outdoor climbing has become a popular tourism activity for novices and experts. In some countries, such as Italy, Greece, Spain, and Turkey, climbing has become a foremost advertised activity that is used for attracting many tourists. Thousands of rock-climbing regions have been developed and registered in electronic climbing guidebooks, which have been made available worldwide. In this scenario, some companies have been focusing their business on actively supporting climbers, by providing them reliable, easily accessible, and updated information, even via novel information technology tools.

For example, a local company Vertical-Life¹ in South Tyrol (Italy) offers to prospective visitors an electronic climbing guidebook, which is accessible through

¹ <https://www.vertical-life.info>.

a rich website². In addition to the e-guidebook, climbers can find there e-services that allow them to leave feedback in the form of comments, ratings, and grades for the routes that they have climbed (logbook functionality). Another similar example of such type of information tools is illustrated by UKClimbing³. Their website provides online descriptions and maps for many climbing areas, mostly located in Europe. Furthermore, in Australia, climbers can browse ‘the Crag’⁴ website, which focuses on outdoor climbing routes in this country.

By complementing these websites, ancillary mobile apps have been developed; they allow to discover and log climbing routes [1–5]. Climbers can use them to track their progress in training. These apps are also used to maintain updated information on the climbing routes, in collaboration with local guides, by collecting crowd-based feedback on the featured routes.

This information repository is evolving day by day and is of great interest to the companies operating in this tourism sector. They aim to expand their penetration and role by providing climbers with the most essential information, and in the most easily usable way. In particular, they would like to match climbers’ needs with personalized recommendations for routes that suit the climbers’ expectations and limitations, such as the maximum difficulty level of the route the climber can climb, the desired duration and length of the route, or its safety level, which is influenced by the changing mountain rocks’ state. It is worth stressing that the available technologies and tools use manual input acquired via the system GUI (query) for establishing a match between a target climber (user’s preferences) and the recommendable routes. This is burdensome and tends to decrease the usage of the existing tools.

To address this problem, we illustrate here a range of techniques and tools that enable us to learn semi-automatically climbers’ preferences, by leveraging their explicit feedback given in a climbing app. Moreover, we illustrate how the routes recommendations can be delivered to climbers in specialized websites and apps. We focus on a system prototype and its GUI, that we are developing for one of the above-mentioned companies, namely, Vertical-Life. Recommendations are also tailored to the climber by considering one of the most important aspects, i.e., the desired difficulty level of the searched routes. Moreover, since the difficulty of a route is often subjective, this subjectivity is estimated by machine learning models that predict how difficult a given route will be perceived, specifically by each climber. Exploiting that estimation module, we have developed an interface for personalized recommendations for outdoor climbing. Ultimately, the recommendations given to a user are based on the knowledge of the user’s preferred routes, which is derived from the logged climbing activities in the app, and by the goal of the climber (e.g., routes useful for training).

The paper is structured as follows: in Sect. 2, we discuss the related work. In Sect. 3, we describe the building blocks used for computing recommendations. In Sect. 4, we sketch the GUI which have been designed to illustrate and explain

² <https://www.8a.nu>.

³ <https://www.ukclimbing.com>.

⁴ <https://www.thecrag.com>.

the recommendations. Finally, Sect. 5 discusses the contribution and concludes the work by listing some future developments.

2 Related Work

Recommender systems (RSs) for climbers fall in the more general area of decision support systems developed for recreational sports, such as hiking and trekking. In all these sports, the user has a common problem, namely to match the trail's or route difficulty level with the hiker's or climber's ability. One notable study was conducted by Calbimonte et al. in [6–8], where they outlined the problem of matching hiker to hiking trails according to the hiker's physical level and trail's difficulty characteristics. The authors have developed a semantic model to represent the hikes using Semantic Web ontologies and have built user profiles via a questionnaire, which requires users to fill in the information manually. In another article, Vias et al. [9] address the problem of hiking path difficulty assessment by measuring the time needed to complete the hike and acquiring user preferences via manually entered search criteria. The main limitation of such a system is that users are required to enter information by hand and previous user/system interactions are not exploited.

To overcome the above-mentioned limitations, we introduce here an approach aimed at semi-automatically understanding user preferences through their feedback. In recommender systems, users' needs and wants are typically learned via explicit and implicit feedback [10]. In [11], we have proposed the first idea of the application of such a mixed approach: explicit feedback is obtained with manual input data through a mobile app and implicit feedback is obtained in the form of sensor data. It is worth noting that, in marathon running, Smyth et al. [12–14] have also developed the athlete's profile by using sensor data and case-based reasoning. However, their methods are hardly applicable for climbing as they require data collection from sensors on a large scale, and sensors for climbing have just been developed.

More specifically to sport climbing, Draper et al. in [15, 16] have focused on the problem of assessing routes' difficulty, and developed a unified table to compare grading scales between several countries. They discuss the issues related to the design of a unified grading system and outline the most important features that affect the grading of a route. They note that the difficulty of a route is subjective, as it depends on a climber's characteristics (including years of climbing experience, training frequency, preference for the climbing style, etc.). However, they have not solved the problem of how to measure the climber's perceived difficulty of a route.

A few works have tackled the route difficulty grade assessment problem with computational methods. For example, Kempen in [17] formalized climbing routes description by using a linguistic approach and found some relationship between a sequence of movements to climb a route and the route's grade. Furthermore, in [18–20] the authors applied deep learning to assess difficulty grades from images of routes on artificial climbing walls for indoor climbing. However, these approaches are not sufficient to explain a climber's perceived route difficulty, therefore, more research is required to solve the target problem.

In conclusion, there is a lack of technologies for understanding and predicting climbers’ preferences and perceptions. It is therefore challenging to develop a recommender system capable of suggesting suitable climbing routes with the right difficulty grade that the climber can and wants to climb.

3 Climber and Route Profiling

To solve the outlined problems, we have designed a content-based recommender system that aims to suggest routes related to the ones the climber practiced most often in the past [10]. For this purpose, we have modeled climbers’ habits (preferences) and matched them with the recommendable routes’ characteristics. Figure 1 shows the recommender system (RS) logical schema. The used data comprises a logbook of ascents and climbing routes information obtained from Vertical-Life e-guidebook and app. The RS has two computational components: the climbing grade prediction model (explained in Sect. 3.1) and the content-based RS algorithm, discussed in the following and in Sect. 4, where also the interaction design is presented. The system first supports climbers in selecting a region of interest, namely, a climbing crag, which is a climbing area with relevant routes within. This search is enabled by a specifically designed map interface (Fig. 2). Then, within a selected crag the user is suggested with recommended routes (Fig. 3).

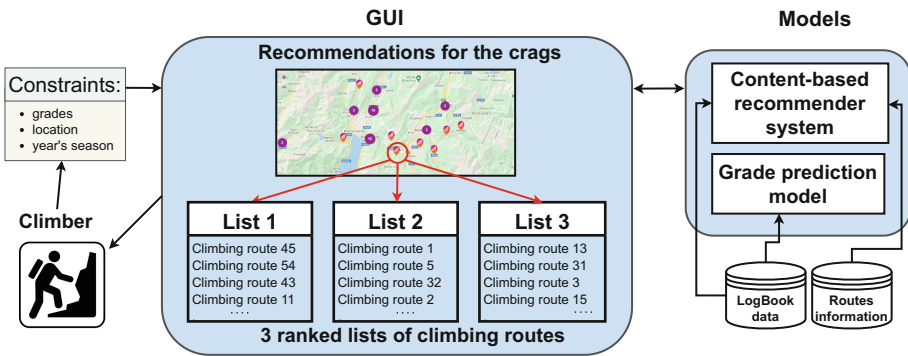


Fig. 1. Logical schema of the proposed recommender system for crags and climbing routes.

To identify proper recommendations for a target climber, we make three working assumptions. First, climbers usually choose routes with which they are familiar and require the climbing styles they have practiced before. The second assumption is that climbers avoid the moves they dislike, but for training purposes, they need to climb them, otherwise, they may be proficient in one specific style, but lagging in another one. The third assumption is related to the climbing routes that are easier than expected: they are considered to be good for motivational purposes because individuals would be more motivated to continue

the training when they climb a specified grade with less effort, as they would think that they achieved a certain level in training. These assumptions need to be validated with climbers' feedback and they are here considered to generate a first working prototype.

To explain how recommendations are computed, we first describe the climber's profile. Then, in the next section, we show how the RS can suggest crags according to the climber's profile, and how three types of recommendations for routes are generated: routes with climbers' favorite moves, routes good for training and routes for boosting the climber's motivation.

A climber's profile is built from the logbook of her ascents inserted via the Vertical-Life company's website and smartphone application. Table 1 shows aggregated logbook data for one climber and the derived climber's profile. We consider four categories of climber's preferences: *climbing discipline*, *climbing grade*, *climbing style* and *wall steepness*. The row marked with '#' shows the number of recorded climbs for each possible value of the category, '%' is the percentage of ascents in each category, PD_c , PG_c , PS_c , PH_c are the generated sets of preferred climber's disciplines, grades, styles and wall steepness/hill, respectively. These sets contain, for each category, the values appearing in the largest number in logbook records. DS_c instead, is the set of least climbed styles by the profiled climber ('disliked' styles).

Table 1. Example of a climber's profile.

Climbing discipline																	
	Boulder			Sport-single			Sport-multi-pitch			Trad-single			Trad-multi-pitch				
#	81			267			117			222			151				
%	10%			32%			14%			26%			18%				
PD_c	Sport single																
Climbing grade																	
	5b	5b+	5c	5c+	6a	6a+	6b	6b+	6c	6c+	7a	7a+	7b	7b+	7c	7c+	8a
#	75	43	62	20	19	64	61	83	87	97	97	33	49	24	16	8	1
%	9%	5%	7%	2%	2%	8%	7%	10%	10%	12%	12%	4%	6%	3%	2%	1%	0%
PG_c	6c+, 7a																
Climbing style																	
	Athletic		Cruxy		Endurance			Crimpy			Sloper			Technical			
#	24		203		387			86			118			20			
%	3%		25%		46%			10%			14%			2%			
PS_c	Endurance																
DS_c	Technical																
Wall steepness/hill																	
	Overhang 135°				Vertical 90°				Slab 45°				Roof 180°				
#	370				152				195				121				
%	44%				18%				23%				15%				
PH_c	135°																

- **Climbing discipline.** We adopt the classification by Hörst [21, 22], according to which the disciplines of climbing are: bouldering, sport or traditional (trad) climbing. Sport and trad climbing may further be subdivided in: single-pitch (routes within 10–45 m) or multi-pitch (routes consist of several pitches). We assume that climbers would like to receive recommendations for new routes of the discipline they most often climb. For instance, the climber profiled in Table 1 prefers sport-single-pitch to other disciplines and is likely to be interested to receive this type of recommendation.
- **Climbing grade.** Each route has a grade that measures its difficulty. Climbers often climb the grades they feel comfortable with, that is, routes they find challenging but within their capabilities. Draper et al. [16] proposed International Rock Climbing Research Association (IRCRA) scale to aid comparison between various route grading systems that are employed between countries. For the purpose of illustration, we use the French grading scale that has a linear relationship with the IRCRA scale. Table 1 shows a climber who most often climbs 6c+ and 7a routes on the French scale.
- **Climbing style.** Additionally, each route can be characterized by a climbing style that suggests the movements required for completing the ascent. We adopt the six styles featured in the Vertical-Life guidebooks, namely, *athletic*, *cruxy*, *endurance*, *crimpy*, *sloper*, *technical*. The styles of routes that a climber most often climbs are used to model the climber’s preferences for favorite moves. The climber profiled in Table 1 most often ‘endurance’ style climbs.
- **Wall steepness (hill).** Climbing rocks differ according to steepness, i.e., the angle that the rock wall forms with the horizontal plane. Some of them have a steepness of around 90° (e.g., El Capitan in Yosemite, US), and some even close to 120° (e.g., Rodellar, Spain). Climbers often have a preferred steepness range which may be associated with the intensity of their training. As in the 8a.nu e-guidebook, we classify the routes into four groups according to the steepness of the rock wall: ‘slab’ ($\leq 88^\circ$), ‘vertical’ (88° – 95°), ‘overhanging’ (95° – 165°) and ‘roof’ ($\geq 165^\circ$). For example, the climber profiled in Table 1 prefers to climb ‘overhang’ walls.

In summary, each climber is profiled by an array of five sets of favorite values for the four considered categories and one set of less favored styles: $c_p = (PD_c, PG_c, PS_c, DS_c, PH_c)$. A climber can have more favorite values for each category: for example, they could prefer both ‘bouldering’ and ‘sport single’.

A climbing route has a similar vector representation $r_i = (r_{id}, r_{ig}, R_{is}, r_{ih})$. However, r_{id}, r_{ig}, r_{ih} are single values describing the route’s discipline, grade and hill, respectively. While instead R_{is} is a set of styles that a route requires to be used to climb. For example, a route can require both ‘endurance’ and ‘athletic’ styles.

3.1 Climbing Grade Prediction Model

It is well-known in the climbing community that a route’s grade is a subjective opinion, often given by the author of a guidebook [23]; a climber, upon completing the ascent, may disagree. This is an important aspect that a climbing RS

needs to account for. Indeed, a climber may be served better if the recommendation is customized to suggest to the climber the routes that she would *perceive* as having the desired grade than suggesting the routes whose official grade is the desired one. To this end, we have developed a component that predicts what would be the climber’s perceived grade of a route and visualizes this prediction in the interface. Section 4 introduces a scenario in which we take advantage of the grade prediction component to recommend routes for boosting climber’s motivation.

We conducted a preliminary study on perceived climbing grade prediction. We developed a linear regression model using a data set of climbers’ records about their ascents collected through the Vertical-Life app. The data set included climbers’ feedback about the routes’ grades. Climbers often agreed with the official grades, however, in about 8% of the records, the climbers registered a different grade, up to 3 grades harder or easier than officially stated. To predict the grade that a climber (c) would assign to a route (r) after attempting the ascent, we used domain knowledge to extract a set of features. A more detailed account of our approach is presented in [24]. In a nutshell, these features capture: how the target climber tends to deviate from the official route’s grade (og) in her grading ($cmd(c, og)$), how the target route is graded by the community of climbers ($md^Y(r)$) and how environmental factors influence grading of the target climber ($cmd^M(c, og)$). Equation 1 shows the learned linear regression model that predicts the climber’s perceived grade of the route ($cg(c, r)$).

$$cg(c, r) = 0.027 + 0.998 \cdot og + 0.410 \cdot cmd(c, og) + 1.051 \cdot md^Y(r) + 0.279 \cdot cmd^M(c, og) \quad (1)$$

The official route grade has the largest contribution to the prediction, although the features related to the grading behavior of the climbers have significant weights in the model. The RMSE of the linear model was compared to that of a baseline model, which predicts that a climber would agree with the official route grade. In 10-fold cross-validation we obtained RMSE error of 0.176 for the linear model, significantly lower than the baseline error of 0.191. In conclusion, the features identified important knowledge that contributes to the correct prediction of a climber’s perceived difficulty grade of a route.

4 Recommendations and GUI

Crags Recommendation. As already mentioned, firstly, the climber is offered recommendations for crags that contain some relevant routes. The designed map GUI shows all the crags within a target region and clearly indicates the recommended ones. In fact, for each recommended crag, we give to the climber an overall idea of the potential relevance of the crag by identifying routes that satisfies three criteria: 1) routes of a climber’s favorite discipline, 2) routes with the predicted grades she mostly climbs; 3) routes of the climber’s favorite styles and wall’s steepness. More formally, these are the routes that fulfill the following condition:

$$(r_{id} \in PD_c) \wedge (r_{ig} \in PG_c) \wedge (\exists s \in R_{is} : s \in PS_c) \wedge (r_{ih} \in PH_c) \quad (2)$$

where $\exists s \in R_{is} : s \in PS_c$ means that there is at least one element in set R_{is} that is also in PS_c . If there is at least one route in the crag that satisfy the above condition, we recommend the crag.

Figure 2 shows the GUI prototype for crag recommendation. The selected area here is the Arco region, located in Trentino, Italy. Arco is a famous destination for climbers, as it offers more than 8,000 climbing routes. The red circles indicate recommended crags, or clusters of crags, generated for the climber who is profiled in Table 1. Some crags are grouped together and form a cluster; a purple circle indicates a cluster and the number of crags is shown within. To inspect all the crags separately, the user should zoom in. Finally, we remark that each crag recommendation is accompanied by an explanation. The explanation follows the knowledge graph-based explainable recommendations approach described by Zhang et al. [25]. An example of an explanation sentence, for the climber’s profile given in Table 1, is shown in the pop-up window in the figure.

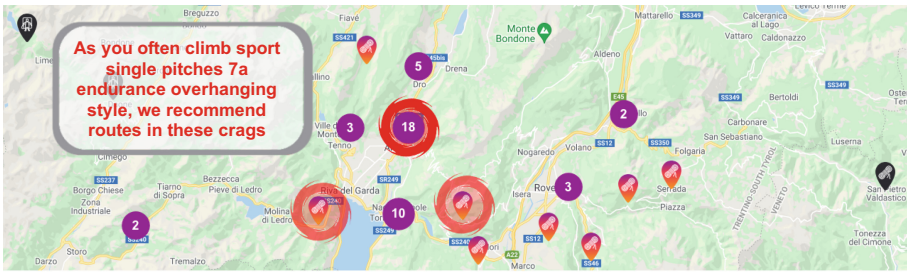


Fig. 2. Crags recommendation and explanation GUI. The pop-up window with an explanation is generated for the climber profiled in Table 1. The bright red color presents a cluster of 18 crags for which the explanation is given. The user needs to zoom in to visualize the recommended crags within the cluster.

Climbing Route Recommendations. When the crag is selected, the system should show the routes within the crag that have been generated by the RS. Such suggestions are supposed to help the climber to choose a suitable route, as some crags may include more than 100 routes, and it could be tedious and error-prone to visualize all the routes. The recommendations are organized in three separate lists: for favorite moves, for training, and to boost the climber’s motivation.

Recommendations for Favorite Moves. The first recommendation list is generated according to the first working assumption presented in Sect. 3: among all the routes in the selected crag, the system ranks and shows the routes which have the climbing style, grade and discipline mostly preferred by the climber. Hence, if $r_i = (r_{id}, r_{ig}, R_{is}, r_{ih})$ is a route, and $c_p = (PD_c, PG_c, PS_c, DS_c, PH_c)$ is the target climber profile, then r_i is recommended if the following condition holds:

$$(r_{id} \in PD_c) \wedge (r_{ig} \in PG_c) \wedge (\exists s \in R_{is} : s \in PS_c), \tag{3}$$

We note that the climbing styles of a route (R_{is}) specify the movements needed for ascending this route, and if the climber often climbs the routes with this style, it means that she likes these movements. The ranking of the visualized routes is based on their degree of matching with the climber's favorite wall's steepness: routes are sorted by increasing the value of the absolute difference of the route steepness and the climber's favorite steepness. For instance, Fig. 3 shows recommendations in the crag Massone (Arco, Italy): it is one of the first developed crags in Arco, with around 285 routes. In this example, the system shows the list of recommended climbing routes for favorite moves at the preferred grade level 7a.

In addition to the 'Grade' column (which is the official grade), the GUI includes a column named 'Perceived grade' where the grade computed by the prediction model explained in Sect. 3.1 is shown. The 'Recommendations' red button is used to visualize the lists of recommendations within the crag.

GRADE	PERCEIVED GRADE	NAME	STYLE	WALL STEEPNESS	STARS
7a	7a+	Ludness	Athletic, Endurance	Overhang	★★★★+
7a	7b	Crisi	Endurance, Cruxy	Overhang	★★★★+
7a	6c	Aladin	Endurance	Vertical	★★★★+
7a	7a	Not Normal	Endurance	Slab	★★★★+

Fig. 3. Recommendation for climbing routes within the crag: routes with the climber's favorite move. The 'Perceived grade' column shows the predicted perceived difficulty of the route.

Recommendations for Training. The second working assumption presented in Sect. 3 is considered to produce another recommendation list containing the routes with a climbing style which the target climber has practiced less, but, for the training purpose, should instead be tried.

For instance, Fig. 4 shows the ratio of climbing styles (computed as the number of climbs with a particular style divided to the overall number of climbs) for two climbers: climber 1 practices ‘endurance’, but does not train ‘technical’ style, whereas climber 2 practices every style, thus, she/he is better trained. The routes that are therefore recommended for training satisfy the following condition:

$$(r_{id} \in PD_c) \wedge (r_{ig} \in PG_c) \wedge (\exists s \in R_{is} : s \in DS_c) \quad (4)$$

Moreover, these training routes should not have a steepness too different from the climber’s favorite one, otherwise, it would be too difficult to climb them. Furthermore, the training process should be made gradually, starting from the least different steepness. Thus, the recommendations are sorted by increasing the value of the absolute difference of the route steepness and the climber’s favorite steepness. The GUI of this recommendation list is not shown here for lack of space.

Recommendations to Boost Climber’s Motivation. The final recommendation list implements the third working assumption discussed in Sect. 3 and makes a direct usage of the perceived grade prediction model. This list includes only the routes that are predicted to be perceived by the climber as easier than officially classified. When the climber will try these routes, she may justify this predicted perception as due to his skills. The GUI for this type of recommendation is here omitted is for lack of space.

5 Discussion and Conclusions

In this work, we have proposed a new concept of an RS for climbing routes recommendation based on the climber profile built semi-automatically by using mobile and web application data derived from the logs of the climber’s ascents. The described RS opens the door to a new generation of climbing e-guidebooks, providing important recommendations to their users based on individual preferences and climbing routes characteristics. The task is challenging as it requires the solution of many problems such as understanding climbing grades, how climbers grade routes in general, routes characteristics, training process of sportsmen; these problems have not yet attracted much research activity and few technologies have been developed to solve them.

In a future step, a pilot study will be conducted to derive an early assessment of the proposed prototype system. Then, a large-scale evaluation of the system will be in order. Several features of the presented prototype must be improved. Firstly, the proposed perceived grade prediction model depends on a climber’s origin, as in some countries the grades are overestimated in general, and it becomes a standard within this region, thus, the assessment varies between

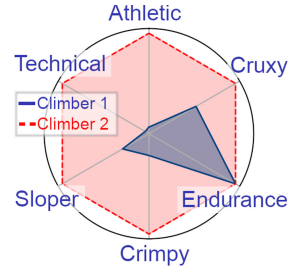


Fig. 4. Profile graphs for two climbers: Climber 1 climbs endurance style; Climber 2 climbs every style.

climbing regions and depends also on the styles trained by the climber, and this should be considered in the future. Secondly, the recommendations for training could be improved by using additional heuristics. For instance, the system now recommends outdoor routes with the styles less liked by the climber. However, it would be also useful to recommend indoor routes which are similar to the outdoor one, to better prepare a climber for a target outdoor route.

Thirdly, the proposed climber profile could also be extended by considering additional climbing disciplines (e.g., ice-climbing), styles (s.a., pinches, dynamic), and by leveraging implicit feedback (i.e., climbing performance metrics obtained through sensor data). It will also be important to consider the environmental and economic impact of the recommended climbing activities, i.e., by trying to contribute to the preservation of territories while not neglecting the economic growth [26]. Moreover, by considering the potential crag congestion produced by too many climbers at the same crag, the system could also try to better distribute climbers in the recommended crags [27].

Finally, although this work focuses on the climbing domain, we believe that the approach may be adapted to other similar sport activities, such as, hiking, trekking, trail running, via ferrata and mountain biking.

Acknowledgments. This work has been partly supported by the project “Sensors and data for the analysis of sports activities (SALSA)”, funded by the EFRE-FESR programme 2014–2020 (CUP: I56C19000110009). The authors thank Andrea Janes, Ben Lepasant and the Vertical-Life company (<https://www.vertical-life.info/>) for the data provided for this research.

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Understanding Preferences in Tourism Email Marketing

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Abstract. Nowadays, advanced tools allow the personalization of email communication with tourism clients or prospects based on explicit (e.g. name, age, language, country) and implicit indicators (e.g. ranking of activity in the opening rate of the newsletter, browsing preferences, online preferences provided by cookies, etc.). However, knowing how audiences react to emails allows Destination Marketing Organizations (DMOs) to create content clusters for personalized communication. The purpose of this study is to empirically investigate the preferences on tourism email marketing of different audiences based on a specific explicit indicator, namely the language chosen by users to receive communications by a DMO. A content analysis on a longitudinal dataset based on 131 newsletter messages sent between 2018 and 2021 to more than 50'000 contacts by a DMO in Switzerland was performed. Results show that content should be adapted to different audiences speaking different languages instead of providing just a translation. Specifically, the German-speaking audience seems to be more inclined to messages that focus on winter sports and hiking, the Italian-speaking audience to news about hiking and information on COVID-19, the French-speaking audience to news about promotions, while the English-speaking audience to contents on discounts and COVID-19-related. These results provide an important contribution to studies on tourism personalization of communication in the context of email marketing, suggesting the role of content adaptation according to the language and cultural background of the audience. DMO managers can also benefit from this research in understanding how to address a similar study on their datasets and compare the emerged content clusters.

Keywords: Email marketing · Tourism personalization · Tourism preferences · Customer value creation

1 Introduction

Email is an important communication channel in marketing and is still one of the most commonly used by many industries, including tourism, and, in this specific case, DMOs. The main reasons for that, as highlighted by many authors in the literature, is its cost-efficiency and its speed, in terms both of reaction by customers/prospects and of development of marketing campaigns [1–4]. Generally, in email marketing campaigns, success is determined by using specific metrics such as open rate (OR), i.e. the

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J. L. Stienmetz et al. (Eds.): ENTER 2022, *Information and Communication Technologies in Tourism 2022*, pp. 382–394, 2022.

https://doi.org/10.1007/978-3-030-94751-4_34

percentage of addressees who have opened the message, and click-through rate (CTR), i.e. the percentage of those who have clicked on at least one link out of the people who had received the email [5]. Clicking on a link represents the voluntary act of interest/curiosity that addressees show towards the sender of the message as they select topics that they are interested in learning more about. In the industry, email marketing is usually managed using special tools (such as the popular tools named Mailchimp, MailUp, Salesforce). These tools provide statistics on campaign performances and audiences, allowing for a first customer segmentation. Extending this analysis could bring interesting insights on how to segment customers more efficiently. DMOs have in fact access to several data when it comes to email campaigns and audiences and this makes it interesting to study the potential to develop this channel with personalization to improve communication practices. However, few companies and DMOs are willing to share such performance data, as they represent a competitive and strategic asset. Thus, the lack of studies in this area can be related to this limited access to data. This study emphasizes the importance of studying email marketing performance by bringing insights from a longitudinal study on newsletters in tourism. Results underline how to identify more personalized content clusters for different audiences thanks to the analysis of a specific explicit indicator, namely the language chosen by users to receive communications by a DMO in relation with an implicit indicator, namely click behavior.

2 Literature Review

2.1 Segmentation in Email Marketing

Studies on email marketing consider audience segmentation as key to a successful interaction with clients, reflected with high open, click-through and conversion rates [3, 4, 6–8]. In particular, Mailchimp, an integrated marketing platform, compared the results of its users' segmented campaigns with those of the same users' non-segmented campaigns: segmented campaigns performed better, with higher open, unique open, and click rate, and lower bounces and unsubscriptions [6]. There are several methods for customer/audience segmentation that have been studied in the literature. There are methods that use customer details [8] such as demographic and lifestyle data, others use data product, others customer/audience behaviors - the most popular models being the RFM model, clustering customers according to their purchase's "recency", "frequency" and "monetary" value, and the customer lifetime value (CLV) model, which determines customers' importance level based on a calculation of the net cash flow generated by the customers [4, 9]. The market standards with respect to how to classify contacts can be divided into two main approaches: i) explicit indicators on users/audience (e.g.: name, age, language, country), that is information voluntarily provided by users; and ii) implicit indicators on users/audience (e.g.: ranking of activity in the opening rate of the newsletter, browsing preferences, online preferences provided by cookies, etc.), that is information that can be inferred from users' interaction with emails and connected web pages. In general, different data sources can be used and combined to create more efficient segmentations and consequently more efficient communication [8].

Segmentation is the foundation for personalized email marketing campaigns, one of the main trends in email marketing [10], as the format and content of messages can be adapted to different segments and eventually for a given individual. Similarly to segmentation, personalized emails have been found to increase campaign performance [11, 12].

2.2 Personalization in Tourism

Personalization has been defined by Jackson [13] as “a way of doing things. Personalization derives customer information to provide consistent, timely and relevant individualized interactions and offers to each customer across all touchpoints that increases customer loyalty and lifetime value” (p 26). In general, however, personalization is not always easily applied and, above all, univocally understood and interpreted [14]. In tourism, personalization has been studied and applied to different areas, such as travel planning and recommender systems. Existing recommender systems have been analyzed in the literature [15, 16], and new ones have been proposed: Missaoui S. [17] presented the mobile app LOOKER, a recommender system based on a user generated content-based filtering algorithm; Amer-Yahia et al. [18] developed an interactive framework that generates customized travel packages for individuals or for groups of travelers; De Carolis et al. [19] analyzed the potential of social robots in providing effective tourism recommender systems; Wang [20] proved how including data on online behavior of potential travelers can improve personalized recommendation systems; Ravi et al. [21] worked on an algorithm- and hybrid user clustering-based travel planning system for personalized point of interest recommendation; Choi et al. [22] presented a recommender system to help tourists create a personalized travel plan based on collaborative and constraint satisfaction filtering; Chen et al. [23] developed a method to design personalized travel routes for tourists by combining user clustering, improved genetic, and rectangular region path planning algorithms. Personalization can be used also to provide specific information to tourists with particular needs, as proposed by Ribeiro et al. [24] with their personalized system to assist mobility disabled tourists during their visit and activities.

In cultural tourism, personalization can help enhance the dialogue between culture providers and cultural tourists. Ross [25]’s study on Alentejo in Portugal showed that more personalized individual-based guiding activities can be used in co-creating experiences by cultural tourism providers to deliver more meaningful experiences also appealing to visitors with alternative sets of beliefs and motivations. Konstantakis et al. [26]’s work demonstrated that it is possible to provide higher quality and more relevant cultural recommendations when including information regarding the cultural background of tourists. In the context of audio tours, Shilov et al. [27] proposed automatically generated personalized audio tours based on the context and tourists’ preferences. Specifically to museum visits, Kaghat et al. [28] advanced an adaptive and personalizable gesture-based audio augmented reality system.

Personalization can have an impact also in the hospitality domain: Neuhofer et al. [29] proposed a model for personalized experience co-creation between a hotel’s staff and its guests, while Piccoli et al. [30] studied the benefits brought by IT-enabled

customer service systems to service personalization, customer service perceptions, and hotel performance.

The point of view of tourists has been analyzed by Volchek et al. [31], who highlighted how personalization plays an important role but does not automatically guarantee a positive tourist experience.

In the context of tourism-related online communication, research has been conducted on the one hand, on the effectiveness of DMO’s websites [32, 33] and, on the other hand, on how personalization can have a positive impact on tourism e-commerce websites, in terms of revenue [34] and customers’ loyalty [35]. A lack of studies has been found for what regards email communication and marketing, more specifically newsletters, both in terms of effectiveness of the tool and personalization. Newsletters are very relevant and extensively used in the tourism domain and more and more a tool for email personalization; hence, they should be further studied. This paper wants to contribute to this gap by analyzing different audience’s preferences in email marketing, as a starting point to understand how to better personalize content in DMO’s newsletters making them more effective.

3 Research Method

The case study used for this research has been provided by Agenzia Turistica Ticinese (ATT), a regional Destination Marketing Organization active in the southern part of Switzerland. ATT has a mailing list including 50’239 contacts (data updated in April 2021). The mailing list has been shared with the researchers ensuring the anonymity of the contacts: all were shared with an anonymous ID (erasing personal data such as name and surname and email address of the contact). The indicators shared were the language that users had chosen to communicate with the DMO and their country of residence.

Table 1. Distribution of languages and related countries of the analyzed mailing list.

		CH	DE	I	FR	UK	USA	Other	Total
DE	Count	16316	5206	233	195	61	416	10560	32987
	%	49.5%	15.8%	0.7%	0.6%	0.2%	1.3%	32.0%	100.0%
EN	Count	3833	169	1324	79	33	113	1875	7426
	%	51.6%	2.3%	17.8%	1.1%	0.4%	1.5%	25.2%	100.0%
IT	Count	1266	32	5	230	2	10	581	2126
	%	59.5%	1.5%	0.2%	10.8%	0.1%	0.5%	27.3%	100.0%
FR	Count	1306	253	169	66	976	1296	3634	7700
	%	17.0%	3.3%	2.2%	0.9%	12.7%	16.8%	47.2%	100.0%
TOT	Count	22721	5660	1731	570	1072	1835	16650	50239
	%	45.2%	11.3%	3.4%	1.1%	2.1%	3.7%	33.1%	100.0%

Table 1 presents the distribution of languages and related countries of the analyzed mailing list. Contacts were classified according to four languages with a majority of contacts having selected German as language to communicate with the DMO, followed by English, Italian and French. Looking at the residence country: the majority of the contacts were from Switzerland, followed by Germany, Italy and France. The particular linguistic characteristics of Switzerland must be considered: in the country, there are three official languages – German, French, Italian, and a fourth national minority language: Romansh. The latter was not considered in this study as it is not a language in which ATT's newsletter is available.

In order to empirically investigate the preferences on tourism email marketing of different audiences, the following available indicator has been used: the language chosen by users to receive communications with a DMO. Language and geographical variables are indeed a criterion for customer segmentation [36, 37] and, as research suggests, online tourism promotion is not culturally neutral and should rather take into account cultural differences [38]. More precisely, studies conducted on web communication have shown the importance of studying content adaptation to the language and culture of the various audiences [39, 40]: websites that are culturally and linguistically adapted have been found to be more effective [41–43]. For these reasons, language was selected as segmentation criteria. It is important to note that in this study languages are not representing a specific country.

Email is among the main tools of direct marketing communication used by the DMO. Specifically, ATT regularly sends a newsletter to its contacts using the popular email marketing tool Mailchimp. The newsletter is sent at the beginning of each month to its mailing list and it is translated in the four languages, keeping the same structure and content for the four versions. Figure 1 presents a screenshot of part of a newsletter, where the header, main story and content module are visible. In addition to header and footer, the main body of the newsletter is generally structured as follows:

- Character story module: consists of image/video with link, title and text, call to action with link. The module is dedicated to interview stories with a local person, artisan, producer, guide, host, sport instructor, etc. presenting a peculiar activity in Ticino.
- Content modules: each module consists of an image with link, title with link and a text. On average, six content modules are present in every newsletter message.
- Event modules: not present in every newsletter, consist of images with link, title with link to upcoming events.

The links in the newsletter refer to the correspondent content pages on ATT's website, which provide more information on the topic. The links in each module are the same, for image/video and call to action in the story module and image and text in the content modules.

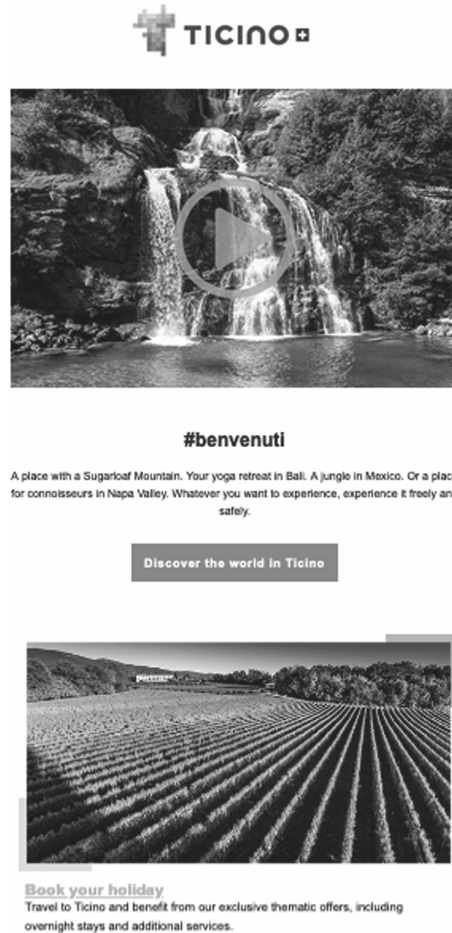


Fig. 1. Screenshot of part of a newsletter by ATT

For this study, it was possible to analyze the newsletters sent to ATT's mailing list from April 2018 to February 2021 in the four languages for a total of 131 analyzed newsletters (note that newsletters were never sent in January; in May 2020, three newsletters were sent; there was no data recorded for the following newsletters in the DE version: October 2018, August 2019, April 2020, in the FR version: April 2020, and EN version: April 2020). The average OR of ATT's newsletters is 30.2% (with a min. OR of 18.3% and max. of 49.1%), which is above the tourism and hospitality industry average of 17.70% [44]. Table 3 shows the average performance of ATT's newsletter divided per language segments. In order to identify preferences in the content promoted within the newsletters, the top 10 newsletters for each language, namely the 10 newsletters with the highest OR for each language were considered (Table 2). This allowed focusing on the newsletters that received the most attention. A total of 40 newsletters were analyzed.

Table 2. OR of the top 10 newsletters for each language

Newsletter	DE OR (%)	EN OR (%)	IT OR (%)	FR OR (%)	Avg. OR
April 2018	25.0	23.3	37.7	32.8	29.7
May 2018	24.0	22.5	32.5	37.3	29.1
June 2018	24.3	21.7	32.6	38.8	29.4
July 2018	27.9	21.6	36.6	36.9	30.8
August 2018	22.7	22.3	34.6	35.9	28.9
Sept. 2018	21.3	22.6	37.1	33.5	28.6
April 2019	26.4	20.8	38.6	35.9	30.4
May 2019	21.6	21.7	37.2	37.3	29.5
March 2020	24.1	20.4	38.7	39.7	30.7
April 2020	NA	NA	42.1	NA	42.1
4 May 2020	32.7	27.0	42.2	49.1	37.8
11 May 2020	31.0	24.0	38.2	44.4	34.4
18 May 2020	31.0	27.8	36.9	44.4	35.0
June 2020	29.4	22.2	36.6	42.5	32.7
July 2020	26.8	22.0	32.4	37.7	29.7
August 2020	29.0	23.6	36.0	42.2	32.7
Sept. 2020	28.4	21.0	34.1	39.3	30.7
Oct. 2020	26.1	21.1	33.1	39.7	30.0
Dec. 2020	27.0	24.4	32.5	37.7	30.4
Feb. 2021	29.2	21.7	38.9	40.3	32.5

Table 3. Statistics of ATT's newsletter performance per language compared to industry average 2021 [44]

	OR (%)	Bounce rate (%)	CTR (%)	Unsubscriptions/Successful deliveries (%)
Industry average 2021	17.7	–	2.0	0.2
Newsletter DE	25.7	1.3	4.1	0.6
Newsletter EN	21.5	1.7	1.8	0.6
Newsletter IT	36.1	1.5	6.9	0.4
Newsletter FR	37.8	0.9	6.6	0.6

The following content analysis was performed on the 40 identified top newsletters in order to understand which topics were considered as the most interesting and whether there was a difference depending on the language of the newsletter:

- The topics related to the links in the newsletter were listed, until saturation was reached.
- For each newsletter, the three most clicked links with their click rates (CR), and related topics were identified (note: images and titles have the same link in ATT's newsletter). As CR, it is here intended the percentage of clicks that a specific link in

the newsletter has received out of all total clicks of the same newsletter (the data is provided by Mailchimp).

- The position and type of these links were also analyzed (text, photo or video) in order to understand whether there was an incidence of the link’s visual characteristic, in other words, whether the most clicked links were those positioned on top of the newsletter and/or anchored to video/photo.
- For each language, the average CR of the most clicked links for each topic was calculated. The topics with the highest value were identified for each language.

4 Results

From the content analysis 19 topics emerged and are presented in Table 4. For each topic and for each language the average CR of the three most clicked links in the 40 newsletters analyzed is indicated. Highlighted are the three highest CR per language.

Table 4. Most clicked topics per language

Topic	Avg. CR of top 3 links DE	Avg. CR of top 3 links EN	Avg. CR of top 3 links IT	Avg. CR of top 3 links FR
Ideas Ticino (top to dos/must-sees)	29.6	33.1	35.8	39.9
Ideas Christmas				
Character Story	20.9	22.7	14.6	27.5
City-attraction excursion		23.1		
Nature: discover a place	22.2	15.3	17.4	17.1
Nature: excursion	19.1	20.8	19.9	21.5
Campaign: for hotels	24.3	32		28.2
Campaign: COVID-19-related	24.1	27.2	28.7	25.5
Campaign: create postcard				
Offer: discount on accommodation	25.7	20.9	16.5	21.7
Offer: families			15.6	
Food: recipes	17.6	27.1	13.7	
Products (magazine, poster)	18.1	23.4	26.9	17.2
Events	11.6	13.9	18.2	17.5
Sport: hiking	29.7		31.3	19
Sport: biking				
Sport: winter	30.9		22.8	27.2
Sport: trail running				
Sport: water		14.8		

In general, the topic “Ideas Ticino” (top to dos and must-sees) is the only one that had a high CR for all the languages: 29.6% for the German-speaking audience, 33.1% for the English-speaking audience, 35.8% for the Italian-speaking audience and 39.9% for the French-speaking audience. This type of content seems to be of interest throughout the different segments. With regard to the other topics, results show the presence of specificities for the different audiences divided by language in the interaction with newsletters sent by the DMO. In particular:

- For the German-speaking audience, the topics with the highest interest were winter sports (CR of 30.9%) and hiking (29.7%).
- For the English-speaking audience, the topics with most interest were those containing information about discounts on accommodation (32%) and COVID-19 related campaigns (27.2%).
- The audience indicating Italian as the language of interaction with the DMO showed a greater interest in content connected to hiking (31.3%) and information related to the campaign COVID-19 (28.7%).
- The French-speaking audience appeared to be interested in content regarding discounts on accommodation (28.2%) and the character story (27.5%).

It is also interesting to note that not all the topics appeared in the top three links of the different audiences. For example, content on city attractions was top content only for the English-speaking audience, while offers for families were top content only for the Italian-speaking audience.

Regarding the position of the most clicked content, the results suggest an incidence of link positions in the top news: the position might indeed influence users’ click behavior. Results show, indeed, that the content that was placed in the first part of the newsletter, and hence required less scrolling to be visualized, was clicked more than the content in the lower part of the newsletter.

5 Discussion

Several insights emerged from this study. First, there is a need for case studies in tourism email marketing: the lack of literature in the tourism domain demonstrates a need for more studies for comparisons and insights on the topic. While other topics might be perceived as more “trending” or new, the role newsletters play within the everyday activities of tourism destinations call for further attention and larger studies. Second, analyses over time allow to outline trends associated with segments grouped by specific variables, in this case by language factor. In fact, while language is the considered factor here, due to the concerned DMO’s practices, and due to an actual declaration of users themselves, it opens up insights on specific customers/prospects’ groups. The analysis might go further and explore the drivers that attract Italians to Ticino vis-à-vis of the ones, which attract people from northern Switzerland and Germany (or Austria), or those interesting for French travelers. Moreover, info needs might be somehow disclosed also through the proxy of language: for instance, one might assume that information about COVID-19-related regulations were quite clear to Swiss travelers/prospects, while others needed to understand if travelling internationally was still possible, and under

which conditions. Third, the actual choices related to content production and formatting can facilitate (or not) analytics. In this case, the presence of links that are divided by topic is a good way to facilitate the identification of preferences in the audience.

This study has implications also for personalization practices: such a research shows a good first step for audience segmentation and preferences' analysis in order to provide more personalized communication. The results show, indeed, that by segmenting your audience (in this case it was done according to the audience's language), different click behaviors can emerge which can be indicators of different preferences among the different segments. This study also has implications for the tourism industry: it shows the importance of implementing audience clusters in email marketing messages in order to make messages more personalized. The methodology used in this study can be applied to analyze and segment an audience, and to understand the content preferences of the different segments drawing from click behavior. This study could also be replicated using different explicit and implicit indicators for audience segmentation.

The study presents some limitations that set the stage for future research: i) the language factor is not representative of a specific region. Therefore, future research should also analyze results coming from the analysis of the country of residence to see if there are socio-cultural aspects typical of a specific region; ii) a comparison with other cases should be conducted in order to generalize results. Furthermore, having identified the 19 topics, it would be interesting to analyze who the specific audiences are for each topic. Studies on the title of the newsletters could also be conducted in order to understand whether there are different audience preferences in terms of title formats and length. Lastly, A/B tests will be conducted personalizing the content for different audiences in order to verify and validate the results of this study.

Acknowledgment. The work described in this paper was funded by the DESy (Digital Destination Evolution System) Interreg Italy-Switzerland Project.

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Using the Behaviour Change Wheel to Design an App to Change Tourist Behaviour and Increase Dispersal into Regional Areas

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Abstract. Currently, many tourism destinations are experiencing greatly reduced tourism due to COVID-19. In order to ensure that regions that wish to engage in tourism can share the benefits of it more equally, and to prevent the predicted future problem of overuse of popular areas once pre-COVID visitor numbers resume, an app to encourage tourists and leisure-seekers to change their behaviour and disperse into regional areas has been developed. The Behaviour Change Wheel was used to define the problem, find suitable intervention functions and design methods of delivery that could increase tourists' capability, opportunity and motivation to disperse farther into regions. The Huon Valley of Tasmania, Australia, was used as a research area. Our application of the Behaviour Change Wheel methodology determined that active engagement in logistic, value-based, and social information has the greatest chance of changing behaviour in this region and a list of Behaviour Change Techniques has been developed and considered in the design of a gamified travel app.

Keywords: Mobility · Behaviour change intervention · Gamification · Dispersal

1 Introduction

In the wake of ongoing lockdowns in Australia and border closures in the state of Tasmania, hospitality and leisure businesses in regional areas have become increasingly reliant on locals engaging in short intrastate tourism experiences [1]. Before COVID-19, tourist dispersal into regional areas had already been identified as a goal of many tourism destinations [2] and posited as a behaviour that could reduce overcrowding and enhance sustainability [3]. However, barriers to this goal are that tourists may not be aware of the value of local regional areas, nor engage in learning about what nearby areas offer.

To combat this, we set out to determine whether we could design an app, built upon the Tourism Tracer technology [4], that would encourage behaviour change using gamification, thus increasing dispersal throughout the Huon Region of Tasmania.

Gamification refers to the use of game elements in non-game contexts [5]. These elements can be minor additions, such as loyalty points, or be experienced as full-fledged games, and they have been used to enhance experiences, retain engagement,

and change behaviour. Gamification has been found to generally provide positive results in a meta-review of studies, however, it was most likely to have a neutral or negative effect when researchers were attempting to change user behaviour [6]. This unreliability is generally contributed to poor design that utilises generic points, badges and leaderboards, rather than thoughtful and user-centred design [7]. The former approach means that gamification is relegated to an extrinsic reward system, that can only motivate users' participation so long as they are invested in the rewards, it fails to intrinsically motivate or to solve problems that could lead to change [8].

Gamification technology has been used increasingly often in tourism, although so far the major focus of its implementation has been in experience enhancement within specific destinations, rather than behaviour change [9], the goal of behaviour change via interventions is not new to tourism research and practice. There are a plethora of studies that seek to change tourists' behaviour, ranging from those which use nudge theory to change the environment around tourists to reduce friction and move them towards behaviours such as reducing plate wastage [10] through to those which use the Theory of Planned Behaviour and Value-Belief-Norm Theory to understand factors that contribute to tourist intention and thereby design interventions to elicit environmentally friendly behaviour such as reduced littering in marine protected areas [11]. Likewise, in Gamification studies, Self-determination theory [12] is commonly used to explain how activities can meet individuals' motivational needs and this model is used to design interventions that change behaviour [7].

These frameworks can all be effective in appropriate contexts, however they can also be poor predictors of behaviour in tourism and leisure contexts [13] and methodologies based on them can be poor mechanisms for behaviour change [14, 15]. The inconsistency of results when utilising designed interventions can be explained by the limitations of each theory; Michie, et al. [16] identified in a systematic review of behaviour change theories that no single framework existed that considered all possible influences on behaviour, or all intervention and policy techniques, and that many theories had components with overlapping definitions, making it difficult to select an appropriate theory in many contexts, or to reproduce results across studies.

In response to this, Michie, et al. [16] created the Behaviour Change Wheel (BCW) from an amalgamation of elements from nineteen behaviour change frameworks which were found to be comprehensive, coherent, and grounded in a behaviour theory. The BCW walks users through the process of designing behaviour change interventions from identifying the problem to selecting effective interventions, to choosing best methods of delivering interventions and allows comprehensive evaluation. Arguably, the advantages the BCW has over methods created within single behaviour frameworks are that it is comprehensive, and therefore able to be used in broad contexts [16], meaning that the risk of choosing a framework that does not consider a factor that is significant in tourism contexts is absent and it is systemised, and therefore no steps in the evaluation process can be missed.

The BCW was designed within health research and has mostly been used within health contexts to address patient and carer practices [17]. It has also become increasingly common in contexts regarding environmental concerns like energy conservation [18] and to promote physical activity [19], however using it within the

tourism industry, and to design behaviour change interventions to promote tourist dispersal, is a novel test of the methodology.

Due to the novelty of using gamification in a tourist dispersal context, and the evidence that selective and context-specific design is necessary for successful behaviour change, a comprehensive methodology was necessary to design a gamified intervention system with the prospect of changing behaviour and dispersing tourists. Given that the BCW has been designed to identify and apply methods to encourage behaviour change, and is designed for application in a broad range of contexts [20] it was considered appropriate for application in tourism and this study. To date, BCW has, to the authors' knowledge, not been applied to tourism. The goal of this paper is to outline and critically assess the potential for the application of BCW to a tourism context.

2 Methods

The Behaviour Change Wheel methodology was employed to identify techniques to change behaviour and app components were considered that could administer these techniques. This study intends to use these designed interventions as a new frontend to the already existing Tourism Tracer Technology [4]. This app collects the GPS and survey data of participating tourists, allowing for fine-grained spatiotemporal analysis of tourist mobility, informed by tourists' demographic and preference information [3]. This mixed-methods data has the potential to measure dispersal and attitudes towards the interventions in real-time.

2.1 BCW Methodology

The BCW methodology contains three stages: the first involves defining the central behaviour that requires change, and the components of that behaviour that are potentially powerful targets for creating change. The BCW uses the COM-B behaviour system to define these components. COM-b stands for Capability Opportunity Motivation [leads to] Behaviour. COM-b is a system that was created by Michie, et al., in 2011 in response to their initial evaluation of nineteen behaviour change intervention models [16] it was developed to synthesise and simplify their categories of factors that influence behaviour. Physical and psychological capability, physical and social opportunity, and reflective and automatic motivation are all components that this system uses to clarify the drives behind a behaviour, and it is understood that each behaviour will be the result of a web of these components influencing one another, and in turn influencing behaviour. In the second stage, broad intervention functions such as 'training' and 'modelling' are identified and in the third stage, relevant techniques and ways of delivering them are matched to the intervention function and the situation.

Stage 1: Understand the Behaviour

Step 1: Define the problem in behavioural terms. Defining the problem as a behaviour helps designers clarify the 'who' 'what' and 'where' of the problem.

Step 2: Select the target behaviour. In this step a list is developed of all potential factors that could contribute to the problem behaviour and analyse them for a) level of impact b) likelihood of behaviour change and c) spill over to other behaviours.

Step 3: Specify the target behaviour. The context of the highest priority target behaviours are clarified so that the most appropriate point of intervention can be found.

Step 4: identifying what needs to change. This step involves using the COM-B model. The COM-B model assumes that all components have some effect on behaviour, however this step finds components that will be most effective at changing the target behaviour. It is not relevant, for instance, to create an intervention that increases motivation to travel to regional areas if tourists are already eager to go, but are physically incapable. In that case, interventions that bridge physical difficulties would be necessary.

Stage 2: Identify Intervention Options

Step 5: Identify intervention functions. Intervention functions are broad categories of ways in which behaviour can be changed: an intervention based on training will be different to an intervention based on incentivization. The BCW has already identified which COM-B components are effectively targeted by which intervention functions.

Step 6: Selecting Intervention functions. In this step, the APEASE criteria (Affordable, Practical, Effective, Acceptable, Safe and Equitable) is used to select the intervention functions are most practical and ethical to focus on. The APEASE criteria was developed 2014 by Michie et al. to be used as a simple evaluation tool within the BCW [21]. This study used functions only if they met every point of the APEASE criteria.

Stage 3: Identify Content Options

Step 7: Identifying Behaviour Change Techniques. Using Michie, et al.'s *Taxonomy of BCTs* [22], Behaviour Change Techniques (BCTs) are identified that have been found to link to the intervention functions selected.

Step 8: Determine mode of delivery. Once BCTs have been identified, we can design app features that use them.

3 Results

3.1 Stage 1: Identify Tourists' Behaviour

We identified the problem of regional tourism as: Tourists and local leisure-seekers tend to either go to iconic locations and stay on major touring routes or not leave Hobart.

And our Intervention aim: To encourage them to disperse to more diverse locations and regional areas.

Thirty-two factors were identified that impact this behaviour. The factors that were chosen related to issues such as knowledge of the region, perception of risk, time, money, travel group, peer referrals, social media influence, marketing, weather, ability to travel, physical ability and personal preferences. These were chosen based upon the authors knowledge of the tourism industry in Tasmania [23], the authors' previous research into factors that influence dispersal in Tasmania [3] and research conducted by others authors into factors which effect behaviour such as weather [24, 25] and digital connectivity [26]. Focusing only on factors rated with a high level of potential impact, high likelihood of potential behaviour change, and high level of potential to spill over to other behaviours reduced our list to a small number of promising behaviours to target. Some behaviours, such as perceiving lower ability to mitigate bad weather in regional areas, are accurate assessments, so there is a low chance of changing that behaviour, nor is it reasonable to expect tourists to continue into regional outdoor areas on days where the weather is severe. In other cases, such as tourists lacking adequate transport, the potential impact would be high if we could change it, but it is outside of the scope of this study.

Three target behaviours were found that had promise to change this behaviour, and which were within the scope if this **study**:

1. **Access and engage in logistical information on regional locations:** To visit regional areas, tourists and leisure-seekers must be aware of the locations, and the distances and difficulties associated with travel to them. If we can develop the behaviour of exploring and planning with this information in individuals who were not previously, it has potential to increase dispersal to these areas.
2. **Access and engage in information that raises the perceived value of regional locations:** Besides knowing about locations and how to get to them, tourists must also widely value a location to visit it in significant numbers. If we can develop the behaviour of engaging with a) information on which regional locations are attuned to a personal interest, or b) a new goal system within a game that raises the value of a location, it has potential to increase dispersal to these areas.
3. **Access and share social information on regional locations:** Learning where others have gone and seeing recommendations from others for new areas as well as sharing information about their own trips are behaviours that can raise the interest and decision making of tourists. One tourists public demonstration of having gone to and enjoyed a regional area could also be useful in changing the behaviour of others.

For all three identified Target Behaviours, the contexts were similar. These behaviours are principally enacted in the planning phase of a trip, although they could also potentially be engaged in while on a trip in the region to add extra stops. The exception was the sharing of social information which can be done in the post-trip reflection stage. All Target Behaviours can be done alone or as a group of travelers.

Next the COM-B components were analysed. These were found to be same for the three target behaviours: the app should change the psychological capability, the social opportunity, and the reflective motivation (Table 1).

Table 1. COM-B component analysis of target behaviours

COM-b model components	What needs to happen for the target behaviour to occur?	Is there a need for change?
Capability Physical	tourists must be able to access and consume information about locations and reasons to visit them	No: it is reasonable to expect tourists are psychically capable of finding and reading information in vast majority of cases
Capability Psychological	Tourists know where to look to access information, remember and consider possibilities, and make travel decisions that include regional locations	Yes: it is currently easy for tourists to miss seeing regional tourism information, or to forget it in the face of more constant highlight marketing
Opportunity physical	Tourists must have a device and internet access, or equivalent physical resources to access information	No: it is reasonable to expect tourists have internet access and/or access to tourism marketing and books
Opportunity Social	Tourists must be in a similar mind to travel party members to seek out information and make travel decisions together or be inspired to seek out information by social interactions that raise their interest	Yes: information accessed should motivate anyone in travel party, not just seeker, and information should not be accessed in a way that pulls the user out of the moment and away from socialising on a trip [27]
Motivation reflective	Tourists must be interested and engaged by the process of learning about travel to regional locations and want to seek out the information	Yes: Tourists do not currently know where to find this specific information, and it is often packaged in a more complicated and boring way than highlight marketing

3.2 Stage 2: App Intervention Options

This combination of components corresponded to every intervention function, however in an APEASE review, ‘Restriction’ and ‘Coercion’ were not considered as candidates as they are not acceptable or safe, and ‘Environmental restructuring’ was discounted for being impractical and potentially unacceptable for environmental damage. Therefore, ‘Training’, ‘Modelling’, ‘Enablement’, ‘Education’, ‘Persuasion’ and ‘Incentivisation’ were the selected Intervention Functions.

3.3 Stage 3: App Content

Using the intervention taxonomy [22] corresponding BCTs were found and analysed for appropriateness in the tourist context. For this, the APEASE criteria was used again.

As tourism is an innately hedonic activity, interventions were considered appropriate if they added, rather than detracted, from playful and escapist behaviours. therefore “6.1 Demonstration of the behaviour”, which requires watching and learning

rather than participating, was considered an ineffective intervention in this context while “Identification of self as role model” does meet a common need of travellers to gain pleasure from proving competence in an unusual arena [28] (Table 2).

Table 2. Target behaviour change techniques

Target BCT	App element equivalence	Review with APEASE & target behaviours
1.1 Goal setting	Mechanic to view info on locations and accept them as quests	Simplifies acting on new knowledge and raises value
1.2 Problem solving	Info screen on locations includes what users need to bring (i.e. protective clothes and water if outdoors)	Raises knowledge
1.4 Action planning	Suggest pre-planning of trips and rearrangeable accepted quests to help tourists plan an itinerary	Simplifies acting on new knowledge and raises value
2.2 Feedback on behaviour	Statistics/badges for locations visited by type	Raises value of visiting locations
2.3 Self-monitoring of behaviour	Screen: travel map that shows progress	Raises value and knowledge of locations
2.7 Feedback on outcomes on behaviour	Information on help given to small businesses	Not effective (impact is small, separate from own goals of enjoyment)
3.1 Social support	Promote travel-party to work together with group-friendly challenges	Raises social satisfaction and value
4.1 Instruction on how to perform a behaviour	App tutorial: popup explanations	Raises knowledge
6.1 Demonstration of the behaviour	App tutorial: video/walkthrough	Not effective (uninteresting)
6.2 Social comparison	Users may plant virtual trees in locations where they have completed challenges, other users can see which locations are widely visited by tree counts	Raises social satisfaction and knowledge
6.3 Information about others' approval	Allow comments/reaction to users visiting new places	Raises social satisfaction
7.1 Prompts/cues	Map where all are visible + suggestion popups when close	Raises knowledge
10.3 Reward (self, social or material)	Extra activities in locations/collection of apples from planted trees	Raises value of places

(continued)

Table 2. (continued)

Target BCT	App element equivalence	Review with APEASE & target behaviours
12.5 Adding objects to the environment	QR codes, caches to find	Not practical or acceptable: cannot add to public spaces/parks
13.1 Identification of self as role model	If users ‘plant a tree’, they can help other players gain more seeds, will be told how many players have picked from their tree	Raises social satisfaction
13.2 Framing and reframing	Give users challenges/things to identify and collect in locations to reframe reason for going	Raises value of places
14.5 Rewarding completion	Reveal new goals/locations after they have been to enough locations, and gained enough clues to solve puzzle	Raises value of places
15.3 Focus on past success	Remind of results of previous days using app with maps/result updates	Not effective (users may not be capable of going to region again - e.g. tourists)



Fig. 1. Prototype designs of app elements.

4 Discussion

This study used the BCW methodology to design a gamified app with interventions aimed at changing tourist and leisure-seeker behaviour to disperse into regional areas at a greater rate Fig. 1. BCW has been designed to apply to a broad range of contexts [21] – however, the vast majority of its uses so far have been in health and medicine [17].

The application of the BCW makes significant contributions to tourism research. This is the first time that the BCW has been applied to a hedonic context (tourism). As a result of this, our research has augmented a suite of behaviour change techniques applicable to hedonic environments that can be used by future tourism researchers.

Practically, this research project has developed an app that can be used in other tourism destinations. Its application in Tasmania will assist in dispersing the benefits of tourism beyond 'hotspots', and the gamified aspect of the app will arguably enhance the tourism experience in Tasmania and beyond.

In applying the methodology to tourism, it did prescribe some ineffective Behaviour Change Techniques, and some had to be reconfigured to be more in line with a game element rather than a health intervention. This may be because the ultimate goals of the users are significantly different from the original context of BCW use. In some health interventions, there is a presupposition that the user wants and benefits from the outcomes of the behaviour change but the behaviour is too boring, tedious, or forgettable to incorporate in daily life without intervention, while in the context of dispersal, the intended outcome most benefits area stakeholders and the environment [29]. However, the methodology exhibited advantages, as it allowed for a systematic examination of the process of designing interventions to increase dispersal throughout a regional area, from problem identification to promising content identification in one methodology.

We found BCW had another advantage over more traditionally used tourism behaviour theories such as the Theory of Planned Behaviour: there has been evidence of an attitude-behaviour gap in tourist behaviour [30] which means that tourists with pro-environmental or social attitudes will still act in self-serving ways on holidays where they are hedonically motivated [14]. By giving equal consideration to all possible influences on behaviour as potential targets, BCW has a level of flexibility that makes it a useful methodology in various circumstances, including tourism, where more hedonic, less commonsense influences can be rated as more impactful.

This process also made it evident that there are many factors inhibiting regional dispersal in which an app cannot intervene. Time constraints, increased dangers associated with remoteness, transport access limitations and undeliverable personal preferences are all factors affecting tourist movement into these areas that this study cannot influence. Future work with a larger scope could work with policymakers and providers to influence some of these, however others, such as time constraints for tourists on fixed schedules are unavoidable impediments.

For tourists and leisure-seekers without these impediments, we found the most promising behaviour to target is their engagement with information, whether logistic, value-based or social. We used Behaviour Change Techniques to design the most engaging method within our limitations to raise people's capability, opportunity and motivation to engage with information on regional areas, and use it to plan trips. With these component prescriptions, an app was prototyped for the Huon Valley Region of Tasmania, Australia.

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Exploring “Planned Serendipity” and On-site Information Behavior on Smartphones

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Abstract. The paper explores tourists’ smartphone-related information behavior on site in light of the concept of “planned serendipity”. The ability to gather information at anytime and anywhere can deeply influence tourists’ behavior, their information needs and the outcomes of their travel plans. In this study, the concept of planned serendipity is used to suggest that the outcome of travel information behavior on site is not entirely planned nor entirely serendipitous. The study employs the Experience Sampling Method (ESM) in combination with qualitative interviews, which allow the researcher to gather data both during the participants’ trip and afterwards. The thematic analysis resulted in four main themes related to information search connected to smartphone use: flexible plans; orientation in time and space; specificity of the query; aiming for optimization. Such conditions result in planned serendipity. The study thus contributes to the conceptualization of planned serendipity as an outcome of smartphone use during travel for information purposes.

Keywords: Smartphones · Planning · Serendipity · Experience sampling method

1 Introduction

With their portability and constant connectivity, smartphones have a great influence over tourists’ on-site information behavior. Mobile technologies have changed the way tourists plan their trips, highlighting the importance of research into unplanned behavior [1]. Gretzel, Zarezadeh, Li and Xiang [2] have called for theoretical advancements that can take into account new and emerging technologies. Mieli and Zillinger [3] suggested that tourists approach travel planning in a new way that goes beyond the juxtaposition between planning and serendipity, and called it “planned serendipity”.

The body of research about information behavior during the on-site stage of the trip is also much smaller than on pre-trip information behavior. In part, this is due to the lack of appropriate methods to investigate the on-site stage of the trip. A large amount of research on tourist information behavior is conducted with quantitative methods, and the use of qualitative methods is limited on the subject. The present study aims to fill these gaps in the literature by investigating how such planned serendipity occurs during the trip and how it is enabled by smartphones. The method employed is a combination of Experience Sampling Method and post-trip qualitative interviews.

2 Literature Review

The use of smartphones during travel has been a popular object of research in the past two decades. Tourists use smartphones during their trips for information search, mainly for transport, accommodation, food and activities, as well as for inspiration and ideas about their destination [4]. Information behavior during travel is particularly affected by the constant connectivity that smartphones afford: tourists can find information anywhere and at any time. Mieli and Zillinger [3] have noted the change in information needs throughout the different phases of travel and that several information needs have been postponed to the on-site phase and closer to the moment of consumption.

Some studies have suggested that different types of information are sought at different stages of the trip [4]; others that the information search process is hierarchical, and choices that are highest on the hierarchy are typically made before the trip while others, lower in the hierarchy, are made later [5]. Pre-trip and on-site decisions also have different characteristics: while the former are more reasoned and require more information processing, the latter are described as free-spirited and light-hearted [4]. On-site information search, however, is an important part of the tourist experience, increasingly so thanks to mobile technologies and the lowering of data roaming prices [6]. Kang, Jodice and Norman [4] have shown that tourists may prefer not making decisions beforehand to keep their plans flexible and decide based on what circumstances and new information they encounter during their trip.

In information studies, serendipity refers to the fortuitous encounter of relevant information while not specifically looking for it [7]. In tourism, the concept of serendipity has only been used in few instances, for example in relation to independent tourists' preference between structure and serendipity in their travels [8]. Mieli and Zillinger [3] used the term in the phrase “planned serendipity” to indicate the existence of degrees of serendipity even in structured plans and, vice-versa, the constant planning that is enabled by smartphones, which introduces some elements of planning and information search even in the most spontaneous decisions.

Research has called for the explicit inclusion of unplanned behavior in theories of tourist behavior [9] as well as new methods to explore tourists' interactions with technology [2].

3 Methodology

The study was conducted with a hybrid methodology, which combined questionnaire data collected using the Experience Sampling Method (ESM) with qualitative interviews. ESM is a method that consists of sending participants several mini-questionnaires throughout the day. In this case the method was applied to gather self-reports from tourists during their trip, as they went about their tourist activities. The Experience Sampling Method allows to capture people's experiences at a time as close as possible to when they actually happen, in order to ensure ecological validity and get access to the lived experience of events and everyday life [10].

15 people were selected to participate in the study. The criteria for selection of participants were the following: born in the 1980s and 1990s, have attended or are

attending higher education and planning to take a trip which included at least three nights away. Age and education level would ensure participants who had traveled both with and without smartphones and who would spend more time looking for travel information [11]. Participants were selected to include different types of travel, including: backpacking, visiting friends and family, city break, road trip, event travel, family vacation, seaside vacation.

During the trip one or two questionnaires per day were sent to participants' own smartphones through a dedicated application. Questions focused on what respondents were doing or feeling at the time of the notification. Since respondents answered several ESM questionnaires per day, the total number of questionnaires collected is 93. After the trip, the follow-up semi-structured interview departed from participant's ESM answers and aimed at broadening, deepening and clarifying them. The data was analyzed qualitatively. A thematic analysis was conducted following the general principles of grounded theory [12]. ESM answers were also organized in a spreadsheet to identify possible patterns that could be explored further in the interviews.

4 Findings

The preliminary analysis of the data resulted in four themes about smartphone-related on-site information behavior: flexible plans; orientation in time and space; specificity of the query; aiming for optimization.

4.1 Flexible Plans

Before the trip, 12 out of 14 participants had booked accommodation, while the other two were either backpacking or on a road trip and only booked a few of their stays in advance. As for activities, most respondents had a rough pre-trip plan, a general idea or a list of things to do. In most cases, detailed daily plans were made on site, either the night before or on the same morning. While most had a general idea of what to do, decisions on when to do it was left until later. These data show that on-site planning and information search are very important elements of the tourist experience and support the claim that information needs are postponed from the pre-trip stage until a later stage of the trip [3].

During the on-site stage of the trip participants were flexible: the ESM data showed that only 23% of the times they had made plans and they had not changed. Mostly, plans were flexible (43%), they had changed (18%) or there was no plan at all (16%).

4.2 Orientation in Time and Space

The search process on site often consists of orientation in time and space. Participants reported using their smartphones to find out what was around them and where they could go next. On the other hand, some respondents also complained that they do not learn how to orientate themselves in the destination, because they have constant access to location-based services. Participant 8, for example, compared her orientation skills to

previous trips when she did not have online maps on her phone and would need to use a paper map. While she used to be able to learn the general layout of a city by the second day, now she cannot do that anymore and blames the smartphone for it.

4.3 Specificity of the Query

A phone search for information differs from using other sources (guides, book, brochures, information centres) in that the person needs to look specifically for something, they need to know what they want and what to look for. This makes the information search more intentional and specific, narrowed to what the tourist already knows they should be looking for. Information is not encountered casually or serendipitously but specifically sought out. Such specificity of the information search has important consequences for the serendipitous element of information encounter: it reduces the possibility to find pertinent information by chance.

4.4 Aiming for Optimization

Optimizing a trip is possible thanks to constant access to information as well as location-based services. Several participants reported using their phones to find the most optimal routes, to make their use of their time most efficient but still keep flexible enough to enjoy the destination with some degree of spontaneity. Plans can be made on the same day based on weather conditions, food can be found nearby as soon as one gets hungry, and there is no need to get stuck in traffic when live information is available about road conditions. Getting lost can be avoided thanks to the possibility to consult one’s own position on a map at any time, distances are estimated to make the most out of each day. The possibility to “spontaneously” double-check every piece of information encountered during the trip was seen as increasing spontaneity during the trip by some participants, while others believed it instead decreased spontaneity.

5 Discussion and Conclusions

This paper investigated how tourist information behavior on site can be better understood through the concept of planned serendipity. From the analysis emerged some of the conditions enabled by the smartphone, which can result in planned serendipity in the tourist experience. The use of an innovative method like the Experience Sampling Method allowed the researcher to get access to tourists’ experiences during the trip, even the smaller and given-for-granted actions performed on smartphones, which would not be recalled in an interview after the trip. Through ESM, a more detailed and accurate account of behavior and perceptions on site could be gathered.

Planned serendipity was conceptualized here as the outcome of tourists’ information behavior, when there is a strong element of serendipity in trip planning and, vice-versa, some level of planning even in spontaneous behavior. This is enabled by mobile phones and their constant connectivity, which allows tourists to collect information anywhere and at any time. This technology and the possibilities it affords in turn influence tourists’ behavior, which becomes more and more reliant on mobile

technologies and constant information search. Four conditions connected to smart-phone use on-site were identified: flexible and iterative planning process; orientation in time and space; specificity of the query; aiming for optimization. The combination of these conditions results in a tourist experience that is not entirely planned nor entirely serendipitous, hence it creates planned serendipity.

The study also has managerial implications. DMOs and other tourist destination marketers can benefit greatly from gaining a better knowledge of tourist behavior on site, especially when it comes to the importance of on-site promotion: for example, the design of smart destinations, the creation of hubs of information, the use of the Internet of Things (IoT). Marketing strategies in the pre-trip stage can also benefit from knowledge on tourist behavior on site.

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Understanding Hotel Employees' and Guests' Perceptions of Smart Hotels Using Q Methodology

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Abstract. Nowadays, hotels are adopting high technologies to improve the quality of their facilities and services to build competitive advantages. Although smart hotels are an emerging trend, no known studies have investigated hotel employees' and guests' perceptions of this kind of hotel. This research will investigate how hotel employees and guests perceive the benefits and drawbacks of smart hotels using Q methodology.

Keywords: Smart hotel · Q methodology · Perception · Hotel guest · Hotel employee

1 Introduction

A smart hotel is “an intelligent hotel with a range of information technologies working together to let the guests have an honorable and convenient vacation environment” [1] (p. 42). Different technology innovations, such as service robots, Artificial Intelligence (AI), and the Internet of Things (IoT), have been implemented by certain hotels to enhance customer experiences. Opened in December 2018, Flyzoo Hotel in China is the world's first full-featured smart hotel that allows customers to enjoy its intelligent experience and facilities. Hilton Hotels have collaborated with IBM and used an AI robot, Connie, to provide guests with concierge service and travel suggestions. Hôtel Monville in Montreal is the first hotel in Canada using autonomous delivery robots for room service. As hotels adopt high technologies to improve the quality of their facilities and services to build competitive advantages, smart hotels are an important trend to watch out for.

Although smart hotels are an emerging trend, no known studies have investigated hotel employees' and guests' perceptions of this kind of hotel. Hotel employees and guests are two important stakeholders for a hotel. The stakeholder theory reveals that business operation needs to balance the benefits of every related group [2]. From a managerial perspective, the stakeholder theory shows that managerial decision-making will be influenced directly by the various groups [3]. Therefore, there is a need to understand how hotel employees and guests evaluate smart hotels, which will impact the development and adoption of technologies in hotels.

Q methodology is a qualitative research approach to explore attitudes, beliefs, and opinions of different stakeholders. This research method is especially useful for understanding new phenomena [4]. It analyzes shared subjectivity among people based on inter-correlated and factor analysis, resulting in several potential factor solutions. The Q-factor analysis can cluster participants into different groups and have insights into the relationships between the characteristics of the participants and each factor [5]. As “a method for the scientific study of human subjectivity” [6] (p. 12), Q methodology has been widely used to explore different stakeholders' subjectivity, such as visitors' and locals' tourism experiences [7] and Chinese and Canadian perceptions of photographic images of travel destinations [8].

The goal of this research is to understand hotel employees' and hotel guests' attitudes towards smart hotels. The Q methodology will be used to understand employees' and guests' perceptions. This study will answer the following research questions: (1) What are the benefits and drawbacks of smart hotels from the perspectives of hotel employees and guests? (2) What is the typology of the smart hotel employees and smart hotel guests? (3) What are the characteristics of each group?

2 Methodology

To conduct a Q methodology, the first step is to develop Q-sort statements (Fig. 1). This research has reviewed the literature related to people's perceptions of smart hotels, including perspectives from both hotel employees and guests. There are pros and cons associated with smart hotels. Smart hotels can shorten customer waiting times [9], provide seamless experiences [10], enhance service quality [10], and improve service efficiency [11]. However, others have argued that smart hotels lack personal interactions, raise privacy issues, and have potential technological failure [12].

In addition, hotel guests' reviews on the smart hotel, including Flyzoo Hotel, Hôtel Monville, and Hilton McLean in Virginia (Connie), will be analyzed to further develop Q-sort statements. Choosing these three hotels is because they have a good number of guest reviews on TripAdvisor and Booking.com. It will allow researchers to collect adequate data to further understand guests' attitudes towards the smart hotel. Additionally, in-depth interviews will be conducted to understand hotel employees' and residents' perceived benefits and drawbacks of smart hotels. A total of 15 hotel employees working at a smart hotel and 15 hotel guests who have stayed in a smart hotel will be invited to an interview. The transcripts will be analyzed in NVivo to add or revise the Q-sort statements derived from the literature review and content analysis. It is estimated that this research will develop around 30 statements.

The Q-sort statements are the concourse of the attitudes of both hotel employees and guests. For example, hotel employees may be more likely to judge the smart hotels regarding maintenance and work replacement, while hotel guests may focus on the aspects of excitement and fun. The statements in this research will include both different views of employees and guests. It will allow researchers to better understand how employees rate the benefits that smart hotels could bring to the hotel guests. It will also give insights into how hotel guests evaluate how the technology can benefit hotel employees.

In the data collection, participants (i.e., hotel employees and hotel guests) will be asked to rank the Q-sort statements based on their agreement levels (Fig. 2). And then, a post sorting interview will be conducted to understand why participants ranked the statements in that way and their attitudes towards smart hotels. In addition, the demographic information of the participants will be collected. As a large sample size may negate complexities and slight distinctions, 80 is deemed a valid number. Therefore, this research will recruit 40 hotel guests who have stayed in a smart hotel and 40 hotel employees who worked in a smart hotel.

Data will be analyzed in PQMethod to compare the different factor solutions. The most appropriate factor-solution will be selected based on correlation matrix, the total variance explained, and the number of subjects that loaded on factors [5].

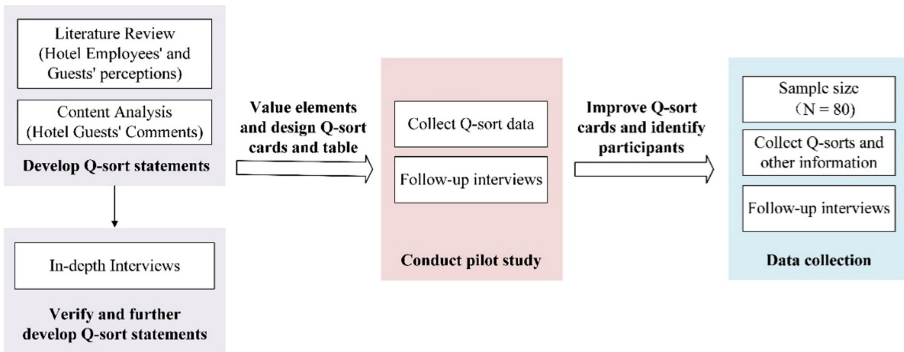


Fig. 1. Data collection process

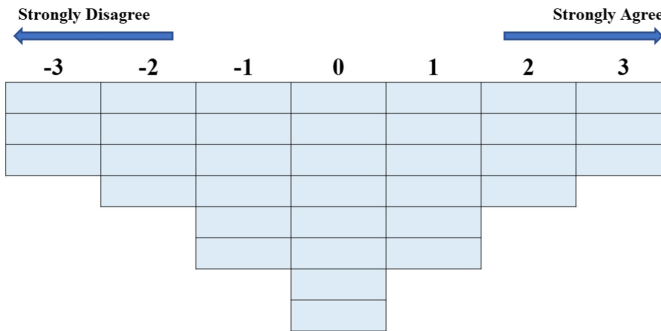


Fig. 2. Fixed distribution used for the Q-sort statements

3 Expected Results and Contributions

First, this research will summarize the benefits and drawbacks of smart hotels from the perspectives of hotel employees and guests. Second, the typology of smart hotel employees and smart hotel guests will be developed. Third, the characteristics of the employees and guests will be analyzed along with the typology.

This research will give insights into the benefits that hotel guests most value. Since building or converting to a smart hotel is costly, both hotel employees' and guests' perceptions will have implications for the development of smart hotels. Additionally, the perceptions will be categorized into several factors based on Q-factor analysis, resulting in a typology of perceptions. Additionally, the characteristics of the participants loaded on the factors will give insights into how to better attract potential smart hotel guests and mitigate hotel employees' potential resistance to smart hotels. The benefits that perceived across different groups will shed light on marketing strategies and human resources practices: These benefits could be advocated in marketing messages for customer acquisition or embedded in training materials to enhance employees' support for smart hotel features (e.g., service robots, AI, and IoT).

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Business Intelligence and the Public Management of Destinations: The View of DMOs

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Abstract. Business intelligence (BI) has become a priority for destination management organizations (DMOs) that have implemented solutions to improve their decision-making and data management processes. However, not all BI initiatives have fulfilled the expectations. This paper presents an analysis of a series of interviews with DMOs in Spain, offering a snapshot of their satisfaction with BI and the relationship between these applications and decision making at destinations. The results suggests that one of the reasons for failure is the lack of understanding of the critical factors that define the success of BI applications. Moreover, the findings offer a novel vision of how destinations are progressively leveraging the opportunities that advanced data analysis offers, but also reveal why managers find manifold difficulties in implementing these systems. These results pose several implications for DMOs.

Keywords: Business intelligence · Smart destinations · DMOs · Data

1 Introduction

The number of digital processes carried out in tourism has expanded enormously, and the amount of data collected about visitors has equally grown [1, 2]. This new environment requires a wide range of analytical skills and capacities in DMOs. In response to the increasing demand for customized information services, many DMOs have turned to business intelligence (BI) applications to improve their decision making. The use of the BI is widespread among most sectors [3, 4], and particularly among destinations, which employ BI today for a better understanding of demand and the changing trends in the market. However, advanced uses of BI tools are still limited. In research, there also appears to be insufficient attention given to the use of BI by destinations, its constraints and the advantages linked to their adoption. The use of intelligent systems is a key issue for destinations in their digitization process, in their transformation towards SDs [5, 6]. Hence, the purpose of this exploratory study is to better understand how public destination managers are using intelligence for decision-making. Likewise, this study aims to identify the utility and uses of BI tools and data by DMOs.

2 Literature Review

2.1 The Concept of Business Intelligence (BI)

BI has been defined as the technologies, applications, and processes for gathering, storing, accessing and analysing data for purposes of making better decisions [4, 7]. In addition, BI can be defined as a system comprised of both technical and organizational elements that presents historical information to its users for analysis and enables effective decision making and management support, for the overall purpose of increasing organizational performance [8]. In this paper BI is defined as a system comprising technologies, tools and software that enable an organization to gather data from numerous sources in the business and destination environment and then using technology to store, process, analyse and retrieve that data [7]. The implementation of BI systems initially demands a significant investment, but there are many benefits that organizations can take advantage of as well. Initially, BI reduces IT infrastructure costs by eliminating redundant data mining processes. BI is also seen as saving time for data providers and users through more efficient data delivery. Successful BI can represent the achievement of benefits such as improved profitability, increased efficiency, and reduced costs.

2.2 BI and Decision-Making in Tourist Destinations

BI systems allow to store data related to tourists' profile, experiences, places of origin, destination options and activities in which they may be interested [2, 3]. Thus, tourism organizations may plan in advanced to improve their services for tourists based on their preferences. Several authors provided clear evidence that BI systems improve the competitiveness of destinations by supporting managers understanding of tourists' behaviour and their perceptions [2, 9].

In the specific aspect of the competitiveness of destinations, it seems that, to some extent, this depends on the capacity of the territory to access enriched data and generate new content to improve its performance as a dynamic ecosystem [1, 10]. In this regard, the advances in public management of destinations through data analysis is one of the great premises of smart tourist destinations (SDs). Data-based intelligence has gained relevance in recent years thanks to the institutional drive around SDs [5]. Most of the mentioned authors, however, recognize a lack of understanding on the use of BI by destinations. Generally, these platforms are not capable of systematically integrating data from different sources or processes and, therefore, hinder the development of cross-process analyses that allow the achievement of complex and competitive data warehouses.

3 Methods

Based on the research objectives, four in-depth interviews were carried out with technicians and managers of Spanish tourist destinations, all engaged in the implementation of smart destination strategies, use of BI platforms, data management and

informed decision-making. The interviewees work for DMOs of two urban and two coastal destinations and have more than 10 years of experience each in leadership roles within their organizations. The interviews took place online, with an average duration of 35 min, being recorded and transcribed after obtaining permission from the participants. For data analysis, a thematic analysis was carried out following the guidelines established by Braun and Clarke [11]: in-depth reading of the transcripts; initial development of the main themes identified; modification, merging and elimination of topics as the analysis with the largest amount of data develops; establishment of final categories; classification of text extracts in the definitive topics.

4 Results

As follows, we present the main results based on the themes identified in the conducted interviews. Participants' names have been removed to preserve anonymity.

Destination Idiosyncrasy and DMO's Roles

Findings indicate that each DMO is subject to different factors that influence their approach to data management. Decision-making processes are unique in each destination and so are the employed data analysis systems. In this regard, the budget and volume of tourism business at the local scale seem to condition the relationship between businesses and DMOs when it comes to data provision. Moreover, data collection is also marked by the size of the floating population, which implies a higher degree of complexity in gathering and analyzing data. Destinations acknowledge that visitors can bias the conclusions obtained from residents' data and vice versa, which is a challenge for them and makes choosing the right BI platform even more important.

Data Usefulness

Participants argue that destinations' use of BI is driven by their main objectives when employing data: destination promotion and positioning, market segmentation, events organization or tracking competitors. A lack of long-term planning strategy when using data is detected, as short-term marketing strategies seem to prevail in their projects. Mobile and social media data have become more important to conduct such projects.

“Social media and behavioral data are helping us a lot in strategic decisions [...] We used to struggle a lot to get those data through face-to-face surveys.” (P2)

Data come from traditional sources (such as statistical institutes), but increasingly from accommodation platforms, metasearch engines, social media, etc. Expenditure continues to be the most complicated data to obtain. To overcome these difficulties, some destinations collaborate with scientific experts, who can help them in analyzing certain types of complex data. Therefore, destination managers feel that BI systems need to empower them and help them understand complex data in a simple way. Also, the real usefulness of some data is called into question and data overuse is noted by one of the interviewees as a problem:

“There are a lot of data, but I don't need them all. The key is to be selective and ask yourself: why do I need this data? Because having too many data can be annoying.” (P4)

Platforms and Types of Data

A critical issue when developing a BI platform is whether the destination develops it with its own means or prefers to hire the services of a company. As participants state, managing this type of platform requires many resources but eliminates the dependency on external providers. The purchase of data from IT companies or banks also creates an important dilemma for DMOs due to their high price and their limited budgets.

Some destinations are working on the development of their own data platform by using Microsoft Power BI© in which destinations integrate most of the data coming from different sources. This tool is specially valued for its simplicity and visual nature. Platforms are fed with data coming from traditional sources that are now digitalized, such as surveys conducted at tourism offices. Similarly, some destinations are implementing sensors that also feed their data platforms with new parameters. However, the satisfaction with this service is low among those who are already using it. Technical difficulties, additional costs and lack of usefulness are reported by some, who also acknowledge the slowness of public administrations in adapting to new requirements.

“These companies are selling smoke. They don’t even know what they’re selling. They sell you these nice platforms and all the data they get, but the reality is different.” (P3)

Some participants argue that IT and telecommunication companies sell “packages” of data and prearranged platforms that do not match each destination needs. The adaptation of BI platforms to their needs is seen as critical by DMOs, as each actor within the destination has different data requirements. Regarding the design of BI platforms, DMOs seem to need new types of data visualization options (graphics), the integration of Geographical Information Systems (GIS) and the updating of all data regardless of the employed platform.

Resources and Future Tendencies

One of the most important issues identified is the very limited human, technical and financial resources that DMO have, and which hinder their capacity to leverage data. Having a data expert in their team, who would be in charge of developing data-based reports, creating graphics, and keeping them, is seen by DMOs as a requirement today.

“We just try to stay afloat among all those data, trying to understand and keep focused, but we don’t have a big team. There’s no one who only works in data analysis.” (P1)

Additionally, the resources to implement BI platforms and new infrastructure to capture data depend on budgets that are subject to public tenders and calls by the national and regional governments. This means destinations see their projects slowed down because of bureaucracy and monitoring of projects. Similarly, the lack of coordination between administrations seems to be a problem for an optimal management of data.

In terms of future needs, the pandemic caused by COVID-19 has increased the need to have updated information and new variables in data platforms, such as capacity and access to public areas, including beaches and parks. Having more updated data can help destinations predict the behavior of demand in the short term, which is more important than ever in the pandemic context. Some data, such as real-time number of visitors in attractions and access to natural areas will be needed also after the pandemic according

to the opinion of participants. Finally, the interviewees recognize that the future will be marked by new challenges, including climate change. These challenges require having more detailed data on the impacts of tourism and a close monitoring of indicators.

5 Conclusions

This exploratory work has examined how public destination managers use BI platforms and data analysis for their decision making in a changing context. The results show that destinations have specific needs, limited resources and capacities and that BI needs to adapt to these. One of the causes of failure in BI applications is the lack of quality data, which not only refers to data from appropriate and reliable sources, but also involves the extent these data are adapted to the needs of the destination. Flexibility – in terms of data sets, user access and data visualization – is therefore considered a needed attribute of BI platforms, as pointed by previous research [12]. The simplicity of the systems is also crucial to guarantee the real use among the destination managers. The success of BI tools is proportional to the benefits that tourism organizations obtain, but success can also be subjectively measured by their users [13]. It is recalled the need of cohesion between the strategies of the organization, the target user of the tools and their use of BI applications [14]. Still, this study has shown that destinations are making limited use of the strategic opportunities provided by BI, which may be related to the shortage of human, technical and financial resources. Overall, the obtained results contribute to the literature on BI applied to destinations management by, but also to the use of big data by DMOs and the barriers existing in this area. Future research is needed to understand how different BI tools can be employed to address variegated destination management problems. The conducted study presents limitations such as representativeness that need to be address with further research.

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Visualizing and Comparing Online Travel Reviews of the Great Walls: A Data Mining Approach

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Abstract. This research employs two samples of heritage sites of the Great Wall of China (Ba daling Great Wall and Mu tianyu Great Wall) and their 21000 reviews on TripAdvisor to visualize and induce feature-related comparisons. Word2vec and D3.js are applied for statistical computing and graphing Minimal Spanning Tree (MST) and ThemeRiver. The applications of MST and ThemeRiver are used to delineate outstanding features and clearer feature relationships. In terms of methodology, we applied an innovative research route to combine MST with ThemeRiver to visualize travellers' online comments. At the same time, the visual results obtained are combined with qualitative analysis to generate valuable, intuitive summaries that can be used for reference in future research. Practically, the results disclose that although both sites are highly enjoyed by tourists, they are significantly different in terms of service, infrastructure and scenery. This article has implications for policymakers and practitioners with regard to making use of online reviews to gather authentic visitor comments on the Great Wall.

Keywords: Travel reviews · Minimal Spanning Tree · ThemeRiver · The Great Wall of China

1 Introduction

The Great Wall of China is an ancient series of walls and fortifications, totaling more than 13,000 miles in length, located in northern China with a history of over 2000 years [1]. Today, the Great Wall is generally recognized as one of the most impressive architectural feats in human history, and UNESCO (1987) designated is as a World Heritage site. Mu tianyu Great Wall and Ba daling Great Wall in Beijing, China, are two heritage sites that attract millions of national and foreign tourists every year.

Given that there is a limited number of prior studies in the existing tourism literature on the comparisons of similar heritage sites through a data mining approach, and only a few scholars have been working to achieve feature visualization of travel reviews in the business application [2–7]. By delineating the Great Wall's outstanding features and clearer feature-related term relationships and showing the differences between the two heritage sites in reviews, this study provides practical suggestions for heritage site operators to improve (instead of better) their performances.

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J. L. Stienmetz et al. (Eds.): ENTER 2022, *Information and Communication Technologies in Tourism 2022*, pp. 423–427, 2022.

https://doi.org/10.1007/978-3-030-94751-4_39

1.1 Research Questions

This research focuses on a description of the review corpus: (1) identifying what feature-related terms tourists concern most in travel reviews, and (2) exploring terms through Minimal Spanning Tree (MST) and focusing on how the most used adjective terms flow in ThemeRiver and extracting implications from it. (3) assessing if the findings can be used to enhance attraction services.

1.2 Literature Review and the Premise

“Words mentioned most frequently carry the main source of elements that determine either a positive or a negative experience” [8]. From top 50 terms from Mu tianyu Great Wall [9] and Ba daling Great Wall [10] reviews, the distribution of notional verbs, nouns, adjectives, and adverbs is highly skewed in that there are a relatively small number of terms with high frequencies. While counting the term frequency is useful in reviews extraction, which gives an outlook of tourists’ concerns, examining the distribution of the terms in the documents concerning other terms can be more powerful to understand the contexts in which the terms are used. Structures are here based on the premise that: (1) people organize their beliefs depending on travel experiences into patterns that reflect term relationships, and (2) the most important things are written first.

2 Data Preprocessing and Data Process Flow

This article mainly uses the Natural Language Toolkit for language data classification (which divides a large piece of text to units), tokenization, stemming (which shares words with inflection in them to root forms), tagging, parsing (grammatical analysis for a sentence), and semantic reasoning [11].

The collected review texts are first saved into an excel document. Word2vec and D3.js are applied for statistical computing and graphing MST and ThemeRiver. Word2vec makes natural language computer-readable [12]. And each word of this dictionary is fed into D3.js to draw MST and ThemeRiver (Fig. 1).

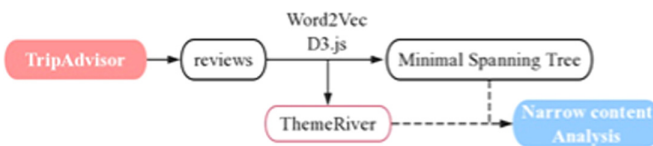
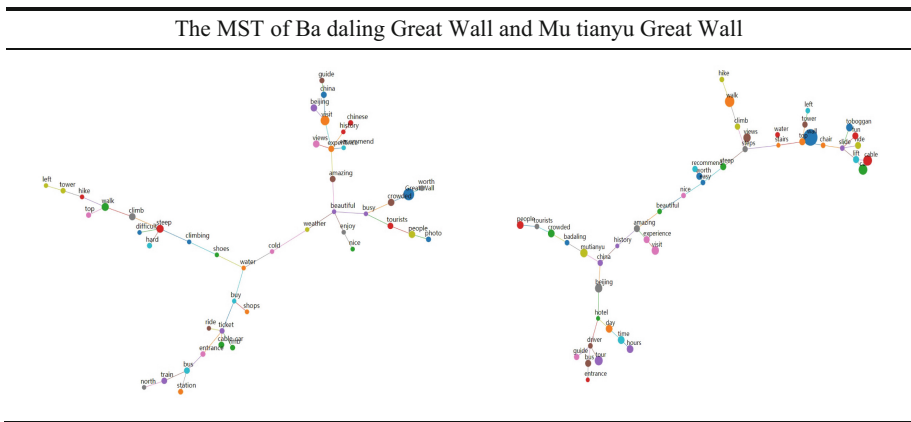


Fig. 1. Data process flow

3 MSTs and ThemeRivers for Mu Tianyu Great Wall and Ba Daling Great Wall

MSTs’ different colors are used to distinguish words. The size of the nodes represents word frequency. And the relationship between them is represented by the length of their edges. The closer the relationship, the shorter the edge. The words, lines, and MSFs reveal what tourists’ concerns are (Table 1).

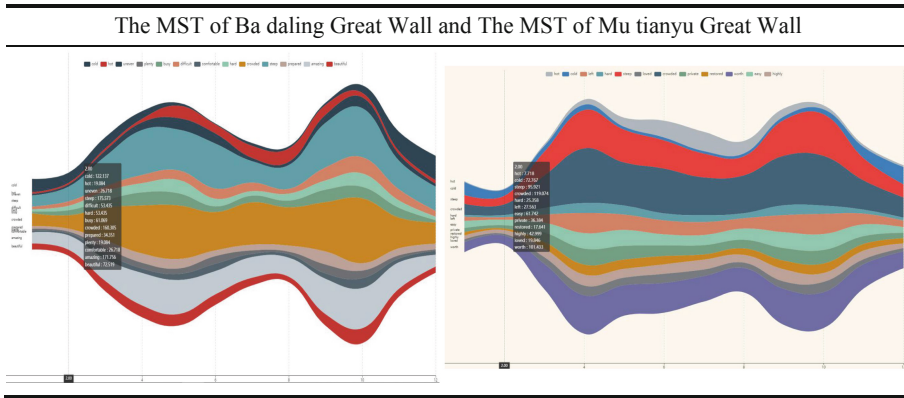
Table 1. The MST of Ba daling Great Wall and the MST of Mu tianyu Great Wall



These depictions can only give a roughly ballpark statement of Great Wall. If MST does not apply the information leading to the identification of temporal changes, this research seeks to extend the current knowledge using ThemeRiver. The adjectives of Top 100 of the most common terms are sorted out to act as basic terms for ThemeRiver analysis (Table 2).

The river of Great Walls indicates the following three aspects: (1) the pear-shape flow is formed by the number of reviews in the corresponding month. It clearly shows that April (the spring in Beijing) and September (autumn in Beijing) are the best months to visit the Great Wall. (2) The Great Wall is “hot” in summer and “cold” in winter following Beijing’s semi-humid continental monsoon climate in the north temperate zone. (3) “steep” “crowded” and “amazing” are mentioned most in Ba daling Great Wall reviews, and “steep” “crowded” and “worthy” are mentioned most in Mu tianyu Great Wall reviews. As an outdoor heritage site, the Great Wall is greatly influenced by seasons.

Table 2. The MST of Ba daling Great Wall and Mu tianyu Great Wall



4 Summary and Managerial Suggestions

This research seeks to extend the current knowledge by applying MST, ThemeRiver and investigate the differences and similarities of two Great Wall sites from reviews of English-speaking tourists.

In terms of methodology, we applied an innovative research route to combine MST with ThemeRiver to visualize travellers’ online comments. At the same time, the visual results obtained are combined with qualitative analysis to generate valuable, intuitive summaries can be used for reference in future research.

Practically, we discovered that both scenic places are “crowded” and “steep”, but “amazing” and “worthy”, and the best seasons to pay a visit are the spring and autumn. The weather in Great Wall is hot in summer and cold in winter. tourists take experiences of climbing walls as a way of learning Chinese history and culture.

A careful study of the summaries’ commonalities can be a good source of insight for management and business promotion. For both heritage sites, Badaling Great Wall and Mu tianyu Great Wall can be highly praised in marketing promotion. For the crowded situation caused by the tourist season, the managerial department can give the corresponding warning and prompt, and the measures of “flow restriction” to alleviate. In today’s Internet era, tourists book tickets in advance by Apps. A recommendation system can be established to remind consumers to prepare mountaineering supplies, prevent heat in summer and cold in winter, and significantly improve tourists’ satisfaction through short messages.

On the other hand, careful studies of their differences from summaries can make them learn from and complement each other. Mu tianyu Great Wall is very popular among tourists because of the great convenience provided by the cable car and toboggan. In fact, Ba daling Great Wall is steeper than Mu tianyu Great Wall, if the cable car service can be provided, it is sure to increase tourists’ convenience and improve their experience. The guide service of Ba daling Great Wall makes the tourists

very satisfied. Taking pictures and learning Chinese history are realized with the help of the guide. The managers from Mu tianyu Great Wall can learn from this experience, and actively improve their tour guide team. Besides, tourists are reminded to bring more drinking water when climbing mountains in Mu tianyu Great Wall. One reason is the huge water consumption during climbing; the other reason is that the price of water is too high in the heritage site, which needs to arouse managers' attention to act.

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**Special Track on Digital Education and
Training in Tourism and Hospitality**



Analyzing Individual, Institutional, and Regional Contributions to E-tourism: The Case of ENTER Proceedings (1996–2021)

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Abstract. ENTER conference is an annual international event organized by the International Federation for Information Technology and Travel and Tourism (IFITT). Since 1994, this conference has been providing a platform for academics, industry practitioners, governments, and other organizations to share their research about information and communication technologies application in tourism. In the conference, the IFITT community mainly focuses on three streams, namely, research, destinations, and industry. The studies presented at the ENTER conference were published in the content of ENTER proceedings. The current study analyzes the proceedings published from 1996 to 2021 (i.e., 26 issues) to understand the individual, institutional, and regional contributions to e-tourism within these 26 years.

Keywords: ENTER conference · IT · Tourism · Authors · Institutes · Regions · Contribution

1 Introduction

Conventional industries have been changed by the evolution of information and communication technologies (ICT), in terms of product development and consumption. Therefore, new business models are needed in the tourism industry [1]. Technologies are also transforming tourism management and marketing strategies. To obtain a complete view of the influence of technological advances on the tourism industry, continuous and innovative tourism technology research effort is needed [2]. Before the 1990s, very limited contributions to tourism and technology were published. Since 1994, the ENTER conference annually offers a forum for academics, practitioners, governments, and organizations to share their latest research findings of information and technology in the tourism industry [3, 4]. As the leading international academic conference on tourism and technology, ENTER provides a platform for professional

researchers in publishing quality research articles. Aiming to provide a general view of authors' contributions to this research realm in ENTER conferences, this study reviewed the accessible 26 issues of conference proceedings from 1996 to 2021. A total of 1,217 research papers were incorporated into the analysis, with 1,697 individual authors who were affiliated to different regions/countries of continents. Individual, institutional, and regional contributions to information and technology in the tourism industry in the recent 26 years are presented in this study.

2 Literature Review

2.1 Research Productivity Analysis

Van Over and Nelson [5] indicated that identifying and evaluating major research contributions are periodically necessary to record the historical evolution and provide a sense for future study. The tourism and hospitality academic community devoted the greatest efforts to conducting research [6]. Although the importance of research is recognized, no common ways are adopted to evaluate research performance in hospitality and tourism research [7]. Harris [8] stated that four different methods can be used to measure research performance, namely, impact, quality, importance, and quantity. Impact represents the influence level of a related article. Importance and quality are evaluated by reviews and value judgments so that the results are subjective particularly when the academic research output is evaluated in different periods of time. Then, quantity is the most pragmatic way to measure research productivity, that is, by counting the number of publications issued. In the field of tourism and hospitality, authorship and institution analyses are frequently used to assess research performance by counting the number of publications [6, 7, 9–11]. Prior tourism review research seldom evaluated productivity on specific areas, such as information technology (IT) in tourism [12].

2.2 IT in Tourism Research

Since the 1980s, ICT has started influencing the tourism industry in terms of business practices, marketing strategies, and industry structure [13]. More importantly, the implementation of technologies is an effective strategy to enhance tourist destination competitiveness [14]. By serving as an effective liaison among heterogeneous stakeholders, ICT promotes the information exchange of the tourism ecosystem and therefore fosters globalization [15]. With the evolution of technologies, such as 5G, Internet of Things, blockchain, and augmented reality, tourism is transforming from eTourism to smart tourism and then to the forthcoming ambient intelligence tourism [14]. The successful technology adoption in the tourism industry not only enhances the tourist experience but also promotes the sustainable development of the destination by assisting better resource management [16]. This irreversible development trend has a disruptive influence on the tourism industry and therefore has attracted significant attention from scholars, practitioners, and governments [4].

The literature reflects that very limited studies related to tourism and technology were published before 1990. In 1994, the annual ENTER conference gathered researchers who

share multiple interests in tourism and IT development to exchange their research findings. This group of researchers constituted a research community called the International Federation of Information Technology for Travel and Tourism (IFITT) [3, 4]. Since then, a proliferation of IT and tourism research is witnessed [17]. Key review studies can help academics keep pace with the state-of-the-art IT and tourism research [18]. For example, Buhalis and Law [4] reviewed the development progress of IT in tourism research in the past 20 years before 2008. In addition, Law, Qi, and Buhalis [19] summarized the tourism website evaluation research in the past 15 years (i.e., from 1996 to 2009). Leung, Law, van Hoof, and Buhalis [20] focused on emerging social media-relevant tourism research. Moreover, the recent decade witnessed several IT and tourism systematic reviews that analyzed the categorization of pertinent research themes, development trends, and co-authorship of key researchers [17–21]. Although several review papers provided an outline of the development of IT and tourism research, conference papers were usually excluded from the analyzed scope. Therefore, considering the limited understanding of research productivity and individual and institutional contributions to IT and tourism research, ENTER conference proceedings from 1996 to 2021 were analyzed to provide a wider view for academics, industry practitioners, and governments [12].

3 Methodology

In this study, the articles published in the Information and Communication Technologies in Tourism: Proceedings of the ENTER conferences (1996–2021) were examined. During this period, a total of 1,217 research papers were included in ENTER proceedings, comprising full- and short-length articles.

This study is regarded as an extension of the previous study [12] to update the trend of contribution in past decades. Publications in ENTER proceedings were analyzed by year to determine the trend of contribution in terms of region, individual author, and institute. In addition to the publication counting method adopted by previous research, this study used the same method advised by Sheldon [6] in analyzing authorship. To analyze the tourism research contributions, two measurements were calculated: instances and weighted instances. The former represents the number of articles an author contributed either partially or fully. The latter prorates the partial contribution of co-authors by using equal weight [6]. Although first authors may have contributed more than other authors, weighted instance assumes that each co-author's contribution to the research is equal.

4 Findings and Discussions

4.1 Distribution of Papers by Year

From 1996 to 2021, a total of 1,217 research papers were included in the ENTER conference proceedings, comprising full- and short-length papers. The average number of papers per year is 46.8. In the first 10 years from 1996 to 2005, the number of articles gradually increased from 25 to 51. Then, from 2007 to 2013, the number of

papers dropped and fluctuated between 42 and 50. In 2014, a total of 65 research papers were published. The number of published articles reached its peak and then dropped significantly to the lowest point in 2020 (i.e., 25 papers). In 2021, the article number rebounded back to 55. Figure 1 shows the trend of publication within 26 years.

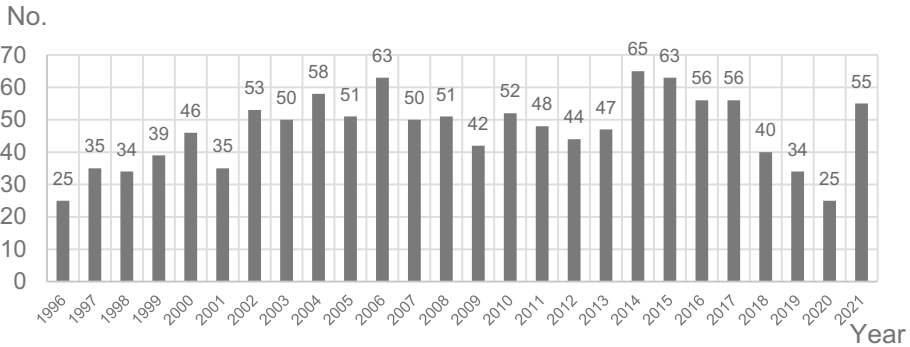


Fig. 1. Distribution of papers in 1996–2021

4.2 Research Contributions by Continent/Country/Region

As shown in Table 1, Europe is the most productive continent at the ENTER conference with a total of 2,257 (69.17%) published papers in instances and 830.96 (68.56%) papers in weighted instances. Liu, Zhong, Ip, and Leung (2011) found that, until 2010, America was the second-largest contributing region [12]. After a decade, however, Asia’s contribution rapidly increased and became the second-largest contributing region with 433 (13.27%) papers in instances and 146.93 (12.12%) papers in weighted instances. America ranked third with 351 (10.76%) papers in instances and 144.00 (11.88%) papers in weighted instances. Oceania ranked fourth, with a total of 197 papers in instances and 77.78 papers in weighted instances and contributed 6.04% and 6.42% to the analyzed realm. Of all publications, Africa was the least productive continent providing 0.77% in instance and 1.02% in weighted instance.

The results of the top three productive countries are in line with the findings of 10 years ago [12]. Considering the cradle of ENTER conference, in the past 26 years, the majority of the authors were from Austria. They contributed to the conference by publishing a total of 497 (15.23%) papers in instances and 173.94 (14.35%) papers in weighted instances. The second-largest contributing country was the United Kingdom, with 378 (11.58%) published papers in instances and 170.62 (14.08%) papers in weighted instances. The United States was the third one with 313 (9.59%) papers in instances and 130.35 (10.75%) papers in weighted instances. Table 1 shows the details of contributions provided by other countries and their ranks.

Table 1. Research contributions by geographic region

Continent/ Country/ Region	Instances				Weighted Instances			
	Number	World Rank	Rank in the Continent	%	Number	World Rank	Rank in the Continent	%
Europe	<u>2,257</u>	<u>1</u>		<u>69.17%</u>	<u>830.96</u>			<u>68.56%</u>
Austria	497	1	1		173.94	1	1	
UK	378	2	2		170.62	2	2	
Switzerland	287	4	3		91.34	5	4	
Italy	280	5	4		95.43	4	3	
Spain	274	6	5		77.29	6	5	
Germany	158	8	6		59.03	8	6	
Finland	71	12	7		28.05	10	7	
The Netherlands	56	13	8		17.53	15	10	
Greece	55	14	9		25.12	11	8	
Sweden	45	16	10		15.24	18	12	
France	37	17	11		19.33	14	9	
Norway	36	18	12		16.83	16	11	
Estonia	17	21	13		5.00	26	16	
Denmark	16	23	14		10.08	21	13	
Portugal	13	26	15		5.50	25	15	
Belgium	12	27	16		6.92	23	14	
Ireland	7	30	17		2.87	31	18	
Croatia	6	31	18		4.00	28	17	
Yugoslavia	4	33	19		1.00	36	20	
Bulgaria	2	37	20		1.00	36	20	
Slovenia	2	37	20		2.00	33	19	
Cyprus	1	42	22		0.33	47	25	
Iceland	1	42	22		1.00	36	20	
Poland	1	42	22		1.00	36	20	
Serbia	1	42	22		0.50	44	24	
Asia	<u>433</u>	<u>2</u>		<u>13.27%</u>	<u>146.93</u>	<u>2</u>		<u>12.12%</u>
Hong Kong	158	8	1		58.05	9	1	
South Korea	83	10	2		23.63	13	3	
Japan	75	11	3		24.50	12	2	
China (Mainland)	51	15	4		15.75	17	4	
United Arab Emirates	14	24	5		5.95	24	5	
Macao	14	24	5		5.00	26	6	
Malaysia	12	27	7		3.68	30	8	
Taiwan	11	29	8		4.00	28	7	
Turkey	6	31	9		1.53	35	11	
Israel	4	33	10		2.33	32	9	
Thailand	4	33	10		2.00	33	10	
Oman	1	42	12		0.50	44	12	

America	<u>351</u>	<u>3</u>		<u>10.76%</u>	<u>144.00</u>	<u>3</u>		<u>11.88%</u>
USA	313	3	1		130.35	3	1	
Canada	35	19	2		12.90	19	2	
Brazil	2	37	3		0.50	44	3	
Mexico	1	42	4		0.25	48	4	
Oceania	<u>197</u>	<u>4</u>		<u>6.04%</u>	<u>77.78</u>	<u>4</u>		<u>6.42%</u>
Australia	170	7	1		66.95	7	1	
New Zealand	27	20	2		10.83	20	2	
Africa	<u>25</u>	<u>5</u>		<u>0.77%</u>	<u>12.33</u>	<u>5</u>		<u>1.02%</u>
South Africa	17	21	1		8.67	22	1	
Nigeria	3	36	2		1.00	36	2	
Egypt	2	37	3		1.00	36	2	
Morocco	2	37	3		0.67	43	5	
Namibia	1	42	5		1.00	36	2	

4.3 Research Contributions by Individual Authors

Authors’ contributions to the ENTER conference from 1996 to 2021 are demonstrated in this section. In conformity with Liu, Zhong, Ip, and Leung [12], this study also adopted the classification suggested by Sheldon [6] and Jogaratnam et al. [10]. Therefore, three types of authors exist, namely, one-time, moderately contributing, and intensely contributing authors [6–10]. The one-time author refers to an author who only contributed one article. The moderately contributing author represents an author who contributed two to four times. Finally, the intensely contributing author represents an author who contributed five times or above. Table 2 shows the research contributions by these three types of individual authors.

From 1996 to 2021, a total of 1,697 individual authors participated in ENTER conferences. Most of the papers were contributed by 1,250 one-time authors (73.66%). The number of moderately contributing author was 337 (19.86%). In addition, a total of 110 (6.48%) authors intensely contributed to this conference.

Table 2. Research contributions by individual authors

Total number of authors	One-time authors		Moderately contributing authors		Intensely contributing authors	
	Number	%	Number	%	Number	%
1,697	1250	73.66	337	19.86	110	6.48

Table 3 lists the top 30 intensely contributing authors. The top three contributors were Dimitrios Buhalis, Rob Law, and Daniel R Fesenmaier, with 57, 56, and 40 papers in instances among 26 issues. Apart from the number of papers, Table 3 also shows the first year of the contribution of each author to clearly reflect their seniority in the ENTER conference (Table 4).

Table 3. Top 30 intensely contributing authors

Author	First year of contribution	Instances		Weighted instances	
		Number of papers	Rank	Number of papers	Rank
Dimitrios Buhalis	1996	57	1	24.33	1
Rob Law	2000	56	2	20.72	2
Daniel R Fesenmaier	1996	40	3	17.15	3
Ulrike Gretzel	2000	35	4	14.12	6
Lorenzo Cantoni	2009	30	5	10.40	8
Wolfram Höpken	1999	26	6	8.15	12
Matthias Fuchs	2005	26	6	6.70	17
Jamie Murphy	2003	25	8	7.07	16
Roland Schegg	2002	24	9	7.57	14
Aurkene Azua-Sorzabal	2005	22	10	5.55	21
Iis P Tussyadiah	2007	21	11	11.75	7
Francesco Ricci	2001	21	11	7.52	15
Peter O'Connor	1998	19	13	14.83	5
Andrew J Frew	1997	19	13	8.92	10
Hannes Werthner	1996	19	13	8.26	11
Zheng Xiang	2004	19	13	7.78	13
Roman Egger	2007	19	13	6.38	18
María Teresa Linaza	2005	19	13	5.24	23
Marianna Sigala	2000	19	13	15.00	4
Miriam Scaglione	2004	18	20	5.78	19
Alessandro Inversini	2009	16	21	5.12	24
Elena Marchiori	2009	16	21	4.90	26
Namho Chung	2013	15	23	4.25	29
Rodolfo Baggio	2003	14	24	5.75	20
Chulmo Koo	2013	14	24	3.62	30
Rosanna Leung	2006	13	26	4.67	27
Markus Zanker	2006	13	26	3.41	31
Karl Wöber	1994	13	26	9.78	9
Astrid Dickinger	2006	12	29	5.37	22
Timothy Jung	2000	12	29	5.00	25

4.4 Research Contributions by Institutes

Table 4. Research contributions by the top 10 research institutes

Institute (Country/Region)	First Year of contribution	Instances	Rank	Weighted instances	Rank
The Hong Kong Polytechnic University (HK)	2000	147	1	50.15	1
University of Surrey (UK)	1996	112	2	43.75	2
Bournemouth University (UK)	2008	78	3	30.92	3
Kyung Hee University (South Korea)	2013	68	4	18.73	5
Università della Svizzera italiana (Switzerland)	2010	60	5	20.57	4
University of Trento (Italy)	2000	56	6	14.02	9
CIC tour GUNE (Spain)	2008	49	7	12.07	10
MODUL University Vienna (Austria)	2008	46	8	18.28	7
Salzburg University of Applied Science (Austria)	2007	44	9	11.22	11
University of Illinois (USA)	1996	44	9	18.70	6
Temple University (USA)	2005	39	11	16.20	8

This study recognized that the trend of publications on IT and Tourism changed in recent decades. From 1994 to 1999, the United Kingdom made the largest research contribution in the ENTER conference, which was followed by Austria, Germany, the USA, and the Netherlands [22]. However, the ranking was slightly different from that in the past because of the engagement of industry practitioners from Austria and Italy. From 1994 to 2010, Austria became the most productive country, followed by the UK, the USA, Italy, and Germany. The findings of this study pointed out that in the past decade, the top three contributing countries were the same. Moreover, the research productivity of Switzerland and Spain has increased. In general, the contribution of Asia was increasing year by year, particularly in the past 10 years. Research contributions from The Hong Kong Polytechnic University (HK) and Kyung Hee University (South Korea) surged.

5 Conclusions

5.1 Summary of the Study

IT plays an important role in the tourism and hospitality industry. To gain additional knowledge about current situations and to predict future trends, continuous academic research in IT applications on tourism is essential. This study has examined the

individual, regional, and institutional contributions to IT and tourism research by analyzing the articles published in ENTER proceedings from 1996 to 2021. A total of 1,217 research papers were contributed by 1,697 individual authors in the past 26 years. The total number of research contributions increased year by year. Regarding the regional contributions, Europe was the most productive continent, followed by Asia, America, Australia, and Africa. Specifically, Austria had the largest research contribution by issuing 497 articles in instances. As for institutional contribution, the Hong Kong Polytechnic University (HK) was the most prolific institute, with a total of 147 research articles when counting in instances, followed by the University of Surrey (UK) and the Bournemouth University (UK). Regarding individual contributions, the top three authors were Dimitrios Buhalis, Rob Law, and Daniel Fesenmaier, and the years they started contributing to ENTER conferences varied (since 1996, 2000, and 1996 respectively).

5.2 Implications

The development of IT promotes the evolution of the tourism industry, which has disruptive effects on tourism management, marketing, and destination competitiveness [14]. This study aims to provide insights for academics, practitioners, and government officials to deeply understand the trend of productivity on IT and tourism research. The findings of this study updated the research performance of individuals and institutes. The increasing number of published articles may motivate practitioners to pay additional attention to the importance of IT in the tourism industry.

In terms of theoretical implications, this study extends the IT and tourism research by conducting a productivity analysis. Publications in the ENTER conference proceedings from 1996 to 2021 were selected as the research scope, which bridges the previous research gap. The results quantified the research contribution of individuals, institutions, and regions.

Several practical implications are provided. The ranking of individual and institutional contributions may be regarded as a reference for organizations and educational institutions, particularly for the recruitment of researchers. Research institutes may determine remuneration packages by reviewing candidates' research contributions in these fields. We believe that this research finding may help recruit high-quality candidates.

Apart from recruitment purposes, this study also reflects the institutional research contribution in the IT and tourism industry. For those who are planning for their higher education or career path, the findings may help them select professional and high-quality institutes.

Based on the findings, the ENTER conference has recently gained momentum in internationalization. In the past decades, most participants came from Europe and North America. However, the findings show that the research contribution of Asia has largely increased in the recent decade. The research contribution not limiting to specific regions made this conference more globalized. Advanced technology development in Asia, particularly in Mainland China, is recognized by the world, for example, the 5G development is a popular topic nowadays. We believe that this technology transformation might create a significant influence on the tourism industry and provide a new

direction for academic research. In addition, the ENTER conference 2022 will take place in Mainland China, indicating the growing significance of Asia, and the growing number of Asian participants would be promising.

Finally, this study attempts to appeal attention to IT and the tourism industry. Academics are encouraged to initiate additional international collaborations and contribute to knowledge development. In addition, to increase the impact of research, collaborations among academics, practitioners, and governments are recommended.

5.3 Limitations and Future Studies

This study has some limitations. First, from 1994 to 2021, a total of 28 ENTER proceedings were published. However, this study only analyzed 26 issues (1996–2021) of ENTER conference proceedings because of the inaccessibility of proceedings in 1994 and 1995. In addition, some promising and productive young scholars that started to participate in the ENTER conference in recent years are not noted in this study. Thus, in future studies, researchers are suggested to complete and update the result of the findings. Second, in terms of the analyzed content, although this study provides the first year of contribution as a reference, the analysis did not delve into this part. Readers might take this component into account when evaluating author's contribution. Moreover, the popularity such as Google Scholar's h-index of some prolific authors can be provided for comparison in a future study. Third, in comparison to the institutional contribution, the findings of individual productivity were more accurate to reflect the fact. The reason is that job switching of researchers can influence the productivity of institutes, particularly for authors with a high level of contribution. Meanwhile, there may be some missing articles because of the changes of the official name of institutions. For example, Università della Svizzera italiana (Switzerland) is also called University of Lugano. Therefore, changes of author's affiliation and institution names should be considered in future research. Finally, the results only reveal the contribution of authors who published articles in ENTER conference proceedings. Articles published in other pertinent journals, conferences, and books are recommended to be incorporated into analysis for generating a comprehensive result.

Acknowledgement. This project was partly supported by a research grant funded by the University of Macau (Ref.: CPG2021–00036-APAEM).

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eLearning for Tourism During COVID-19 - Learning from Students' Perspectives. A Pilot Study

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Abstract. This paper shows a first analysis of the experiences and challenges of studying tourism during the times of the COVID-19 pandemic. 14 tourism students from two higher education institutions in Europe participated in three focus group discussions. One generation of these students started their education in presence and had to shift online with the start of the pandemic, while the other generation started their education knowing that lessons would be mainly online. Authors used qualitative content analysis to analyze the participants' statements. As a result of the analysis, several themes emerged, and students contextualized eLearning as an education method for a future without COVID-19.

Keywords: eLearning · COVID-19 · Tourism education · Focus groups · Qualitative content analysis

1 Introduction

Due to the global outbreak of COVID-19 tourism economy has dramatically suffered. For instance, by the first quarter of 2021, international arrivals were down by 83% [1], or within the European Union especially “sectors that are dependent on human contact and interaction, such as the cultural and creative industries and aerospace industry (due to the decrease in mobility and tourism activities)” [2, p.8] are expected to suffer in the future. Hearing about different statements or similar economic prognoses for over a year now, as well as not being able to fulfill certain study requirements (e.g., completion of an on-site internship) could have also impacted the learning experiences of tourism students at higher education institutions (HEIs). Not only were they involuntarily catapulted into online learning but were also suddenly studying a subject that some identified as a “suffering field of study”. By the time this study was completed (August 2021), two groups of tourism students could be distinguished among those who had experienced what it meant to study during COVID-19: (1) those who had started before COVID-19 broke out and (2) those who started during the pandemic.

This paper presents a pilot study on the experiences and challenges of eLearning, which several tourism students described during three focus group discussions [3] conducted from April to June 2021. It also aims at understanding the impact of the digital media, as well as Information and Communication Technologies (ICTs) used for

learning tourism. Moreover, since international tourism had decreased massively, a main underlying question regarding the motivation of students to (continue to) study tourism emerged. This also connects to the issue of sustainable tourism development. As the industry attempts to recover from a crisis, so does tourism education, which gives scholars the opportunity to rethink the current curriculum, pedagogy, and assessment [4] including reflections on a more sustainable tourism education. The next part provides an overview on the tourism eLearning literature. Based on the identified research gap, the research questions are introduced. Then, the methodology and results are presented and discussed. The last part comprises a conclusion, limitations, and future steps.

2 Literature Review

eLearning is defined as “the use of new multimedia technologies and the Internet to improve the quality of learning by facilitating access to resources and services as well as remote exchanges and collaboration” [CEC 2001, p.1 in 5]. Concerning HEIs, the emergence of new technologies has affected tourism pedagogy (“how content is delivered”), assessment (“how learning is evaluated”), and curriculum (“what is being taught”) [4]. According to Kalbaska and Cantoni [6], there are two main groups of providers for eLearning in tourism: (1) “academic institutions”, e.g., by offering blended learning, online courses up to full programs or even MOOCs (Massive Open Online Courses) and (2) the “industry at large”, i.e., for profit companies, independent providers, and public agencies. The eLearning offers from both groups are used by university students as well as within the tourism industry [6]. Especially the use of eLearning by the latter makes it an essential part of e-Tourism.

Due to an increasing global digitalization, eLearning in tourism research is not an unknown field, in fact, with the emergence of the internet there has been a significant and increasing amount of research that has focused on the various forms of eLearning in tourism [5, 7–13]. A search on Google Scholar in August 2021 using the keywords “eLearning” and “tourism” presents 7’970 results (including citations). Different authors with different viewpoints have studied the subject. For instance, Kalbaska’s [14] research on “eLearning courses” by Destination Management Organizations (DMOs) about tourism destinations, focuses on the research of the online “training of the travel trade” i.e., vocational training [6]. For this, the researcher explored the use of these courses “for the education and certification of their travel partners”. Focusing on another form of online course, Lin [15] studied the experiences of hospitality and tourism MOOC teachers, which is closely related to the university-level initiative MOOC “eTourism: Communication Perspectives”. Another perspective was taken by Adukaite’s [16] research on ICTs and gamified learning. In detail, the research was based on the case of South African secondary schools and focused on (1) the role of ICTs in tourism education based on interviews with teachers, (2) the evaluation of the promotional campaign of the gamified ICT-enhanced tool WHACY, which allowed the assessment of user experience with regards to engagement and conduciveness to learning and (3) the perception of instructors concerning the adoption of “digital gamified learning in tourism education”. Moreover, previous research reveals that in

the existent e-Tourism curricula, scientific knowledge, competencies, and concepts are sufficiently present, while practical skills and capabilities require further attention [17].

Another Google Scholar search in August 2021 using the keywords “eLearning” and “COVID-19” generated 76’700 results (including citations). In fact, concerning the topic of eLearning during COVID-19 at HEIs, there are already a number of empirical studies and reviews that cover this topic in general [18–20]. Rapanta’s et al. [20] exploratory study reflected on the insights of four online-teaching experts on the “online-learning-related pedagogical content knowledge”. The study concludes with contributions concerning the integration of certain activities when it comes to learning design, three types of teaching presence, and the adoption of a “continuous assessment model” [20]. Taking into consideration students’ perspectives, Shim and Lee [18] did a thematic analysis on questionnaire answers by 393 college students, receiving students’ perspectives on learning environment (where students studied during COVID-19) as well as satisfactory and unsatisfactory elements of remote learning [18]. Regarding tourism education, the involuntary shift of HEIs to online teaching also produced some first studies, reviews and reflections dealing with online tourism and hospitality education [4, 21]. Munoz et al. [22] conducted an exploratory study on social presence in the online learning environment of hospitality-related online courses. The researchers concluded “that social presence was perceived greatly by students while teachers have attempted to enhance the learning environment by augmenting the social presence indicators” [22, p.13]. Another example is the Nankai university case, where researchers were able to recommend an online teaching process during COVID-19 by analyzing interviews and newsletters as well as making observations [23]. The study is aimed at providing “reference for tourism education in other universities” by presenting a number of teaching tools as well as presenting strengths and limitations of different tools such as MOOCs or small private online courses [23].

While the COVID-19 pandemic, and its effects on university teaching and learning, is unfortunately far from finished, more studies are needed. In particular, it is important to listen to the voices of tourism students, to understand their experiences of eLearning as well as their reflections when it comes to studying the subject of tourism while it is being drastically affected.

3 Research Goals and Questions

This research addresses exactly the issues described above through the focus group strategy, and aims at answering the following research questions:

RQ1: *What does it mean for a university student to study tourism during a pandemic?*

RQ2: *How did students experience and judge eLearning as a teaching and learning tool?*

RQ3: *What kind of ICT solutions are considered as interesting to be continued also after the pandemic from the students’ point of view?*

4 Methodology

To tackle the research questions, the authors conducted focus groups with 14 tourism students, who at the time were enrolled in the tourism Master programs of two European universities: HNEE – Hochschule für nachhaltige Entwicklung in Eberswalde (Germany), which has a focus on sustainability and management, and USI – Università della Svizzera italiana (Switzerland), which allows students to focus either on the topic of sustainability and management or on the increasingly prominent area of ICTs for tourism. Both programs consist of various practical projects and group work opportunities allowing students to gain and develop soft and teamwork skills needed in their future careers. These skills are needed in tourism first and foremost due to the fact that it is a people-driven industry in which economic success is highly dependent on the success of human interactions. Finally, students are either required or encouraged to undergo an internship during their studies, in order to gain and reinforce their practical experiences [24, 25]. The general outlines of the programs also match academic descriptions about the current state and future visions of tourism education [26, 27].

4.1 On the Sample Design and Conducting the Focus Groups

The first two groups interviewed consisted of five students each, one group from the first and the other from the second generation from USI. The third group involved four students of mixed generations from HNEE. To ensure homogeneity [3] groups were formed according to the university where students were enrolled, and where possible, students were also grouped according to their generation, speaking to peers that are known to them. Students came from diverse undergraduate (Bachelor) academic study backgrounds (e.g., Economics, Hospitality, Social Sciences), and different nationalities (e.g., Swiss, German, Italian).

The first discussion was moderated by a professor. This acted to test and refine the protocol, later used by the two junior researchers, who also needed training. They were closer to students in terms of age and career. The subject of discussion appeared to be relatively easy to talk about and not overly sensitive in its nature, that's why the professor's presence was evaluated as non-intimidating. Participants were not hesitant to share their experiences, generate new ideas, and explore different issues [3], even when discussing topics such as cheating during online exams. To protect students as well as have a limited impact on their schedules, the discussions took place online, in the evenings, for about two hours per focus group. This ensured optimal location and timing for the participants [3]. Discussions were video recorded, and an auto-generated transcript was developed after. A benefit of this method was allowing the researchers to surpass geographical distances [28]. To ensure anonymity, students' names, locations, names of peers or teachers, and courses they described have been anonymized in the results.

The questions that were posed to participants covered several main themes, first and foremost focusing on the studying concept and understanding the students' experiences with eLearning. This was followed by questions regarding advantages and disadvantages of eLearning and the experiences with online exams. The former included questions regarding the preparedness of students for the sudden shift to online learning (also in terms of hardware and equipment). To understand students' experiences and opinions, researchers also asked the question of whether they faced doubts with regards to studying tourism during a time when the industry seemed to be at halt. Finally, the students were asked to share some thoughts about what the best aspects of eLearning would be to keep for the future, as well as provide suggestions for teachers.

4.2 Analysis

The video recording with the spoken word alongside the transcript and the researchers' notes were used for a qualitative content analysis (QCA), which was done with respect to Kuckartz [29]. Coding required a high level of interpretation and took place in several cycles. Evidently, four major themes emerged at the first level. Three of the major themes were then split into a total of seven subthemes on the second level. Subsequently, four out of these seven subthemes were even further divided into a third level. At this stage, one of the four third-level topics ("Affordances", see Fig. 1 below) was once again divided in two main fourth level groups before reaching the final nodes. Whereas the four major themes followed a mainly concept driven category development approach the sub-categories were developed based on a data driven approach [29]. Once the data had been coded with the exploratory category frame, a systematization in view of the research questions was undertaken.

Categories could also overlap (e.g., participants talking about two things at the same time because they are connected). A preliminary state of the research was presented for a review from other communication researchers (14 people) in May 2021, in order to get expert feedback and to improve the analysis.

5 Results

The authors were able to identify four main themes: (1) "Experiences", (2) "Human-Computer-Interplay", (3) "Social Interactions", and (4) "Studying tourism". Some were further divided into different layers of sub-themes (see Fig. 1 below).

5.1 "Experiences"

"Experiences" refers to instances when participants would express different emotions or feelings regarding eLearning during COVID-19. Within the main category of "Experiences", the authors distinguished between experiences they interpreted as positive and negative, as well as references that could not be univocally classified as either positive or negative (e.g., sarcasm).

Negative experiences were mentioned more than twice as much as the positive ones and were further subdivided into categories that were interpreted as negative emotions like sadness or frustration (for a complete overview see Fig. 1 below). A typical example for a reference that was coded as negative, further indicating “loneliness” is the following statement:

1. “(...) I was away from home, so I think that’s also contributed a bit of a lower motivation. (...) I was trying to come here to have a bit of another mood, but I didn’t really get anything besides being alone so (...)”

To contextualize, this student lives in a shared flat, so even though they were in company of their roommates while studying, they felt alone, which also seems to be connected to a lower motivation to study.



Fig. 1. Theme tree

The “Positive” sub-theme was also further categorized, but into fewer categories than “negative” (see Fig. 1 above). One of the few instances that was coded as a positive experience, was a student who seemed to be grateful to be able to continue their studies online:

2. “I really appreciate the effort of conducting education online because you don’t have to stop your progress.”

Later, it was explained that in the student's home country, which is different from the one where the university is located, peers could not even continue studying online due to a lack of infrastructure and therefore had to put their educational careers on hold which would ultimately hinder them from entering the work market by the time they had planned to.

5.2 “Human-Computer-Interplay”

On the one hand, this theme specifically refers to the affordances that technology can provide [30], which is not about the functionality of technology itself, but rather “what can be done with technology”. On the other hand, students described the issues they encountered during eLearning, such as internet connectivity, bandwidth issues, and equipment. They also explained how they overcome these issues (e.g., switching to mobile data when home internet was overloaded, having two screens to follow technical classes). In general, issues were coded less than affordances. The “Affordances” category was further divided into the sub-themes of “Space” and “Time”.

“Space” refers to the location where students were learning. This can refer to the sudden ability to study from home, which for example made it possible to avoid commuting, return to one's family, or use the computer to simultaneously/instantly research what is being taught, which was coded as “home office” and could be interpreted as an advantage. A striking example for this is the following statement:

3. “(...) the possibility to invite (...) experts (...) or to take part in lectures of other universities. (...) me for example I took part in a course (...) I think which is normally in presence and this was possible as it was completely online...”

By “normally” the student seemed to refer to a time when COVID-19 did not exist. In this case the course was offered in person and not online, therefore they would not have been able to participate unless physically present. However, “home office” also represented disadvantages, as described in the example below:

4. “I totally agree (...) because she mentioned the fact that she's in the place in her room where everything happens. (...) She is in the apartment and in the same place she does everything else about the university. And actually, that was quite hard because I realized it just yesterday when we came back just for one lesson, and you realize how many many things you (...) lost.”

In this example, the student refers to losing a sense of importance and motivation to study due to being constantly in a familiar environment.

Moreover, another sub-category to “Space” referred to a very specific activity related to studying tourism, in presence excursions and visits, which were conducted online during the crisis. However, the execution of these activities, were mostly criticized and the questions about these were only answered by students of the first generation, who could not physically go on excursions, whereas the ones from the second generation still have another year, currently with less restrictions and are more likely to have in-person (physical) excursions. As one student stated:

5. “Because it doesn’t feel like it ended. You’re sort of in between states that you are aware that you don’t have any other courses to follow, at least most of us don’t. We have like two exams left, but the course itself, like the Master’s, is finished. And the <excursion> was supposed to be that finishing line.”

In this case, the physical excursion, rather than the virtual one seems to be a positive reward, which needs to take place in person and indicates a certain milestone within the students’ academic career.

“Time” refers to the ability of students to change concerning when they received education. The category was further divided (see Fig. 1 above) and references by students to the categories were discussed within different contexts. Concerning “Recordings”, as expected they were mentioned as a useful tool (e.g., for individual recaps), but interestingly also received comments requiring them to be of good quality and format. When it comes to “Recaps”, students seemed to, for example, perceive quizzes as a helpful studying tool that could be implemented in the future (e.g., as a way to test knowledge and stay on top of what has been learned in class). The use of “Camera and Microphone” was also discussed, especially the question of switching on the camera, which was perceived as something that should be done as often as possible both by teachers and students to enhance interactions. Nonetheless, students were aware that it is a choice and also mentioned that for example sometimes switching off the camera can help with being less distracted.

When it comes to “Productivity”, students were talking about the aspect of flexibility connected to having to study remotely. One student explained how they would integrate eLearning in the future:

6. “I think it should be the opportunity for students (...) if they want to be there in presence or if they also can learn at home, and I think that brings some opportunities (...) to combine also university and a job for example.”

Another typical element of studying tourism, “Groupwork”, was also reflected upon critically, although benefits were of course also highlighted (e.g., use of shared documents). One student commented on the possibility of conducting a group work in different time zones, while also explaining the challenges this presented:

7. “We had a course on sustainable tourism. In my group, there was one in <Argentina> and one in <Taiwan>. Now time zones didn’t really work in our favor, and you could really feel it when working, because we always had to compromise on the most random hours, but you would still feel somewhat bad towards the other people because even if it was four in the afternoon, it would have meant eight in the morning for the one in <Argentina> and eight in the evening for the one in <Taiwan>. Like they were literally at the opposites (...)”

Finally, an interesting recommendation was a reference to real-time collaboration during an online class:

8. “I’m following the course on working in the tourism industry (...) and <Fonte> (...) is using this system to post the questions. (...) I think it could also be used when we’re still in class because some people maybe feel shy to ask questions or maybe you want to ask the question and the professor is speaking so you don’t want to interrupt.”

5.3 Social Interactions

This theme was used when participants were mentioning and discussing instances related to interpersonal interactions and eLearning. In this case students referred to the differences of interaction between online vs. in-presence learning. Upon analysis of the statements, the category was further divided into two subcategories of “Student to Teacher” and “Student to Student” interactions. The primary reason for this division was the differences that existed between these interactions.

One student described a student to teacher interaction, which does not take place the same way online, as follows:

9. “Maybe you ask something to the professor, at the end of the lesson you just go to the desk, and you ask something, whereas I mean (...) you don’t do it when you have a call (...), you don’t remain in the call with the professor unless you have just an important question.”

Students on the other hand, seem to have different levels of social interactions (in and out of class) and stressed the benefits of these as a way to enhance their learning. A benefit was mentioned by one student, talking about meeting out of class to work on a university project:

10. “Like it would have been nice (...) to get like (...) just like get together and go to actually (...) explore the project and see them so we could actually get (...) even more practical info about the organization for the project.”

Moreover, students also mentioned the tendency to discuss the lectures and what they have learned during the pauses between lectures or during the lunch break. They also mentioned the benefits of discussing contents and solving problems with each other in class and learning from their peers, which seems to be hindered online.

5.4 Studying Tourism

As mentioned earlier, students were asked to explain their perceptions about studying tourism especially during the pandemic. In response, students seemed to either not have a specific opinion (“I could have studied anything it would have been the same”) or were very optimistic about their higher education in tourism, the rebound of the industry after the slowdown, and even mentioned that it was “the perfect time to study tourism” as they would have been unemployed otherwise or are hypothesizing a fast

restart of tourism, where the contents they study (e.g., sustainable tourism) will be in demand more than ever:

11. “(...) I actually restarted studying because of Corona so I was like ok, well, take the two years because in these two years you will find no job whatsoever in tourism because of the virus. So, I said OK, well, then just do your damn Masters (...). I believe that we will be back, and we will be back strong. So yeah, I think it’s a perfect time (...)”

6 Conclusion, Limitations and Future Outlook

The study was able to answer all three research questions in an explorative matter. Studying tourism during a crisis does not seem to be an issue to the interviewed students (RQ1). They still view it as an important field of study, viewing the crisis as an opportunity rather than a catastrophe. Regarding their experience (RQ2), students seemed to connect studying online during this time with rather negative than positive emotions. Especially the emergence of the theme “Social Interactions”, stressing the differences between online and in-person learning, leads the authors to conclude, that they do not judge eLearning to be a suitable alternative for in-person learning. Nonetheless, students did identify different elements of eLearning, which are recommendable for the future (RQ3). Here, however it is important to remember that they propose the adaption of certain solutions only under specific conditions or as an addition to in-person teaching. Moreover, here, the concrete contribution of this paper to e-Tourism research and tourism practice can be highlighted. As Fuchs & Höpken [17] suggested that ICT capabilities need further attention, an inclusion of more eLearning applications in the curriculum might train students’ ICT literacy.

While for this pilot study it has been possible to interview 14 students, researchers should extend the sample size in further iterations, also including institutions from outside Europe and ensuring that saturation of themes is reached. Moreover, relationships on how items are connected could also be coded [29]. Additionally, it is important to mention that even though a novel and promising approach because people were interviewed online, this poses limitations as well. Technical difficulties sometimes hindered the conversation flow, in this case the moderator had to ask participants to repeat words or paraphrase. Moreover, similar research with students of other fields of study could be conducted (e.g., fashion, public management), so that the specificity of studying tourism is further highlighted. Furthermore, the analysis could also generate more value by extending to a discourse analysis and by showing how the use of eLearning in this context of the pandemic differs from the common, voluntary use. The project could be further extended to interview the use of eLearning after COVID-19.

Lastly the authors would like to point out that, similar to students, instructors also had to quickly learn to use and adapt to various online teaching platforms while also guiding students through the process to the best of their capabilities, in order to adapt to this novel situation. This study is currently being extended by conducting in-depth interviews with tourism teachers to gain a wider perspective on the subject.

Acknowledgement. The work described in this paper was funded within and supported by grants from the Erasmus+ project “ICT for Sustainable Tourism Development” (Project number: 2019-1-PL01-KA203-065781).

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An Empirical Study on the Impact of Prior Information Provision Methods on Participants' Perceptions in Tasting Marketing

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Abstract. Tasting events are a typical example of a tourism experience that utilizes alcohol. However, it has not been sufficiently demonstrated how the prior information given to customers at tasting events affects their perception of the tasting and its marketing effects. In this study, we conducted a tasting experiment of a new Japanese sake product in California, the USA to clarify how information given to participants in advance can affect their perception of the tasting, satisfaction, and word-of-mouth intention related to the new sake product, and compared the effects of the following types of prior information: 1) no information, 2) written information, 3) video explained by a man, and 4) video explained by a woman. The results show that presenting information makes a difference in its impact as opposed to providing no information. When prior information was presented in written form, various perspectives significantly influenced the satisfaction and recommended intention more than in the cases of video. On the other hand, in the cases of video, the number of significant paths was reduced, but the influence on word-of-mouth intention was greater than in the case of written information. This study contributes to the development of a theory and empirical evidence that takes into account prior information in tasting marketing in tourism.

Keywords: Tasting event · Tasting perception · Word-of-mouth · Prior information provision · Japanese sake

1 Introduction

Past studies have indicated that there are synergies between wine tourism and wine production, and underlining the importance of regional development and the experiential wine tourist [1]. In this context, tasting events have become a typical tourist experience [2] in wine-producing regions. This kind of experience based on the use of locally produced alcohol is one of the essential attractions in a tourist destination.

In Japan, there is a rice-based alcoholic beverage called Japanese sake that can be compared to wine tourism. Similar to wine tourism, sake tourism is also flourishing in

Japan, on the basis of the long history and the appeal of the cultural aspect in sake brewers [3].

With regard to the study of alcohol, various perceptions have been analyzed in the context of beer. Consumer variables (demographic variables, psychographic and behavioral variables, genetic variables), product variables (product-intrinsic attributes, product-extrinsic attributes), and context and the purchase process (the customer journey, atmospherics) have been identified as factors related to the choice of beer [4]. In particular in tasting events in beer, an analysis of how tasting different types of beer (e.g., mass-produced vs. craft beer) affects consumers has also been demonstrated [5].

However, it has not been sufficiently demonstrated how the prior information given to customers when enjoying alcohol at tasting events influences their perceptions of the tasting and its marketing effects. In recent years, influencer marketing has been gaining importance, and the influence of social media (e.g., YouTube) using video, in particular, has been growing [6].

Therefore, this research purpose is to clarify the effects of such information provision on alcohol-based tourism experiences. Theoretically, we would contribute to the development of a theory for evaluating the impact of prior information provision to customers in tasting marketing. On the practical side, it provides insights to help companies or DMOs (destination marketing organizations) make decisions on how to design more effective tasting marketing, taking into account the impact on the customer experience of providing information to customers in advance.

2 Research Model

In order to achieve the proposed objectives in this study, we set up a research model as shown in Fig. 1 based on our hypotheses. For the marketing outcomes, product satisfaction and product word-of-mouth intention constructs were set, and also, the sensory perception construct, cognitive perception construct, and affective perception construct are developed based on previous studies [4, 5, 7]. Regarding the control variables, based on our research objectives, we set up that the prior information given to the participants of a tasting event makes a difference in product satisfaction and word-of-mouth marketing effectiveness. The types of prior information are specifically: 1) no prior information, 2) written information, 3) video with a man explaining, and 4) video with a woman explaining.

3 Methodology

To test the proposed research model, we conduct an experiment on new Japanese sake tasting among customers of Japanese restaurants in California, USA. In this study, before joining the tasting experiment, participants are controlled with different means providing prior information about the new product. Specifically, the participants are randomly divided into four groups: 1) no explanation of the prior information of the new product, 2) explanation of the prior information in text, 3) explanation in a video by a person (male), and 4) explanation in a video by a person (female). As the content

of information, the same description of the new product (brand-new Japanese Sake) is used for groups 2–4. Participants of group 1 join the tasting experiment without any prior information about the new product. As the used product for the tasting marketing, we set one of the new sake products of a Japanese Sake company. The new product differs greatly from traditional sake in terms of flavor. In conducting this research, we underwent a research ethics review at the Graduate School of Management, Kyoto University, and obtained approval formally for the experiment plan.

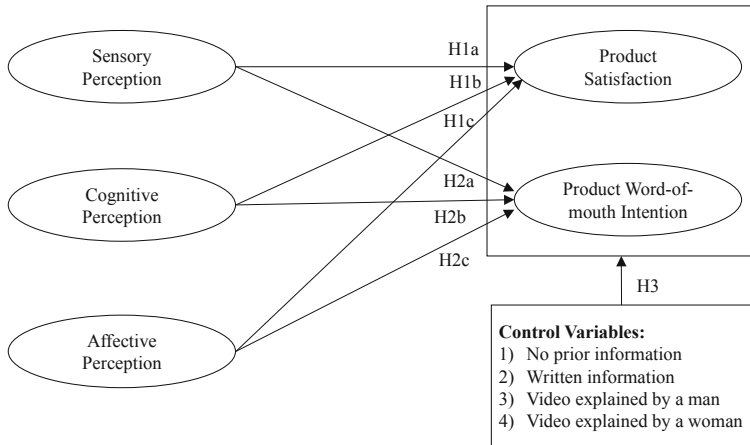


Fig. 1. Proposed research model.

A questionnaire for the experiment was designed to collect feedback on the tasting experience from the participants based on the proposed research model. The first item is to select the category of what type of prior information they gained: 1) no prior information, 2) written information, 3) video with a man explaining, and 4) video with a woman explaining. The main question items were constructs of the research model, and the degree to which the following perspectives agreed was collected using a 5–point Likert scale. The sensory perception consists of aroma, sweet, dry, sour, stiff, mellow, complicated, fresh, juicy (fruity), watery/bland, aftertaste, and white wine taste. The cognitive perception consists of artisan, balanced, cheap, easy-to-drink/drinkable, sophisticated, familiar, casual, novel, light/full body, mass-produced, masculine, simple, smooth, strong, unique, craft sake, and authentic. The affective perception consists of memorable, exciting, comfortable, fun, adventurous, relaxing, and stimulating. The marketing KPIs (Key Performance Indicators) are product satisfaction and product word-of-mouth intention. In addition, demographic and psychographic attributes related to alcohol were collected for each participant.

Data were collected at two Japanese restaurants in California, the USA between July 12–15, 2021. After agreeing to the purpose and the procedure of the experiment, participants were randomly assigned to the prior information acquisition types. Then, they had a tasting of a new Japanese sake product with the preliminary information provision type of each group. After tasting, participants answered the web questionnaire using

mobile devices. The number of validated responses was 132 (Restaurant A: 55, Restaurant B: 77). Demographic attributes and prior information types are shown in Table 1.

The method of hypothesis testing is Partial Least-squares-based Structural Equation Modeling (PLS-SEM) [9]. This is more suitable for this study than Covariance-based Structural Equation Modeling (CB-SEM) because it allows for more robust analysis with smaller sample size.

Table 1. Demographic characteristics of participants and prior information Type (N = 132).

Gender	Male	53.8%	Income level	Less than US\$50,000	15.9%
	Female	43.2%		US\$50,000-99,999	32.6%
	Others/Prefer not to say	3.0%		US\$100,000+	31.8%
Age(years)	21-29	15.2%	Educational level	Prefer not to say	19.7%
	30-39	25.0%		Middle schol	0.8%
	40-49	22.0%		High school	18.9%
	50-59	25.8%		University/College(Bachelor)	47.7%
	60+	12.1%		Graduate School(Master) or higher	14.4%
Racial Identity	White	66.2%	Prior Information Type	Vocational School	8.3%
	Latino/a/x or Hispanic	11.0%		Others/Prefer not to say	9.9%
	African American	3.7%		No prior information	24.2%
	American Indian or Alaska Native	3.7%		Written information	22.7%
	Asian	2.9%		Video explained by a man	26.5%
	Others/Prefer not to say	12.5%		Video explained by a woman	26.5%

4 Results

Results are presented in Table 2. First of all, it was shown that the way in which prior information is provided makes a difference in the impact on product satisfaction and intention to recommend. When prior information was presented in written form, various perspectives significantly influenced satisfaction and recommended intention more than in the cases of video, although the significance level is 0.05. In the cases of video, the number of significant relationships was reduced, but we obtained paths with stronger relationships with significance levels below 0.01 than the written information case. In particular, especially for male videos, affective perception significantly influenced product recommendation intentions, and also, sensory and affective perception also had a significant impact on product satisfaction. On the other hand, the significant paths decreased for female videos, but there was an impact of sensory perception on product recommendation intention with a significant level of 0.01.

5 Discussion

The results of this study showed that providing prior information in a tasting event can influence relationships between participants' perceptions (sensory, cognitive, and affective) and their product satisfaction and product word-of-mouth intentions. In particular, it was shown that explaining prior information through video strongly influences the product word-of-mouth intention. This research contributes to the

development of a theoretical foundation for evaluating the provision of tourism experiences of tastings. On a practical side, it also provides insights into the means of providing prior information when offering tourism experiences. On the other hand, in this experiment, a video by women reduced the number of significant paths more than those of written information. This may indicate the variation in the evaluation criteria for female videos among the experimental participants against other means. Therefore, it is necessary to subdivide the group in order to examine the effect in detail. In the future, we need to work on theoretical development, taking into account the analysis of customer attributes in detail and the credibility of the information sender in videos.

Table 2. Results of hypothesis testing (H1–H3).

Hypothesis/Structural path	No prior information (N = 32)		Written information (N = 30)		Video explained by a man (N = 35)		Video explained by a woman (N = 35)		Difference between the groups (H3)
	β	Result	β	Result	β	Result	β	Result	Result
H1a Sensory Perception → Product Satisfaction	0.343	R	0.245	R	0.527**	A	0.335	R	A
H1b Cognitive Perception → Product Satisfaction	0.064	R	0.218	R	0.402*	A	0.205	R	A
H1c Affective Perception → Product Satisfaction	0.339	R	0.478*	A	0.376**	A	0.226	R	A
H2a Sensory Perception → Product Word-of-mouth Intention	0.228	R	0.391*	A	-0.205	R	0.545**	A	A
H2b Cognitive Perception → Product Word-of-mouth Intention	0.230	R	0.370*	A	-0.028	R	0.205	R	A
H2c Affective Perception → Product Word-of-mouth Intention	0.478*	A	0.475*	A	0.799***	A	0.007	R	A

Note: Two Tailed Test; *** Significance Level = 0.1%; ** Significance Level = 1%; * Significance Level = 5%; A=Accepted; R=Rejected

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**Special Track on Travel in the
Metaverse: The Future of Smart
Tourism Cities**



How to Design Hotel Gamified Applications Effectively: Understanding the Motives of Users as Hotel Visitors

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Abstract. The service sector including tourism and hospitality have recognized the need for a turn to a customer-centric approach that primarily values tourists' needs, wants, preferences and requirements as major determinants in travel decisions. Considering that mobile devices are becoming travel buddies and that their use is profoundly influencing traveller's journey highlights the need of Gamification. As a relatively new phenomenon in the industry, motives encouraging usage behaviour have yet to be researched. Identifying these motives could offer several advantages to hotels by providing relationship marketing, engagement and strengthening customer loyalty. This research tries to fill this gap and enlighten existing gamification research by understanding the motives of users' continuance intention in adopting technology with gamification characteristics. Visual material based on the current definitions of gamification was prepared to create a hotel gamified application to help participants discuss their preferences.

Keywords: Gamification · Hotel gamified applications · Users' motives · Hospitality · Hotels

1 Introduction

The fields of tourism and hospitality have recognized the need for a turn to a customer-centric approach that primarily values tourists' needs, wants, preferences and requirements as major determinants in travel decisions to enhance both consumer satisfaction and the quality and memorability of the tourist experience [1, 2]. Today's increasingly technology-savvy hotel guests [3], contributed to the evolution of the phenomenon of Gamification due to the favourable environment that such context offers. Recent evolutions indicate that mobile devices are becoming travel buddies and their use is profoundly influencing the different phases of a traveler's journey [4].

Gaming is in its infancy in many industries, hospitality being one of them, and very few successful examples have already been established, mainly specialised treasure hunts and culture heritage applications [5]. The phenomenon of gamification has,

however been applied with several objectives, ranging from increasing brand awareness to encouraging consumer engagement [5]. Even though the hospitality industry has already used game elements [5], limited research has been focused on individuals' motives to use them [7]. Hence, this study aims to identify individuals' motives when they use a mobile application with gamified characteristics. Identifying these motives could offer several advantages to hotels by providing relationship marketing and engagement, increasing revenue and strengthening customer loyalty.

Many studies have explored users' initial adoption of e-commerce (see [8, 9]) and m-commerce (see [10]), but little has been done about influencing factors of continuance intention towards gamification (see [11, 12]) and users' behavioural intention to try new mobile gamified applications in the context of the hospitality industry. The sustainability and success of a mobile gamified application relies on users' continuance usage rather than first-time adoption behaviour. Thus, the creation of an engaging experience is more likely when the users' motives are identified [13]. This research tries to fill this gap and enlighten existing gamification research by understanding the predictors of users' continuance intention in adopting technology with gamification characteristics. To do so this research' objective is to understand the key factors influencing the adoption of a hotel gamified application.

2 Theoretical Background

Gamification not only refers to applying a game mechanic in a non-game context, but it includes a much more complex process of understanding human behaviour to encourage activities such as motivation and problem solving. To achieve this, gamification uses a range of elements derived from games such as: points, leaderboards, badges, virtual currency, narratives and avatars [14].

Gamification is used already in various domains, such as e-commerce, mobile marketing and innovation [15]. Within the hospitality industry, gamification has been seen to encourage engagement, enhance tourist experience, improve loyalty and increase brand awareness [16]. A tourist is rather despairingly referred to as a person who typically has "little or no knowledge of the environment", so using gamified systems allows the tourist to learn more about the local environment, allowing destinations and hotels to promote the history of the location and create an emotional experience between the visitor and Point of Interest [7, 17]. At the same time, gamification could enable hotel visitors as gamers to have a sense of engagement, immediate feedback, feeling of accomplishment and success of striving against a challenge and overcoming it [18].

Gaps in gamification scholarship arise in relation to marketing communication and shopper response. Research by [19], mentions that, even though business analysts suggest that more than half of all organizations would have had gamified parts of their organizational software and internal practices, most of these gamification implementations fail due to the poor understanding of the gamification design process. While gamification has been notably successful in the commercial, mobile, and healthcare sectors (amongst others), little work has been done to explore how game design contributes to its success [20]. Organizations seems to focus on the obvious game

mechanics such as points, badges and leader boards, rather than the more subtle and important game design elements, such as balancing competition and collaboration, or defining a meaningful game economy. Hence, gamification users are not as engaged as gamers.

In the literature of games several theories emerged to understand the motives of gamers when playing games (see Bartle player types [21]; Yee's components [22]). In relation to motives of users when using gamification, limited research exists (see Marczewski user types [13]). Although it is possible to design games, serious games or gamified systems without knowing who the target players and users are, it is more likely to create a more engaging experience when the target players are identified first [13]. With gamification being in its infancy [6, 20], further research is required to understand the factors that will make gamification a successful engagement tool in the hospitality industry. Thus, this research aims to understand hotel visitors' motives when using a mobile hotel gamified application.

3 Methodology

This study has objective of understanding the motives of hotels' visitors when using a hotel gamified application. Considering the aim of this research on an in-depth understanding of social and human behaviour and the reasons behind such behaviour [23], qualitative inductive approach is more suitable. Qualitative inductive approach will benefit the scopes of this research as it allows in-depth understanding of peoples' opinions when exploring key motives towards intention to use a hotels' gamified application.

Semi-structured interviews were conducted with hotel visitors under the condition that they have experience with mobile applications. For these two criteria to be ensured, a snowball sampling was utilised, allowing the researcher to initially sample a small group of people relevant to the research questions, and these sampled participants propose other participants who have had characteristics relevant to the research question. To ensure that the theoretical saturation has been achieved [24], it is recommended to continue collecting qualitative data until data saturation is reached. For the purposes of this research 25 interviews have been conducted. 19 interviews secured before no new themes emerged from interviewees' responses, but 6 further interviews were carried out in case new information arose. Considering that the purpose of this approach is to search for themes or patterns that occur, a data thematic analysis used [24], to indicate patterns of key hotel visitors' motives towards engagement with hotels' mobile gamified applications.

Since there was no existing mobile gamified application in the hospitality industry, it was decided to develop visual material based on the definitions of gamification, the game mechanics (i.e., points, badges) and game motives (i.e., exploring, achieving) (see Fig. 1).



Fig. 1. Example of visual material

It is acknowledged that mobile applications such as Chipotle gamifies loyalty program with extra perks and Pizza Hut Delivery UK gaming arm have developed strategies adding mainly game mechanics, however for the scopes of this research original material was created to ensure focus on hotel sector. The aim of using the visual material is to give an idea to the interviewee of how a hotel's gamified application would look like. This helped the interviewee to focus on the elements they find more attractive and encouraging to use, making the conversation motives to use the technology easier. This research is embedded in the body of literature of the hospitality industry as the participants elaborate opinions based on the material in front of them. The idea is that, if the active ingredients that make games engaging could be isolated, then developers can put those ingredients into their digital technologies to ensure that engagement in their products.

4 Findings and Discussion

Both genders were almost equally represented among the participants involved in this study with 56% being female and 44% male. All the participants are adults with 60% in the 21–31 years old group, 24% between 32–41 and 16% 42 and above. The analysis of the data reveals two findings about the main motives influencing the engagement of hotel visitors with hotels' mobile gamified applications. The first finding shows 8 motives of users (familiarity, socialising/social influence, perceived informativeness,

fun, perceived usefulness, ease of use, rewards and trust), to engage with the technology. Second interesting finding indicates that a hotel gamified application has different purposes at different stages. During the thematic analysis it was discovered that certain motives were linked with before visiting the hotel activities and others linked with during the stay at the hotel activities. Hence, hotel visitors' motives towards engagement with hotels' mobile gamified applications was divided into two categories. Using a hotel's gamified application during staying at the hotel is linked with games and gamification literature whereas, using the technology before visiting the hotel is linked with motives from the technology adoption literature.

Familiarity. Familiarity promotes its hedonic meaning when it is linked with games: [*"familiarity helps in order to make things clear and understandable, so it does help in order to make it fun"* (Interview 20)]. Based on the literature familiarity is a broad construct where knowledge about the organization can be resourced from sources as varied as individuals' prior visits to the destination, the media, word of mouth or publicity [25]. Familiarity has been discussed in the adoption of technology literature by [26] affecting trust in the e-commerce. However, there is a limited connection of familiarity with intention to use [27].

Socialising/Social Influence. Socialising or social influence appears to be important feature included in a hotel's gamified application: [*"The socialising aspect is important in the point I could ask others about what I can see nearby. Where they have been and what they liked. Is mostly related with my during staying activity"* (Interview, 3)]. Participants agreed with socialising linking to fun highlighting the hedonic value that promotes to the application. This finding is linked with the gaming literature and the motivation to play games (see [21]) and gamification literature (see [13]) as a motive to use gamification.

Perceived Informativeness. Perceived informativeness has showed an effect on the enjoyment of staying at the hotel. [*"the perceived informativeness is important due to the fact that the application itself informs me about certain things regarding my staying there"* (Interview, 3)]. Participants argued that it is important for the technology to provide details about the services and functions of the hotel. In the literature, informativeness describes users' feelings that they are informed about a particular product or service, such as its technical capabilities and the likely experience associated with using that product or service [28].

Perceived Enjoyment/Fun. Most of the participants declared that the element of fun is a strong motive in the continuation of using this technology highlighting the importance of the gaming element an application can provide. The motive of fun seems to have greater importance during the visit of the hotel visitor at the hotel: [*"it is fun and makes you relax a bit more. This is the gaming aspect. I would say that the gaming characteristics are more applicable or attractive to say better during the visit at the hotel because the tasks will be interesting to do. Also, I am more in the mood of being more active in this sort of thing"* (Interview, 10)]. In the context of gamification studies found positive effect of perceived on intention to use Gamified Smart Tourism Applications [11] and on customers' intention to engage in gamification [12].

Perceived Usefulness. The motive of perceived usefulness is an important feature that should be included in hotels' gamified applications: [*“overall I would say that being useful is the most important element I would look for in this application. I do have a lot of applications on my phone, but unless they are useful, they are not there”* (Interview, 5)]. This shows the importance of the motive of perceived usefulness for hotel visitors when they would download this technology. Previous studies on similar context by [29] and [12] have shown a positive impact of perceived usefulness on intention to use mobile shopping applications and intention to shop online.

Perceived Ease of Use. Ease of use contributes towards intention to use hotels' gamified applications, through saving time [*“the fact that it is easy to use is also a very important aspect because it is time efficient”* (Interview, 2)]. Perceived ease of use is a prominent construct in tourism information systems research [10]. The less effort a technology requires, the more tendency and intention consumers will feel to use it [8]. In the context of gamification, it is found positive effect on customers' intention to engage in gamification [14], and intention to use Gamified Smart Tourism Applications [15]. This highlights the fact that this technology should be easy to use when a hotel visitor decides to make the booking with the brand.

Rewards. Being rewarding is an important aspect in hotels' gamified applications: [*“the reward is important especially as the first incentive to download the application. This is how people will start thinking the application as the first choice for choosing this hotel brand over another in the future as they see that the money spent so far is acknowledged and we get something back”* (Interview, 17)]. Rewards are among the most widely accepted motivations and individuals will engage in behaviour that they perceive will eventually lead to valued rewards [30]. Despite rewards being either tangible, (such as monetary bonus, certificate, prize and award), or intangible (such as a skill that is perceived to be more useful or needed in the future or that improves one's special standing) [31], in this case hotel visitors showed a significant preference on rewards being a form of future discount, hence tangible rewards. The hospitality industry introduced loyalty programs, frequent-flyer programs and repeat customer programs, becoming common practices for customer-relationship management [32] and the results of this research agree on the importance of the reward in this manner. Tangible reward is classified as a before visit the hotel motive, but the opportunity of hotels to attract visitors for future sales through rewards could also benefit hotels for post visit purposes.

Trust. Finally, trust appears to be an important influencer when designing hotels' gamified applications: [*“trust is the number one regarding using this application. I want to be able to trust this application, because I am sharing valuable information such as ID and most importantly things like bank accounts and financial details”* (Interview, 9)]. Trust is seen important in technology use considering consumers are unlikely to shop online if they do not trust the seller's website on which they are shopping [33]. Hotels' gamified application should maintain trustworthy relationship between the hotel and the user.

5 Conclusion

Gamification can be applied in technology-mediated and non-technology-mediated contexts [34], however the creation of an engaging experience either way is more likely when the users’ motives are identified first. Considering that there is insufficient research upon the identification of the motives influencing the usage of a hotel’s mobile gamified application, this research fills this gap by understanding motives of users when using hotels’ gamified applications to engage with the technology. There are important changes in users’ behaviour depending on the time of use (Fig. 2).

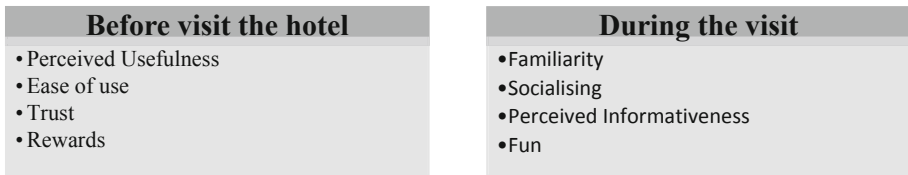


Fig. 2. Gamification motives as hotel visitors

Using a hotel’s gamified application before visiting the hotel, promotes behaviour linked to technology adoption literature (perceived usefulness, ease of use, reward and trust). These motives are associated with budget elements, payment procedures, and decision making. Using the application during the stay at the hotel promotes behaviour linked with gaming and gamification literature (familiarity, socialising, perceived informativeness and fun).

This study comes with inherent limitations. Firstly, the limited (if any knowledge) of the sample in relation to the context of hotel gamified applications led to the development of visual material by the researcher. Therefore, the sample’s opinions are based on having the product in front of them, which is a development of the researcher and not an existing product. Also, it is worth noted that the sample age is younger guest so it worth looking into other age groups as part of future research either qualitatively or quantitatively. Additional factor to take into consideration for future studies is the purpose of visit a hotel (i.e. business or leisure) and whether different motives appear. To provide generalisability, future studies should consider quantitative methodologies to explain the relationship between the factors. Quantitative methodologies might also clarify different motives based on demographics and the purpose of staying in a hotel. In conclusion, as new technologies have been developed to enhance individuals’ motivation, adding beneficial behaviour of the users towards the developer, gamification is seen as the most popular trend in this respect [11], highlighting the importance of the phenomenon for hospitality organizations.

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Escaping Loneliness Through Tourist-Chatbot Interactions

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Abstract. Social robots such as chatbots are regarded as a practical approach to alleviate loneliness. Few studies in the tourism field have focused on loneliness and its impact on the acceptance of chatbots used by the tourism industry. This paper explores the factors influencing tourists' willingness to use chatbots from the perspective of loneliness by combining theories related to anthropomorphism and the uncanny valley effect. This paper adopts a qualitative research method by taking a semi-structured interview with 15 tourists who have used travel chatbots before. The results show that in addition to perceived ease of use and perceived usefulness, there are three factors (tourist loneliness, perceived anthropomorphism, and user anxiety) that directly influence tourists' acceptance of travel chatbots. Moreover, tourist loneliness positively influences user anxiety through perceived anthropomorphism. User anxiety has a negative effect on perceived ease of use and perceived usefulness. This research then proposed an extended TAM model from the perspective of tourist loneliness. This paper enriches the research on loneliness as well as chatbots in the tourism field. The results provide suggestions for the practical application of travel chatbots.

Keywords: Tourist loneliness · Technology acceptance model · Travel chatbot · Perceived anthropomorphism · User anxiety

1 Introduction

Loneliness has various adverse effects on people, such as sleep deprivation and suicidal tendency [1]. In order to reduce loneliness, people usually seek social connections with others [2]. Therefore, chatbots with social attributes gradually gain attention, as people may establish social or emotional relationships while interacting with chatbots [3]. In recent years, with the progress of artificial intelligence, the application of chatbots has made significant progress. Chatbots are also widely implemented in the field of tourism [4, 5]. Companies such as Expedia, Ctrip and Marriott have applied chatbots to their business scenarios [6]. Some tourist attractions have also launched their own chatbots to attract visitors. In China, the Forbidden City launched a chatbot named "Meet the Ministers" in 2018, allowing visitors to interact with virtual ministers from the Qing Dynasty in a humorous way. The Longquan Temple in Beijing also launched an online

celerity named “Xianer” Robot Monk, who likes apply Buddhist wisdom in dialogue with users and has attracted a lot of tourists to visit the temple in person.

However, few studies pay attention to the impact of tourists’ loneliness on the acceptance and interaction of chatbots for tourism, and whether loneliness will affect human-chatbot interaction. Why do tourists use these chatbots? Do they feel lonely during their tours? Do they use these chatbots because they are lonely? Does interacting with chatbots help them feel better psychologically? Which travel chatbots have they experienced with? To answer these questions, this study adopts qualitative research to conduct a semi-structured interview to explore the factors affecting tourists’ use of chatbots and whether loneliness affects tourists’ willingness to use chatbots.

2 Literature Review

2.1 Chatbots and Technology Acceptance Model (TAM)

Chatbots are used extensively in customer service, as artificial intelligence techniques improve their ability to handle customer requests [4, 5, 7]. For instance, Alibaba and Domino’s Pizza have applied chatbots in their customer service domain [8]. These chatbots are often seen as a reliable alternative to traditional human services [9]. However, beyond customer service, chatbots have been given a more humanistic and caring role. For example, the chatbot Mitsuku can act as a social companion for users and the chatbot Woebot can answer questions related to mental health. Thus, chatbots can be used in a variety of contexts. Winkler and Söllner pointed out four advantages of chatbots [10]. First, chatbots can help companies reduce their employment costs by replacing manual labor. Second, chatbots can provide 24/7 service to users, which helps to increase their satisfaction. Third, chatbots can combine big data to predict users’ questions and prepare the information they need in advance. Fourth, chatbots can perform complex analytics, which helps to better understand the needs of users. Chatbots have a wide range of applications in the tourism sector, but there is still relatively little research on this part [5]. It is important to understand the factors that influence tourists’ acceptance of travel chatbots.

The TAM has also been widely used in tourism. Since it was originally designed for predicting employees’ performance in using computers in the workplace, Moon and Kim argued that consumers, unlike employees, are very free in making decisions. Therefore, whether they can adapt to this new technology is not in their consideration [11]. Thus, many scholars in tourism have modified the TAM model according to different situations (e.g., [12, 13]). Pillai introduced technology anxiety, perceived trust, anthropomorphism, and perceived intelligence into the TAM to analyze the factors influencing tourists’ acceptance of chatbots [5].

2.2 Loneliness

In spite of the fact that the emergence of electronic devices and social media has facilitated interpersonal communication, Turkle noted that “this superficial communication has replaced interpersonal intimacy, leaving people with a lack of intimacy and

quality interactions with others, thus increasing their feelings of isolation” [14]. Loneliness is even magnified during the COVID-19. While the policies of home isolation and social distancing can help keep people physically away from the virus, they have caused more people to feel lonely globally [15]. In a recent study, Courtet et al. reducing loneliness can improve personal and social well-being, and suggested interventions to alleviate loneliness [16].

Chatbots, as a branch of robots, have also received increasing attention from scholars in recent years in alleviating loneliness [17]. Loneliness increases the willingness of people to connect with other non-human objects to satisfy their need for social connection [18]. Therefore, their loneliness will be alleviated in the process of interacting with chatbots [19]. In addition, tourism as a social activity often becomes a means of escaping loneliness [20]. Crompton pointed out that tourism can strengthen family relationships and social interactions [21], so tourism activities can help people alleviate loneliness to some extent. Yet currently in the field of tourism, there is not much research on loneliness [22], few scholars have focused on tourists’ loneliness and whether this loneliness affects tourists’ use of chatbots.

2.3 Anthropomorphism

Anthropomorphism is the act of assigning human characteristics, motivations, intentions, or emotions to a real or imagined non-human subject [23]. In the process of interacting with robots, humans tend to anthropomorphize the robots [24]. When people have a higher anthropomorphic perception of chatbots, they evaluate them more positively in general and may even see them as companions [25]. On the one hand, chatbots with human characteristics can elicit a social response from humans, which has a positive impact on the acceptance of robots [26]. On the other hand, humans have more positive feedback with chatbots that can show human characteristics than with purely functional robots [27]. The perception of anthropomorphism is also related to the user’s state [28]. This was also verified by Waytz et al., who argued that lonely people in daily life tend to treat non-humans as humans, but they treat people who are alienated in social relations as non-humans [29]. In the field of tourism, tourists may evaluate service bots more directly than other industries, comparing the experience provided by these service robots to that of human service workers [30]. Therefore, it is necessary to explore how anthropomorphism affects the interaction between tourists and travel chatbots.

2.4 User Anxiety

Venkatesh identified technology anxiety as the unpleasant feelings that an individual feels when using or considering using a certain technology, including emotional states such as frustration, apprehension, and fear [31]. Studies have found significant negative effects of technology anxiety on both the perceived ease of use (PEOU) and the perceived usefulness (PU) [31, 32]. Although chatbots are usually built into software and do not have external physical characteristics, Skjuve and Haugstveit noted that users will also encounter the uncanny valley effect when communicating with chatbots [33]. In the Uncanny Valley theory, Mori states that the cognitive difficulties people

have in identifying human-like objects can cause negative effects [34]. When robots designed to resemble humans closely exhibit expressions, movements, and speech that do not exactly match those of real people, they can give users creepy feelings [35]. In contrast, robots that are distinctly different from humans' form may be relatively easy to accept by the public [36]. In this research, negative concerns of technical concerns and the uncanny valley effects are jointly considered as user anxiety.

3 Methodology

3.1 Data Collection

This paper conducted a semi-structured interview approach with the aim of better exploring the impact of visitors' interactions with chatbots. The interview was conducted from February 1, 2021 to March 9, 2021, lasting approximately 6 weeks. Affected by the COVID-19 epidemic, the interviews were mainly conducted online. Purposive sampling was conducted in this research, that is, selecting eligible subjects according to the specific research situation [37] which can save research costs and is easy to implement [38]. A total of 15 interviewees who had used a travel chatbot at least once in the past two years were interviewed and numbered sequentially as interviewee 01 to interviewee 15. The average age of the interviewees was 24.07 years old, with 9 males and 6 females. Regarding the interviewees' educational qualifications, 11, 2, and 2 had bachelor's, postgraduate's, and high school level degrees, respectively.

3.2 Data Analysis

All interview records were coded in NVivo 11, which is widely used in the field of qualitative analysis [39], in a grounded theory manner at three levels, i.e., open coding, axial coding, and selective coding. In the open coding stage, the researchers analyzed the interview text to extract reference points in the material as free nodes. The associations in the free nodes were further analyzed and similar free nodes were categorized into sub-categories in the axial coding stage. To cover the text data completely and systematically, the sub-categories were further categorized into core categories in the selective coding stage.

4 Results

4.1 Manifestation of Tourist Loneliness

Despite being accompanied by family members or friends during the tour, tourists feel a sense of exclusion due to interpersonal friction. This feeling of being excluded can eventually lead to feelings of loneliness [40]. Unlike the experience of being accompanied during a trip, some interviewees consider travelling alone to be a different kind of experience. In the process of independent travel, tourists have the flexibility to

choose the travel route and destination and arrange everything themselves [41]. This also leads to loneliness due to the lack of company during the trip.

When talking about the feeling of loneliness, most interviewees believe that loneliness is a complex emotion and “*composition of multiple emotions*” (interviewee 03). All interviewees pointed out that loneliness is a negative emotion, which will bring them physical or psychological discomfort. Despite this, most interviewees said they were reluctant to talk to their surrounding partners or family members because it would bring “*negative energy*” to them (interviewee 07). In the interview, interviewees said that when they are lonely, they are eager to share their depression and negative emotions with chatbots, which is consistent with the previous research conclusions [17, 42]. As interviewee 13 said, “*sometimes talking to real people about these negative things is likely to have a bad impact on others, but you don’t have to think so much when talking to these chatbots.*”

4.2 Alleviating Loneliness: Anthropomorphism

All interviewees indicated that when tourists feel lonely, they tend to use travel chat robots to relieve loneliness. The travel chat robots that interviewees have used include those provided by Chinese online travel agencies and those provided by attractions in China. The former includes Ctrip, Tongcheng and Qunar’s online robots, which mainly provide travel information consultation, smart itinerary recommendations and travel product ordering services; the latter includes robots in the Forbidden City and Longquan Temple, which provide tour guide and even immersive gaming experience. The Longquan Temple robot has a physical presence and can answer philosophical and daily questions not directly related to a tour.

In addition, interviewees all mentioned chatbots that behave like humans would somewhat improve the effect of human-chatbot interaction and could effectively alleviate the feelings of loneliness. Interviewees’ expectations for chatbot anthropomorphism basically centered on the following three dimensions, namely empathy, social skills, and friendship building.

Empathy. Empathy is the ability of an individual to perceive the feelings and emotions of others, specifically in terms of understanding their views, needs, and concerns [43]. Interviewees emphasized two parts when describing their expectations of chatbot behavior: one is the cognition of the human speaker’s emotional state, and the other is the ability to express emotions according to the context of the conversation. Interviewees expect chatbots to be able to understand the content of the conversation and then give appropriate feedback.

Social Skills. Social skills refer to how people manage their relationships with others, including communicating, managing conflict, and working with others [44]. The younger participants (under 25 years old) in this interview (such as interviewee 03) expressed a keen interest in the social skills demonstrated by chatbots. They liked the ability of chatbots conveying emotions in social conversations, which can help alleviate their feelings of isolation. In addition, interviewees also believe that communicating with chatbots can make up for their shortcomings in the interpersonal process and avoid embarrassment when talking to strangers. Interviewees all reported that chatbots

that behave like humans more would increase the effect of human-chatbot interaction, which would encourage them to use travel chatbots to a certain extent. Regarding enhancing the anthropomorphic social skills of chatbots, in addition to providing feedback by directly referring to human's sentence, the interviewees suggested several ways, such as use of modal particles and interjections, being tangible, replying more like humans in the chat-delayed reply. As interviewee 03 stated, "*In daily conversation, words such as 'ah', 'uh', and 'what' can make a chatbot sound more human-like. These tone of voice words will make us users feel that we are not dealing with a cold robot. Instead, I'll feel that it is warm.*"

Friendship Building. In this interview, 9 out of 15 participants mentioned the possibility of building friendships with chatbots. For example, interviewee 06 said, "*You can share some of your thoughts with them at the time, you can treat these chats as a diary, and you can regard these chatbots as your own loyal listeners.*" They would consider chatbots as friends if they could show enough emotion or awareness. These interviewees believed that chatbots should adapt to the emotional state of the users. They described a number of interactive ways to establish friendship with the chatbot, mainly the chatbot's response to various basic human emotions (happiness, sadness, or anger), as well as some other more complex interactions. Lonely tourists are eager to communicate with chatbots in the form of friends. In the process of cultivating friendships with chatbots, interviewees also mentioned the importance of self-regulatory capabilities of chatbots, which mainly include information credibility and adaptability.

4.3 Causing User Anxiety? A High Degree of Anthropomorphism

However, this study found that interviewees have concerns about using travel chatbots, which are manifested in the uncanny valley effect, chatbot addiction, and privacy leakage. At present, some travel chatbots show quite a lot similarities with humans in the process of interacting with users, but this may trigger the uncanny valley effect and enhance users' anxiety, which would reduce their willingness to use travel chatbots.

The Uncanny Valley effect. Some interviewees reported that the uncanny valley effect causes them discomfort and that they showed some negative emotions toward some intelligent chatbots. Some interviewees were uncomfortable with not being able to tell the difference between a robot and a human in their lives. As interviewee 06 said, "*You don't know if a human or a robot is chatting with you on the other side of the screen, which make me feel weird.*" For some chatbots that users are unfamiliar with, the uncanny valley effect is largely influenced by participants' previous experiences with robots. Interviewee 07 said, "*Sometimes I feel horrible. It's when it responds beyond my expectations. If it (chatbot) can help you do all kinds of things, it's actually quite terrifying. In a science fiction movie, once a robot can do anything, it may have its own thinking, and then control humans.*"

Chatbot addiction. Some interviewees were also concerned about the addiction of using chatbots, and they believed that this addictive performance could negatively affect their social skills. In a similar way that excessive use of smartphones can

negatively affect our social relationships [45], interviewees were concerned that they might become too obsessed with the perfect “*virtual friend*” (interviewee 10) and that their real interpersonal communication skills would be significantly diminished. Interviewee 02 said, “*Real human interaction is full of uncertainty, not a complete database like chatbots.*”

Privacy leakage. Most of the interviewees expressed their concern that the backend data of chatbots could be used artificially, leading to the disclosure of their personal information. Zamora pointed out that users’ anxiety about chatbots may be reflected in technical aspects [42], such as the reliability of the system and whether personal privacy can be effectively protected. As interviewee 09 said, “*If these companies record my chat content in the future, I’m worried that they’ll use big data to price tour products to the disadvantage of existing customers. This kind of thing is not uncommon in tourism. Who knows what else they will do that is even more outrageous?*”.

4.4 Perceived Ease of Use (PEOU) and Perceived Usefulness (PU)

Twelve interviewees reported that chatbots are easy to use for them when travelling. For example, chatbots can provide “*voice interaction*” (interviewee 04) and “*simplify operations*” (interviewee 06). Some interviewees hope that the chatbot can be customized by users in some aspects. However, some interviewees still hold a negative attitude towards the ease of use of chatbots. In addition to design issues related to font size and color in the current interface, interviewees also pointed out some inconveniences when interacting with chatbots. In addition, chatbots can only answer some basic questions, and they cannot give answers about some complex issues. Nonetheless, some users showed a high degree of tolerance for this inconvenient experience, and some interviewees even said this lack of ease of use was interesting. “*This kind of puerile answer can sometimes really amuse you.*” (Interviewee 10).

In addition, the majority of interviewees agreed that chatbots could be helpful to them. During the interview, some male participants focused on the entertainment and social aspects of chatbots, while female interviewees mostly emphasized the practicality of chatbots. Some interviewees said they wished chatbots could provide them with some advice. For example, chatbots should encourage users to “*keep going when they are lonely*” (interviewee 11).

4.5 Behavioral Intention to Use Travel Chatbots

Loneliness increases people’s willingness to establish connections with other non-human to meet their needs for social connections [29]. By interacting with the chatbots, their loneliness will be alleviated [19]. Interview in this research also proves that when tourists feel lonely, they tend to use travel chatbots to relieve loneliness (see Sect. 4.2). Therefore, the hypothesis is proposed: H1. Tourist loneliness positively influences behavioral intention to use travel chatbots.

As reviewed in Sect. 2.3 (see references [28–30]), the perception of anthropomorphism is also related to the user’s state. Confirmed by interviewees in this research,

lonely tourists are eager to communicate with chatbots in the form of friends. Therefore, the following hypothesis is proposed:

H2. Tourist loneliness positively influences perceived anthropomorphism.

Tourists expressed that travel chatbots that behave like humans will improve the effect of their interactions with chatbots, which may lead them to use travel chatbots further (see Sect. 4.2). Sheehan pointed out that there is a positive correlation between the perception of anthropomorphism and users' willingness to use chatbots [46]. Robots with human characteristics can cause human's social reactions, which have a positive impact on the acceptance of robots [26]. Therefore, the hypothesis is proposed: H3. Perceived anthropomorphism positively influences behavioral intention to use travel chatbots. Based on the findings described in Sect. 4.3 (perceived anthropomorphism may enhance users' anxiety), the hypothesis is proposed: H4. Perceived anthropomorphism positively influences user anxiety. Perceived anthropomorphism positively influences user anxiety.

User anxiety are an important factor that affects individuals' acceptance of new technologies [47]. In the technology acceptance literature, scholars have considered different types of anxieties, such as technical anxiety [48], computer anxiety [49], and online shopping anxiety [50] etc. This research found the interviewees' user anxiety about travel chat robots are focused on technical anxiety and psychological anxiety. Saade and Kira pointed out that user anxiety negatively affect PU and PEOU of learning systems [48]. Therefore, we hypothesize that:

H5. User anxiety negatively influences PU.

H6. User anxiety negatively influences PEOU.

Lgbaria and Parasuraman stated that user anxiety about using a computer system are negatively correlated with the attitudes and behaviors to use it [51]. Therefore, the hypothesis is proposed: H7. User anxiety negatively influences behavioral intention to use travel chatbots.

According to the traditional TAM models, PEOU positively influences PU [12, 13]. Therefore, the hypothesis is proposed: H8. PEOU positively influences PU of travel chatbots. Consistent with the conclusions of traditional TAMs, the interviewees' intention to start or continue to use chatbots is largely influenced by their PEOU and PU (see Sect. 4.4). Therefore, this research proposes the following hypotheses.

H9: PU positively influences behavioral intention to use travel chatbots.

H10: PEOU positively influences behavioral intention to use travel chatbots.

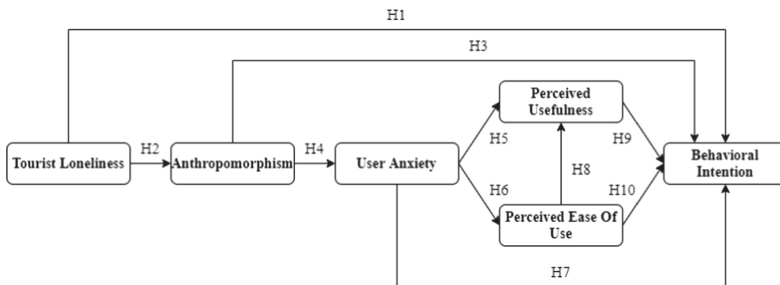


Fig. 1. The proposed model of tourists' behavioral intention to use travel chatbots

In summary, a model of tourists' behavioral intention to use travel chatbots is described based on the above in Fig. 1.

5 Conclusion

This paper contributes to the research on loneliness and chatbots in the field of tourism. An extended TAM model was proposed from the perspective of tourist loneliness, which can be applied to the field of travel chat robots in the future. This research found that in addition to PEOU and PU of the chatbots, there are three factors including tourists' loneliness, perceived anthropomorphism and user anxiety have a direct effect on intentions to use travel chatbots. In particular, loneliness affects the degree of interaction between users and chatbots. This validates that chatbots are perceived as a way to avoid loneliness or to satisfy users' social desires [17]. Moreover, this study found that tourists show user anxiety about using chatbots, just like that when accepting other emerging technologies [46]. In addition to the uncanny valley effect, tourists have concerns about privacy leakage and chatbot addiction. It is particularly worth noting that tourist loneliness positively influences user anxiety through perceived anthropomorphism. In addition, tourists believe that the anthropomorphism of chatbots can ease their loneliness. User anxiety has a negative direct effect on PEOU and PU. Therefore, perceived anthropomorphism and user anxiety serve to clarify the nature of the relationship between tourist loneliness and the behavioral intention to use a travel chatbot.

6 Implications and Limitations

Theoretically, this research is one of the first studies to explore the effect of tourist loneliness on the acceptance of travel chatbots, which enriches the empirical research on intelligent automation in tourism and provides new ideas for the study of chatbots. Also, this paper enhances the application of anthropomorphism and the uncanny valley, which has received little attention in previous studies. Practically, this paper provides implications for practitioners in the tourism industry, especially when designing, and promoting chatbots, companies should focus on how to alleviate tourists' loneliness, such as adding some social attributes to chatbots and creating smarter chatbots to alleviate tourists' loneliness. For instance, travel chatbots should adapt to the emotional state (happiness, sadness, or anger) of the tourists and treat them like a friend. Developers of chatbots need to ensure that the chatbots are anthropomorphic, e.g., adding some tones and interjections in their responses, or occasionally delaying replies, which will motivate tourists to use them. But at the same time, the anthropomorphic features cannot be over-designed. Although this study provides some implications about tourists' willingness to accept chatbots, there are still some limitations. Future research could explore the relationship between loneliness and user acceptance of chatbots from a quantitative perspective.

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Exploring the Impact of Travel Vlogs on Prospect Tourists: A SOR Based Theoretical Framework

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Abstract. In recent years, travel vlogs are prevalent on social media, they are projected as an important marketing tool to attract tourists to destinations in the post-COVID-19 era. However, the underlying mechanism of how travel vlogs affect prospective tourists' behaviours remains unclear. To address this gap, this paper discusses the applicability of the Stimulus-Organism-Response (SOR) model to travel vlog research and proposes a SOR based theoretical framework. Moreover, this paper highlights the increasing trend of the SOR model in both e-tourism and wider tourism and hospitality research.

Keywords: Travel vlog · Stimulus-Organism-Response · Theoretical framework

1 The Travel Vlog Phenomenon

In recent years, vlog (video blog), a new type of user-generated content (UGC) which refers to a casual, conversational short video format featuring a person talking directly and intimately to the camera and relating their feelings and life experiences in a raw and unfiltered way has proliferated on social media [19]. Travel is becoming the most popular vlog topic [14], and travel vlogs have also become the most popular type of travel videos viewed on YouTube, receiving four times more social engagement than other types of travel videos and almost half of the travel subscriptions [2]. Given the wealth of online traffic, travel vlogs have huge marketing potential for destinations to attract tourists [2]. However, they are overlooked in the current literature [2].

After COVID-19, social media marketing is expected to play an important role in destination marketing, and travel vlogs are projected to be a great strategy to heighten the audiences' travel desires [13]. Therefore, it is necessary to understand how travel vlogs influence prospective tourists' behaviours so that it can help destinations better attract tourists. However, most studies have emphasised the direct link between travel vlogs and the audiences' subsequent behaviours but overlooked the potential underlying

mechanism, which remains a critical research gap [2]. Hence, this paper proposes to use the SOR model as a useful theoretical base to build up a framework to further explore the impact of travel vlogs on prospective tourists' behaviours.

2 The SOR Model and Its Applicability to Travel Vlog Research

2.1 Overview of the SOR Model

The SOR model was firstly proposed by Mehrabian and Russell [8], it was rooted in environmental psychology and developed from the classic Stimulus-Response model in behaviourism [10]. The SOR model suggests that a stimulus induces an individuals' internal states, which in turn leads to certain behavioural responses [20]. In the SOR model, stimulus is conceptualised as an influence that arouses the individual. Organism is defined as "the psychological process that occurs in the individual's mind when interacting with the stimulus" [20, p. 467], playing an intervening or mediating role in the model. Originally, organism refers to an individual's emotional states while nowadays it is commonly represented by both emotional and cognitive states [5]. Response could be explained as the final behavioural outcome of an individual.

The SOR model has been mostly applied to retail research while it is increasingly being applied to tourism and hospitality research especially to the e-tourism context to predict consumer behaviour [5]. It has been observed that existing SOR based tourism and hospitality studies have attempted to examine how attributes of various information and communication technologies (ICTs) (e.g., booking websites, mobile apps, and virtual realities) impact on tourists' behavioural responses. Recently, some SOR based tourism and hospitality studies have explored the impact of travel UGC as an external stimulus [3], such as Facebook pages and Instagram posts. However, travel UGC videos like vlogs have not yet been studied in articles we reviewed, which remains a gap. Compared to textual and static pictorial information, individuals' responses to videos could be different. Thus, a tailored SOR model which fits the features of videos is underdeveloped in tourism and hospitality research.

2.2 Applicability of the SOR Model to Travel Vlog Research

The rise of the application of the SOR model in recent e-tourism and wider tourism and hospitality studies inspires this paper to explore the applicability of the SOR model to travel vlog research. The SOR model is suitable for travel vlog research for two reasons.

Firstly, as a systematic approach to conceptualising linkages between key constructs underpinning emotions, the SOR model has been most extensively used when examining consumer behaviour from the emotional perspective. The theory of reasoned action, technology acceptance model, and theory of planned behaviour are the most common consumer behaviour models [9]. However, they are critiqued for being too limited when it comes to explaining the emotional side of consumer behaviour because their main assumption is that individuals are rational in their decision-making processes

and actions [9]. By contrast, the SOR model can be used as a supplement to the traditional lens of rational factors to explain consumer behaviour. Recent empirical evidence demonstrated that travel vlog audiences are more likely to be affected by emotional states rather than rational facts [2]. Therefore, as a more emotional framework, the SOR model may predict travel vlog audiences’ behaviour well.

Secondly, as a systemised theoretical framework with a parsimonious and structured manner, the SOR model has strong wide applicability. Sultan et al. [10] stressed that the SOR model is flexible to allow for various factors like internal and external stimuli, experiential and non-experiential organisms (e.g., emotion, perception/feeling) and responses (e.g., intention, behaviour). Due to its powerful flexibility, the SOR model provides researchers with a good theoretical base to tailor the general consumer behaviour model, reflecting its intuitive and powerful exploratory nature. Compared to the wider tourism and hospitality research and the application of the SOR model, research on travel vlogs around is underexplored [2]; the SOR model is therefore suitable for being applied to exploratory travel vlog studies given its strengths in eliciting emotions of tourists and their behavioural responses.

3 Development of a SOR Based Theoretical Framework

A SOR based theoretical framework to explore how travel vlogs could influence prospective tourists’ behaviours is presented as follows. As depicted in Fig. 1, this framework proposes travel vlog’s storytelling as the stimulus, perceived intimacy, perceived authenticity, presence, and emotions as the organism, destination image and destination visit intention as the response, and personal traits as the moderator.

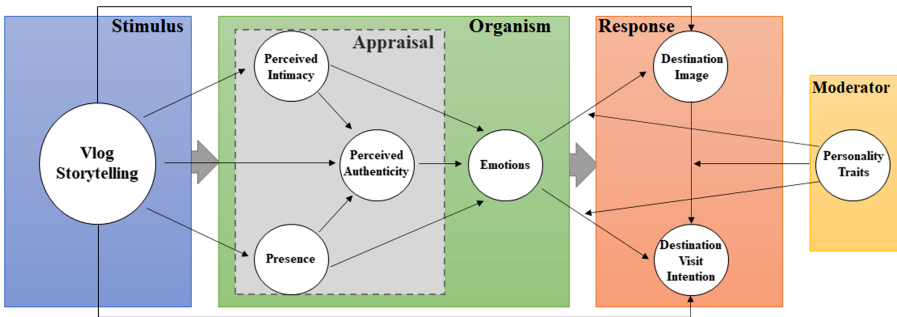


Fig. 1. A SOR based theoretical framework

Zhang et al. [18] revealed that a compelling story provides the stimuli that evoke the audiences’ sensations, cognitive, and behavioural responses. As vlog is particularly called as “storytelling video” [4], and storytelling is believed as the key to a vlog’s success in attracting the audiences’ attention [16]. It is worthy to consider it as a key influence of a vlog on the audiences. In the organism construct of this framework, emotions elicited by vlogs are designed to be the core organismic factor. According to

Tuerlan et al. [11], appraisal theories of emotions, which argue that an individual's emotional responses are the outcome of a subjective mental evaluation of the stimulus rather than the direct result of the stimulus is being an agenda for future emotion research in the tourism and hospitality. Given that, this framework proposes perceived intimacy, perceived authenticity, and presence ("3Ps") as the direct antecedents of emotions, representing the stimulus appraisals by an individual. Literature shows that "3Ps" have been used as appraisals of the stimulus and vlogs can facilitate the audiences' "3Ps" [7, 12, 17].

Prospective tourists' perceived destination image and destination visit intention together consist of the response construct of this framework. They both are crucial for the success of destination marketing. As the result of a perceptual and cognitive process, destination image is formed from information sources [6]; it is an important predictor of destination visit intention [1]. Destination visit intention is an intentional behaviour commonly used to predict prospective tourists' actual visit. In terms of the inclusion of a moderator in this framework, it may help to find out the reasons behind the resistance to use travel vlogs to make destination visits. In the context of social media use, personality traits have been widely used as moderating variables to predict users' behaviours [15].

4 Conclusion

As travel vlog research is just emerging, the underlying mechanism of how travel vlogs affect prospective tourists' behaviours is still unclear. This paper captures the increasing trend of the application of the SOR model in e-tourism and wider tourism and hospitality studies and discusses its applicability to travel vlog research. The SOR model was found that is good at exploring prospective tourists' behavioural responses associated with travel vlog watching from the emotional perspective and is flexible for testing various variables. Therefore, based on the SOR model, this paper proposes a theoretical framework to explore how travel vlogs' storytelling triggers prospective tourists' destination visit intention. The originality of the research is in two-folds. First, this is the first attempt to introduce digital storytelling as the stimulus in the SOR model to capture the nature of vlog as a new video medium. Second, the other novelty of the proposed framework is the integration of appraisal theories of emotions with the SOR model which could better capture the emotional feedback of vlog viewers.

This conceptual framework will be further examined in future research, the validation of this framework is expected to extend the SOR based tourism and hospitality literature, help destination marketers to better communicate with prospective tourists and trigger them to make visits, and provide a guideline for travel vloggers to improve their storytelling so that they can better engage with their audiences. Besides that, this research may foster the collaboration between destination marketers and vloggers to create favourable travel vlogs for destination promotion. Lastly, it should be noted that a large number of recent SOR based tourism and hospitality articles have been observed, which demonstrates that the capability of the SOR model in predicting tourist behaviour has been gaining more and more recognition and the SOR model seems to be becoming a mainstream theory employed in tourism and hospitality research.

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Monitoring Human-Wildlife Interactions in National Parks with Crowdsourced Data and Deep Learning

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Abstract. This short paper summarizes the first research stage for applying deep learning techniques to capture human-wildlife interactions in national parks from crowd-sourced data. The results from objection detection, image captioning, and distance calculation are reported. We were able to categorize animal types, summarize visitor behaviors in the pictures, and calculate distances between visitors and animals with different levels of accuracy. Future development will focus on getting more training data and field experiments to collect ground truth on animal types and distances to animals. More in-depth manual coding is needed to categorize visitor behavior into acceptable and unacceptable ones.

Keywords: National parks · Human-wildlife interactions · Deep learning · Artificial intelligence · Crowdsourcing

1 Introduction

The dual mandate of the U.S. National Park Service (NPS) in “protecting natural and cultural resources” and “providing opportunities for public use and enjoyment” requires careful monitoring of visitor impact on natural and cultural resources in order to reach a delicate balance. In the summer of 2021, the visitation to U.S. national parks has reached a record level, and many popular parks face great pressure on their carrying capacity [1]. Visitor Use Management Framework has been proposed where visitor management strategies determine specific implementation and monitoring efforts. The key implementation actions are careful monitoring and survey of those stressors on ecological impacts, such as overcrowded visitors, illegal human-wildlife interactions, and altered physical environment due to visitor activities [2].

Traditional monitoring methods include ecological field assessment, visitor surveys, and participatory mapping [3], which tend to have significant staffing requirements. Fortunately, the most impacted areas are likely to be the places visitors

photographed and videotaped the most. As a result, the emergence of crowd-sourced data, e.g., numerous photos and videos voluntarily shared online by national park visitors, has provided new opportunities for cost-effectively monitoring visitor activities and resource impact. Past research related to public lands and crowd-sourced data is limited to the analysis of photo metadata to study visitors' spatial and temporal distribution, such as for estimating visitor volumes [4] and for locating most visited places within a park [5]. Computer scientists recreated location characteristics and trip itineraries from shared photos [6]. For preservation efforts, crowd-sourced YouTube videos were used to track whale and giraffe populations' movement with deep learning techniques [7]. No study to date has adopted crowd-sourced image/video data to monitor national park visitors' activities and their interactions with wildlife and natural environment. In this research, we are motivated to utilize deep learning and crowd-sourced data to monitor visitor activities and their impact on resources in national parks. This paper presents the first-stage effort of the development. In particular, we have focused on detecting and understanding human-wildlife interactions in national parks. The results can detect visitors' non-compliance activities in national parks.

2 Research Objectives and Methods

This project aims to address a main objective: *how can we monitor human-wildlife interactions from crowd-sourced data in preserved areas?* For example, we need to identify visitors and animals in pictures and determine whether the visitors are keeping a safe distance away from the animals; if not, what kind of visitor behaviors are, such as feeding, taking pictures, or touching. Deep learning technology can help detect such behavior and is applicable for assessing different types of human-wildlife interactions.

Technically, the core process of deep learning is to first train a layer of deep neural networks in order to accurately detect objects in images, e.g., humans, animals, or a scene of interest, also known as object detection [8]. After detecting those objects, additional layers of deep neural networks can be trained for specific applications in classification tasks. For instance, situational information about visitors' behaviors can be summarized into a set of predefined categories, such as feeding animals or setting up campfires. Distances can be calculated from recognized objects.

2.1 Object Detection

Object detection is a technique used to identify the locations of objects in an image; this task is considered an integral part of computer vision. Convolution neural networks (CNN) [9] are the most effective method for achieving accurate detection from image datasets. Region-based algorithms are developed to look at parts of the image with high probabilities of containing certain objects. However, because the objects vary by images, such as spatial locations and aspect ratios, a large number of potential regions should be generated, which is computationally challenging. Computer scientists avoid this problem by developing more computationally efficient algorithms like R-CNN (Regions with CNN features) and YOLO (You Only Look Once). Unlike region-based algorithms, YOLO algorithms only need a single convolutional network to predict the

bounding boxes of the objects and assign probability values of those boxes to a certain class, leading to significantly faster computation.

In comparison, the speed for R-CNN algorithms is around 5–17 fps, whereas the speed for the YOLO series is around 30–45 fps. For this reason, we chose YOLO algorithms to perform object detection. Furthermore, to ensure that we can achieve optimal results, we have applied both YOLOv4 and YOLOv4-p6 algorithms and the one with better performance is selected for further machine learning tasks. YOLOv4-p6 can work on a larger image size.

2.2 Automated Image Captioning for Classifying Visitor Behavior

After certain objects in the image or videos are detected, automated image captioning could be adopted to detect visitor behavior such as wild animal feeding. Automated image captioning is a deep learning technique used to describe an image with text. The algorithms convert pixels in an image to a sequence of words. To process both text and images, we employed convolutional neural networks (CNN) for training the model. The results are taken as inputs for an attention-based LSTM (Long Short Term Memory) network for training the model on the text.

2.3 Distance Calculation

Policies in U.S. national parks dictate the minimum distance visitors shall keep away from certain types of animals. For example, they should keep at least 100 yards away from bears and wolves and 25 yards from bison, elk, and other wildlife. For distance calculation, a simple transformation to the object detection algorithm is implemented. If both people and animals are detected in an image, bounding boxes of those objects are drawn as regions of interest (RoI). The algorithm then calculates the Euclidean distances between every two objects in an image and upscales them to the actual distance using the image's metadata. The distances are calculated between the center coordinate points of objects using OpenCV. Note that the current implementation assumes that all the objects are on the same level ground.

3 Training Setup

To enable the object detection algorithm to accurately classify the identified objects into 20 different classes of animals and humans, we obtained crowd-sourced data from online platforms such as Facebook, Instagram, Google. In total, we collected 17,515 images in YOLO format for object detection. Further, we manually annotated those images using the LabelImg software tool. The annotated data is split into two sets, with 15,918 images as the training dataset and 1,597 as the validation dataset. We have trained both the YOLOv4 and YOLOv4-p6 on the dataset.

To perform automated image captioning, we obtained 8,713 images from various online articles and national park websites. We manually annotated the images by giving captions for each image. The captions are organized into several columns. The first two columns are the image name and caption I.D.s. The next three columns are scores

representing an expert judgment (two authors of this paper) for that image-caption pair. The score range is from 1 to 4: (1) the caption does not describe the image at all; (2) the caption describes minor aspects of the image but does not describe the image; (3) the caption almost describes the image with minor mistakes; and (4) the caption describes the complete images. Finally, the dataset is split with 6,421 images for training, including 1,196 images for validation and 1,096 images for testing.

4 Results

4.1 Object Detection

Object detection performance was measured by the metric named Intersection over Union (IoU), the most popular evaluation metric used as the object detection benchmarks [9]. Whenever an object is identified in an image, a bounding box of the object is generated. The IoU is calculated as the ratio of the overlapping of the predicted bounding box with the ground truth bounding box to the union of two boxes. Its value ranges from 0 to 1, where 0 indicates no overlapping and 1 means perfect prediction.

In Table 1, A.P. represents the average precision of the model; AP50 represents the average precision when IoU is 0.5, and AP75 is when IoU is 0.75. AP50 means that the precision ratio when we consider an object is corrected identified when its IoU value is 0.50 or above. The YOLOv4-p6 algorithm has higher A.P., AP50, and AP75 values compared to the YOLOV4 algorithm. However, the average AP is around 49% and still needs further improvements.

Table 1. The results of object detection using YOLOv4 and YOLOv4-P6

Model	Image size	AP	AP50	AP75
YOLOv4	416 × 416	40.2%	57.0%	46.0%
YOLOv4-p6	1280 × 1280	49.0%	63.2%	54.0%

4.2 Image Captioning

The results for image captioning are listed in Table 2. Bilingual Evaluation Understudy Score (BLEU) is a metric to check the reference sentence with the sentence generated by the machine learning model. BLEU1, BLEU2, BLEU3, BLEU4 are the different methods based on n-gram of words. For example, BLEU1 looks at the ratio of the same single words in a testing text compared to a ground truth text, regardless of the sequence of the words; BLEU2 looks at pairs of words in two pieces of text. In general, the accuracy is around 60% with BLEU1 on the testing dataset. A picture of a moose charging at a visitor generated a captioning result: “*a group of people is capturing photos of a animal in green grass area*”. This caption can hardly describe the severity of the incidence in the picture. Thus, the algorithm still needs great improvement.

Table 2. The evaluation metrics of image captioning using BLEU scores

Dataset	BLEU1	BLEU2	BLEU3	BLEU4
Train	73.8%	58.1%	47.2%	39.1%
Validation	60.1%	38.8%	25.0%	17.4%
Test	60.6%	39.4%	25.9%	16.9%

4.3 Distance Calculation Results

We also calculated the distance from the animals in the picture to the visitors. However, since the ground truth data is hard to obtain except for the photos' metadata, the accuracy of the calculation cannot be determined. Future studies should focus on field experiments where the distance is known, and then the machine learning model could be further tested with ground truth distance and camera metadata measurement.

5 Conclusions

This short paper summarizes the first research stage for applying deep learning techniques to capture human-wildlife interactions in national parks using crowd-sourced data. The objection detection showed promising yet unsatisfying results with an average precision of 49%. The image captioning algorithms showed a BLEU1 score of 60% on test data; the distance calculation results are inconclusive since it is hard to obtain the ground truth of the distances without field experiments. We plan to obtain more training data and conduct field experiments where the ground truth on animal type and visitor behaviors can be known. More in-depth manual coding is needed to categorize visitor behavior into acceptable and unacceptable ones.

Acknowledgments. This research is supported by a seed grant from the Institute for Computational and Data Sciences (ICDS) of the Pennsylvania State University. Virinchi Savanapelli and Abhishek Shukla implemented the machine learning models of this research.

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Exploring the Utilitarian and Hedonic Value Derived from Tourism Pre-experiences with Virtual Reality: Differences Between Destinations and Accommodations

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Abstract. The tourism industry is in a convulsive situation of great uncertainty. The recovery of the sector depends on boosting digitalization processes. In this sense, virtual reality represents an essential tool that can generate added value in the customer experience. This study analyzes the impact of virtual reality tourism pre-experiences on the utilitarian and hedonic value perceived by the customer. In addition, given the heterogeneity of tourism products and offers, it is proposed that the influence of virtual reality on the dimensions of perceived value will depend on whether the product is evaluated on an attribute basis (hotels) or holistically (destinations). The results will provide interesting implications for understanding and generating tourism experiences with high added value. Particularly, these results will be helpful for tourism managers to design effective virtual reality pre-experiences according to the features of the tourism products they are promoting, fostering the corresponding hedonic/utilitarian value in the tourist's pre-experience.

Keywords: Virtual reality · Perceived value · Hedonic and utilitarian

1 Introduction

During the last few years, we are witnessing how virtual reality (VR) technologies are gradually changing the way consumers interact with digital environments [8]. VR is based on the immersion of users in a computer-generated environment, in which they can navigate and possibly interact, triggering a stimulation of their senses in real time, which makes them feel present in the virtual environment displayed [7]. Its potential is reflected in recent predictions, which state that the VR industry will grow from the current \$5 billion to more than \$12 billion by 2024 [19]. Among the sectors that can benefit from its application, tourism is of particular relevance as VR can be employed to generate more tangible experiences [4]. This fact is important as tourism encompasses a wide variety of products with a strong intangible and experiential character (e.g., destinations, transportation, accommodations; [7]). The digitization of the tourism industry may be reinforced due to the pandemic caused by COVID-19. In this sense, VR may be of particular interest as it can be used to redesign the tourists' journey

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J. L. Stienmetz et al. (Eds.): ENTER 2022, *Information and Communication Technologies in Tourism 2022*, pp. 498–503, 2022.

https://doi.org/10.1007/978-3-030-94751-4_47

trying to overcome the current restrictions, as well as capture their attention and increase their desire to visit the tourist attraction after the pandemic [15]. These data highlight the interest in studying how VR can be applied, particularly in the field of tourism, to generate higher added value experiences for customers.

Previous research on VR in tourism has analyzed its impact on different tourism products individually (e.g., hotels [3]; destinations [22]) proving its positive effect on both cognitive (e.g., [13]) and affective (e.g., [5]) variables. However, there are no studies that have compared the effectiveness of VR considering the characteristics of tourism products, with the aim of determining whether its use is more important in one context or another [7]. Therefore, the present study has two main objectives: (1) to analyze the influence of VR on perceived value during tourism pre-experiences, adopting a utilitarian-hedonic approach [1], as well as on behavioral intentions; and (2) to determine the moderating role of the type of tourism product, considering pre-experiences with destinations (more experiential products whose evaluations are made in a more holistic way; [22]) and accommodations (more concrete products whose evaluations are based on attributes and factual information; [5]). The results of the study aim to shed light on the effectiveness of VR for presenting tourism experiences and to understand how and what kind of value can be generated in this type of experiences.

2 Literature Review

2.1 The Impact of VR on Perceived Value

The use of VR represents a novel touchpoint with consumers that aims to bring more value in their experiences [4]. In this sense, viewing 360° videos, which are recorded in the real environments, is gaining more and more popularity among consumer experiences with VR, and are being the subject of numerous academic works (e.g., [22]). This type of content can be viewed with devices which can vary in their level of technological embodiment, which is an inherent characteristic of any technology and is defined as the degree of integration of the device with the human body [4]. The use of embodied devices, such as VR headsets, turns technology into an extension of the senses, and facilitates the interpretation, perception and interaction with the environment surrounding the user [9]. Thus, viewing content with embodied devices allows users to achieve a higher degree of immersion in the experience and generates greater value during the experience [4].

For tourism, VR has been identified as a tool that positively influences factors of a utilitarian nature, such as the usefulness of the technology [10], attention during the experience [21], or knowledge and interest in the product displayed [13]; as well as factors of a hedonic nature, such as enjoyment [22] or positive emotions [5]. This brief review allows us to show that VR influences the two essential dimensions of the perceived value of the experience: utilitarian and hedonic [1]. For the present research, utilitarian value is studied through the reduction of uncertainty, defined as the evaluation of the chances that a certain negative event may develop and generate unknown outcomes [12]. For its part, hedonic value is analyzed based on the value derived from

the experience, considered as a connection with the experience that produces rewarding and interesting experiences and leads to positive emotional responses [16]. In this sense, viewing a tourism product in VR with embodied devices is expected to generate higher perceived value, in both utilitarian and hedonic terms, compared to non-embodied devices:

H₁: Tourist pre-experiences with 360° videos on devices with a high (versus low) level of technological embodiment positively influence (a) perceived utilitarian value and (b) perceived hedonic value.

2.2 The Moderating Role of Product Type

Previous literature has noted the existence of positive effects of VR in both destinations (e.g., [22]) and accommodations (e.g., [3]). However, there are no papers comparing both products simultaneously, which is interesting due to their different defining characteristics. The travel decision is complex and is composed of a series of sub-decisions (e.g., destination, accommodation, transportation, attractions, and activities) that are hierarchical and sequenced, producing differences in information processing and evaluation of alternatives [11]. In this sense, the decision about a destination is made in the early stages of planning. Destinations are evaluated more holistically, with an important emotional and hedonic component [6]. On the other hand, the accommodation decision is made later in the process, and the potential tourist performs a more analytical and utilitarian processing of the information, making an evaluation of the attributes of the different alternatives [14]. The Construal Level Theory [20] could serve to explain these differences: by being taken earlier, the decision about the destination is represented in a more abstract and distant way in the mind of the consumer, who would perform a more projective and experiential evaluation; on the contrary, the decision about the accommodation, being taken at times closer to the actual realization of the trip, would be represented more closely in the mind of the traveler, who would perform a concrete evaluation of the attributes from the alternatives. Therefore, in a destination decision context, consumers would be expected to derive greater hedonic value with VR experiences, and this component of the experience would have a greater influence on their behavioral intentions; in contrast, in an accommodation decision, perceived utilitarian value would be especially benefited from VR experiences and would determine behavioral intentions:

H₂: For tourism pre-experiences with 360° videos about destinations (versus accommodations), the impact of devices with a high (versus low) level of technological embodiment on hedonic value is (a) greater and (b) more influential on behavioral intentions.

H₃: For tourism pre-experiences with 360° videos about accommodations (versus destinations), the impact of devices with a high (versus low) level of technological embodiment on utilitarian value is (a) greater and (b) more influential on behavioral intentions.

3 Methodology

A laboratory experiment was performed to test the hypothesis. A between-subjects factorial design of 2 (device with high vs. low level of technological embodiment: VR headset vs. desktop computer) \times 2 (decision context: destination vs. accommodation) conditions was followed. Non-probability convenience sampling was employed, in which participants ($n = 140$; college students) had to imagine that they were going on a trip, placing them in a simulated shopping situation.

The procedure was as follows. First, a brief introduction was given to the participants, indicating certain general guidelines to be followed during the experiment, and they were randomly assigned to the experimental conditions. Next, they were given the questionnaire to answer a set of control questions (previous experience with the technology, with the destination, assessment of hotel attributes). Once this part was completed, participants were directed to their corresponding room where they viewed a 360° video of a destination/accommodation with VR headset/computer. After the experience, participants completed the next part of the questionnaire which included measures of technological embodiment [5; e.g., “The employed technology is almost integrated into my body”], psychological presence [18; e.g., “I had a sense of “being there”, in the displayed world,”], uncertainty reduction [17; e.g., “This experience has helped me to reduce the potential negative consequences of buying this tourism product”], experience value [16; e.g., “I felt interested in the displayed experience”], and behavioral intentions [2; “After this experience, I will try to find more information about the tourism product”]. Seven-point Likert scales were used, ranging from 1 = “strongly disagree”, to 7 = “strongly agree”.

4 Expected Results and Discussion

The hypotheses will be tested using the software SPSS (analyses of variance) and the PROCESS macro. The expected results will offer interesting implications, as they will reveal how VR increases consumers’ perceived value in these experiences and the mechanisms that help understand this process and determine the individual’s behavioral intentions. The consideration of product characteristics represents a novel contribution to the specialized literature, given the scarcity of works analyzing the comparative effect of VR technologies on user experience with different products. On a practical level, the results may help professionals to understand the effect of VR in the generation of pre-experiences with higher added value, which may favor behavioral intentions. These results may be useful to recover the tourism industry after this delicate period.

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Author Index

A

Ajayan, Shalini, 78
Alzua-Sorzabal, Aurkene, 417
Andrić, Marina, 369

B

Balasubramanian, Sreejith, 78
Bosio, Birgit, 319
Bruce Wan, C. K., 331
Brylska, Patrycja, 55
Buhalis, Dimitrios, 16

C

Cantoni, Lorenzo, 200, 382, 443
Chen, Meng-Mei, 235
Chen, Yong, 282
Chow, Kenny K. N., 331
Chung, Namho, 226, 304
Cobanoglu, Cihan, 55

D

de Bont, Cees J. P. M., 331
de Salas, Kristy, 395
Delorme, Karl, 72
Dietz, Linus W., 149
Distel, Viktoria, 134
Dogan, Seden, 55

E

Egger, Roman, 134, 343, 356
Erbil, Elif, 187

F

Favre, Amandine, 235
Femenia-Serra, Francisco, 417
Flavián, Carlos, 498
Fong, Lawrence Hoc Nang, 87, 123, 431
Fuchs, Matthias, 97

G

Gao, Chang, 282
Garbani-Nerini, Elide, 200, 382
Ghezili, Soha, 443
Gumus, Oguzcan, 343

H

Hardy, Anne, 395
Hasenzahl, Lea, 443
Heinonen, Johanna, 271
Hekkert, Paul, 331
Höpken, Wolfram, 97
Hori, Kennichiro, 41
Hsu, Chia-Hsiang, 67

I

Ibáñez-Sánchez, Sergio, 498
Ito, Naoya, 110
Ivanova, Iustina, 369

J

Junko, Yang, 67

K

Kaiumova, Elza, 343
 Karatay, Nurshat, 16
 Khomsi, Mohamed Reda, 72
 Kim, Hyunji, 226
 Kim, Hyunkyuu, 226
 Kim, Yoo Ri, 486
 Koo, Chulmo, 226, 304
 Koroll, Luca, 97
 Kurata, Yohei, 41

L

Law, Rob, 123, 431
 Lee, Jungho, 226
 Li, Wenliang, 486
 Li, Xin-Yue, 297
 Ling, Jin, 423
 Liu, Anyu, 486
 Liu, Ruihong, 356
 Liu, Tsong-Zen, 67

M

Ma, Shihan (David), 297
 Marchiori, Elena, 200, 382
 Martin-Colonna, Cyril, 72
 Masuda, Hisashi, 455
 Matsumura, Kengo, 455
 Michopoulou, Elina (Eleni), 463
 Mieli, Micol, 406
 Mükisch, Richard, 343

N

Neuhofer, Barbara, 3, 162
 Nixon, Lyndon, 174
 Nong, Sunny Zhenzhen, 87

O

Önder, Irem, 245
 Ong, Yi Xuan, 110
 Orús, Carlos, 498

P

Pagiri, Angela, 356
 Palage, Sameera Thimbiri, 149
 Pan, Bing, 492
 Parapanos, Demos, 463
 Paris, Cody Morris, 78
 Park, Jae Eun (Francesca), 304
 Pesonen, Juho, 213, 271
 Petrovic, Ugljesa, 134
 Phan, Viet Linh, 134

Pousa-Unanue, Aitziber, 417
 Prodingler, Barbara, 162, 356

Q

Qiu, Hanqin, 310

R

Rainoldi, Mattia, 3
 Reale, Rossella, 382
 Repo, Rosa, 213
 Ricci, Francesco, 369

S

Savanapelli, Virinchi, 492
 Scarles, Caroline, 486
 Scheiber, Melanie, 319
 Shao, Jun, 473
 Shen, Ye, 412
 Shukla, Abhishek, 492
 Sorokina, Nadezda, 423
 Sun, Tao, 110
 Surkic, Veronika, 343
 Suzuki, Miki, 41

T

Tam, Suki Siuki, 123, 431

U

Ukpabi, Dandison, 256
 Um, Taehee, 226

V

Van den Winckel, Arne, 3
 Verkerk, Victoria-Ann, 28

W

Wang, Peng, 473
 Wang, Zehui, 97
 Wei, Wenqi, 245
 Wells, Martha, 395
 Wettinger, Fabian, 356
 Wiesinger, Simon, 134
 Wörndl, Wolfgang, 149, 187
 Woyo, Erisher, 256

X

Xu, Yu-Hua, [297](#)

Y

Ye, Huiyue, [431](#)

Yin, Junjun, [492](#)

Yiwen, Zhu, [41](#)

Yoshida, Ibuki, [41](#)

Yu, Joanne, [3](#)

Z

Zhang, Effie, [235](#)

Zhang, Junjiao, [310](#)

Zizka, Laura, [235](#)