Berta Ferrer-Rosell
David Massimo
Katerina Berezina   *Editors*

Information and Communication Technologies in Tourism 2023

Proceedings of the ENTER 2023
eTourism Conference, January 18–20,
2023

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Editors
Berta Ferrer-Rosell ![ORCID]
Business Administration
University of Lleida
Lleida, Spain

David Massimo ![ORCID]
Faculty of Computer Science
Free University of Bozen-Bolzano
Bolzano, Italy

Katerina Berezina ![ORCID]
Nutrition and Hospitality Management
University of Mississippi
University, MS, USA

Preface

The 30th Annual International eTourism Conference ENTER23@Johannesburg 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) and Seeza Network, ENTER23@Johannesburg takes place face to face, during January 18–20, 2023, with the theme "Inclusive power of e-Tourism: connecting culture, technology and sustainability".

The research track of ENTER23@Johannesburg received a total of 66 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, 17 full papers and 24 short papers were accepted for presentation at the conference and are included in these proceedings. To support the global dissemination of tourism technology research, thanks to IFITT and its members, the proceedings is published in open access mode.

While still maintaining a broad scope, the papers presented in this volume advance the current knowledge base of ICT and tourism in the following areas: social media and user-generated content; technology, including AI-driven technologies; research on destination management and innovations, among others. There are other three main topics suggested by members of the community and proposed as special research sessions: big data analytics and forecasting in the tourism market; metaverse in hospitality; and sustainable solutions for the Fourth Industrial Revolution (4IR) in tourism and hospitality. We hope this 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 ENTER23@Johannesburg 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 to select candidates for the best paper award. Furthermore, we are thankful to the ENTER23@Johannesburg conference chairs Dandison Ukpabi and Katarzyna Minor, the rest of the conference organizing team, Septi M. Bukula and Asanda Bukula from Seeza Network, 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 present their latest research at ENTER23@Johannesburg. This conference would not be possible without their efforts.

Berta Ferrer-Rosell
David Massimo
Katerina Berezina

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The Initial Impact of Technology Enabled Relationship Creation in Rural Lebanon

Alessandro Inversini[1](✉), Maxie Müller[1], and Salma Talhouk[2]

[1] EHL Hospitality Business School, HES-SO, University of Applied Sciences and Arts Western Switzerland, Lausanne, Switzerland
alessandro.inversini@ehl.ch, maxie.muller@eh.ch
[2] American University of Beirut, Beirut, Lebanon
ntsalma@aub.edu.lb

Abstract. Technology enables actor-to-actor experience co-creation leading to value creation for the parties involved in the process. This research presents the initial impact of a mobile application developed to foster technology enabled relationship in rural Lebanon. Results indicate that technology has the potential to positively impact both host and guest fostering relationships building in all the trip stages and leading to socio-economic development and transformative experiences. In fact, the paper shows that relationships created and strengthened with the support of technology are expected to have effects at personal, community and business level.

Keywords: eTourism · eT4D · Community-based tourism · Transformative experiences · Host-guest relationships

1 Introduction

Tourism has become one of the largest economic sectors in our globalized world [34]; however, over the years a series of alternative to mass tourism have been proposed. Those forms of tourism are said to be more community focused and ideally contributing to local socio-economic development. These include community-based tourism (CBT), ecotourism, and regenerative tourism, impact local communities and seek to protect nature [1, 7, 8, 11, 20, 22].

Digital technology, besides having had the merit of reshaping and the competitive environment of the industry [14], are also considerably influencing these alternative forms of tourism [18]. In fact, digital technologies have impacted consumer behavior, service operations and distribution channels throughout the industry [26]. Most importantly for this study, technology has changed the interaction between service providers and customers and using technologies in a specific way further allows to benefit from efforts such as personalizing services or creating value together [2, 14]. Research shows that the possibility to connect with people through technology and co-create experiences [25] facilitates and supports the creation of transformative experiences [17, 28].

This study aims at generating an initial and exploratory understanding of the impact of smart digital technologies for actor-to-actor relationships building towards the creation of (i) socio-economic development at community level and (ii) transformative experiences in the context of rural Lebanon. The study tackles these aim and research objectives by the means of an exploratory qualitative methodology addressing tourism providers and travelers.

2 Literature Review

2.1 Community Based Tourism

While there is no clear consensus on the definition for Community Based Tourism [24 – CBT], it is agreed that it is a form of tourism that puts at its heart the local communities, their development, and the conservation of their culture and habitat [7, 10]. Special importance in this form of tourism can be laid on community participation and involvement, the relationship between host communities and guests, as well as cultural encounters that are often part of Community Based Tourism products [22]. Benefits of CBT include employment opportunities, especially for women, youth, and less-skilled people [13, 22], as well as improvements made to local infrastructure [21]. However, Saayman and Giampiccoli [29] argued that in remote areas, the lack of infrastructure, along with a potential lack of financial resources and low capacities, may hinder community participation in CBT initiatives.

One of the main features of CBT, the heavy involvement of local communities in decision making processes, has been questioned with the assumption that communities are not homogenous; community members have different opinions, and there are different stakes at play within a community [30]. This premise is supported by research by Jamal and Getz [19] who show that views on tourism development vary within a single community. A major limitation to CBT is that socio-economic structures and political systems remain the same despite CBT initiatives that fail to address and change root-causes of poverty and inequalities [32]. Similarly, Scheyvens [30] mentions that state intervention is often required to ensure that the benefits of tourism are captured, and to avoid the destruction of the environment or the violation of labor laws. The involvement of local communities and the consideration of their interests is important, and it must be ensured by involving stakeholders from various groups from the beginning of CBT (planning) processes [3, 19]. Additionally, appropriate policies should be put in place early in the process to avoid environmental destruction and to prevent most benefits of CBT from going towards local elites [31].

The tourism literature discusses the possible impact of travel related initiatives in developing and emerging countries looking at (i) infrastructure development [21] with Saayman and Giampiccoli [29] arguing that the lack of infrastructure in remote areas may hinder visitation and therefore community participation in CBT initiatives. (ii) Employment opportunities pointing out that many jobs within tourism are available to vulnerable members of local communities (women, young people) and are oftentimes suitable for less-skilled people with minimal levels of education [20]. (iii) Economic growth lies in the expectation to capture income from tourists' spending, in other words, increase foreign exchange earnings [20].

2.2 eTourism 4 Development and Host-Guest Relationships

The interplay between digital technologies and tourism in the context of developing and emerging countries has a young academic history (e.g. eTourism 4 Development - 18). Yet, although there is scant research in the field of Information and Communication for Development which focuses on Tourism [16], there is ample evidence of the importance of digital media and especially the internet as a marketing and management tool for small business operating in tourism in developing and emerging countries [18]. Recent research pointed out that the interactive power of technology can be harnessed to develop and sustain actor-to-actor relationships [25] and create personalized and meaningful experiences [4]. A concept often mentioned in relation to the personalization of services with technologies is "value co-creation" [2, 25], whereby both sides (consumer and service provider) make use of modern technology and the wider smart tourism ecosystem to interact and create value together [14, 27]. With respect to tourism destination managers, the use of technology can create increased competitiveness and be a source of competitive advantage [2, 27], and contribute to more suitable, meaningful, memorable, and often transformative experiences for each individual consumer [17]. Thanks to actor-to-actor co-creation [27] the co-created value impact both actors – i.e. host and guests [17].

2.3 Transformative Experiences

Transformational travel has been defined as "intentionally traveling to stretch, learn and grow into new ways of being and engaging with the world" [33, p.4]. Equally, transformative travel carries notions of self-fulfilment and respect towards visited communities and nature [5]. Especially the new generation of travellers is looking for transformational and interactive experiences [9]. Technology is an valuable tool for creating these experiences as it can assist with co-creation processes and creating deeper connections between service providers and tourists [12].

Travelers who go through transformative experiences speak about change in their identity throughout the travel experience, and experiencing situations that allow them to challenge themselves as well as their entire environment [23]. Similarly, another study found tourists talking about experiencing transformation through connecting to different people, thereby enriching their ideas of the world, and becoming more humble [28]. In terms of impact on the hosts of the transformative tourism experiences, Vidickienė et al. [35] discuss how rural areas can benefit from offering transformative tourism experiences by using intangible cultural heritage to attract visitors and creating a multiplier effect for other local businesses. Research by Inversini et al. [17] proposed bonding and meaningful relationships with local communities as drivers for transformative learning experiences.

3 Methodology

This study aims at generating an initial understanding of the impact of digital technology as a tool for actor-to-actor relationship building towards the creation of (i) socio-economic development at community level and (ii) transformative experiences in the context of rural Lebanon.

Due to the specificity of the research topic and its minimal previous exploration, a qualitative case-study approach was chosen for the study. The case-study used is the startup "Daskara" which developed an app indexing local cultural and heritage sites in rural Lebanon, chosen by local experts to foster tourism while preserving local culture and nature in rural Lebanon [6]. Daskara was born as a social mapping projects where rural communities were asked to index their cultural and natural point of interests; it developed as a tool to support 'pre-trip decision making' and 'in-trip guidance' therefore can be used in different behavioral contexts. In fact, the recent development of the app resulted in a smart interface that allows guests to directly connect with hosts through the app and for hosts to offer more experience-based services [15]. The app was deployed on the ground as a smart host-guest relationship tool; the present research focuses on the initial impact of the artifact to mediated host-guest relationships.

3.1   Sample and Procedures

Semi structured interviews were chosen as methodology for investigation as they allow for deeper exploration and understanding of how technology mediated host-guest relationships can impact both parties.

Ten in-depth interviews were conducted, as further detailed in Table 1. These interviews are split into two parts: 5 local tourism services providers (i.e. hosts) and 5 travelers (i.e. guests). Host participants were chosen on the basis of availabilities in the two rural areas with most tourism density (i.e. Al Shouf biosphere reserve and Jabal Moussa biosphere reserve.); travelers were randomly chosen with snowball sampling. Both groups were familiar with the mobile application. The interviews were conducted face-to-face with participants in different areas of Lebanon. Before conducting any interviews, participants were handed a Participant Information Sheet to better explain the purpose of the interview and overall study. Subsequently, participants were handed a form to confirm they were informed about the interviews and agree to participate, including being voice recorded. During the interview, an interview guide was used to ask relevant questions while still offering flexibility to adapt to each individual's responses and follow up with questions to further understand participants statements if needed, or contrarily skip certain questions if already answered previously.

Table 1. List of interviewees

Interviewee N°	Background	Category	Duration
1A	Guest house owner	Service provider	24'
2A	Boutique hotel manager	Service provider	16'
3A	Local artisan and guide	Service provider	24'
4A	Local tourism developer and consultant with FAO and WFP	Tourism expert	29'
5A	Director of Daskara	Tourism expert	14'

(*continued*)

Table 1. (*continued*)

Interviewee N°	Background	Category	Duration
1B	Lebanese tourist/hiker	Traveler	24'
2B	Lebanese tourist/hiker	Traveler	19'
3B	Australian tourist with Lebanese roots	Traveler	21'
4B	Lebanese tourist/hiker	Traveler	21'
5B	Lebanese tourist/hiker	Traveler	18'

3.2 Analyses

After conducting the interviews, they were transcribed; using "Dedoose" (dedoose.com) tool, all interviews were coded with codes, which were deduced from the literature review. A deductive coding approach was primary used starting from the literature about community socio-economic development socio-economic development for the hosts [e.g. 20] and transformative experiences [e.g. 17] for the guests. However, additional codes were added throughout the process if the existing codes did not match what a participant was talking about specifically (inductive coding).

4 Results

4.1 Host Perspectives

Two distinct perspectives appeared in the results of the host interviews: interviewees discussed the socio-economic impact of the mobile application, and they described the power of the app to support and enhance relationships with travelers and within the community.

4.1.1 Socio Economic Development

Participants discussed how apps like Daskara and the relationships built through them could impact others in their community. Interviewee 5A talks about youth specifically: *"Youth empowerment, because if the youth is creating magnificent things in their home and they are the ones who are with new ideas, they are the ones who are trying to make a difference or trying to, uh, collaborate with all the different organizers or the service providers. So, they are being the link between each one."* This interviewee further talks about the opportunity to find connections to other communities with help of smart technology: *"I would honestly love for communication, not only within the same communities, but along different communities within Lebanon."* Going a step further from relationship building, interviewee 3A talks about how an app like Daskara could help with community development in general: *"On an economic level, it will help the Lebanese villagers to stay here in their village, and not to leave. Let's say that I have an empty house. This empty house would be filled with guests, I might open a guest house. And this guest house will be one source of money."* This sense of potential economic

development is equally shared by interviewee 2A, who says "*absolutely [we] would gain more customers and loyalty […], returning customers. Especially in the winter season because in the winter season here […], there's almost no one here. So, building this relationship with our customers will help that they visit us in winter as well.*"

4.1.2 Relationship Building

One of the most mentioned potential impacts came down to the building of new personal relationships: Interviewee 1A tells us that "*Our guests, we consider them as friends […], we let them feel that they belong to this beautiful culture and they can consider themselves that they are true friends.*" Another story is told by interviewee 2A: "*Of course many of my customers from [my] previous work went to my wedding […] in Cyprus, so they followed me to Cyprus. So, this relationship is very, very important to us […]. Most of our customers are based on friendship.*"

One effect these more personal relationships with guests could have was mentioned to be getting to live new experiences, which at the same time could also lead to better cultural understanding and more openness to others, as stated by interviewee 3A: "*On a cultural level […] my Lebanese villagers will be enriched by having other tourists here. They will have other cultures. They will share their proper experience. […] Let's say, to broaden my horizon […] I have to look at the world from different perspectives and Daskara will bring different perspectives to my village. So it's not necessary to visit Italy for example, […] it's a chance to take Italian perspectives, Italian culture, maybe we'll share together for example, information about canes, about history, about nature. I will learn something from different people, they will visit me here and thus I will have my horizons broadened due to that experience also.*"

4.2 Guest Perspectives

Participants agreed that building relationships with hosts through an app like Daskara could impact different components of their travel experience. One area that was mentioned is the opportunity to discover new places and activities through the functions of the app. Interviewee 1B says "*If I want new places, I really don't know where [to go], because maybe I don't know, in a certain region, where are the guest house or who are like some small guest houses. […] If I have an app where I write "Shouf" and I get all the guest houses and I have a picture, it would be cool,*" and interviewee 2B talks about discovering smaller places: "*I think there's added value by having a local app because it'll cater to the local hosts and experiences by basically pinpointing the smallest village or town to visit that may have a uniqueness to it that might not be captured by an international app.*"

Interviewee 2B gives another example: "*Sometimes we also have difficulty, like where is a good place to sit and eat? Where is a good place to sit and relax? Where is it a good place to spend the night? And so, I think the locals would definitely know. Actually, this will bring in a lot of money and a lot of tourism to the village itself.*" This same interviewee further states, "*having someone, or several contact persons, I think would enrich the experience.*"

Something mentioned by interviewee 3B is finding people with similar passions and interests through the app: *"If there's 20% of us, who are passionate about it, […] it's still worth connecting us together"*. Interviewee 4B adds on *"The application that you created, I believe that it will target a specific kind of traveler who has the same passion. If I don't like hiking, I won't go into the application, talking to a guy to take me on a hike. So I guess they will be like-minded people who are talking about this kind of thing."* This thought is complemented by the interviewee explaining how a basis built on similarities may then help you to also better understand certain differences: *"The reality is not that you will see something a hundred percent different. You will see like 80% similar, 20% difference, which is interesting."* The learning aspects, which lead to transformative experiences, were mentioned in the interviews. For example, interviewee 1B states, *"If someone really tells you about the story behind it, the cultural importance, an interesting story, the struggle of a painter or a society, I'm sure it will be educational. […] And if I have like more knowledge, I will be also happier."* Interviewee 5B adds *"Definitely, [through interactions with locals] you learn more about the culture, about the towns you're walking through and all that, you get a feel of like…it's surprising that still exists."*

Through these exchanges, participants have also mentioned better intercultural understanding. *"The kids [while hiking] saw these men wearing traditional ethnic pants. And so the kids were like, "what are they wearing? Why do they have this on their head?" et cetera. So I think even for kids that are a little bit older, that can read such an app, could give them also a little bit of experiential learning about the town and the way it dresses, what they eat, how they speak…,"* says interviewee 5B. Interviewee 2B talks about how connecting with hosts can help visitors become more culturally aware, even before your trip: *"That's interesting because, you know, people coming from the outside might not know about what's acceptable, what's not acceptable. You know, even the simple gestures that are allowable or not allowable, maybe dress codes that are acceptable or non-acceptable so that actually can bring a lot of nuances to it. […] So at least you go there being culturally appropriate, um, you know, and knowing exactly what to say or what not to say."* Interviewee 4B similarly mentions, *"With interactions, just like we are talking right now, I get information from you and you get information from me. So when you have an application, connecting people in a good way, this is a good use of technology. […] I will adapt to your way of thinking and you will adapt to mine."*

Another interesting aspect is mentioned by interviewee 4B talking about how a close relationship can also help you with self-reflection, here specifically in terms of littering: *"I feel if there's a connection and the presence of someone, people are much more likely to not throw the trash. If someone asks me to please take care of the trash, I think it will create an impact."* Interviewee 5B adds that these interactions *"can teach us tolerance and respect"*.

5   Discussion

Interviews with both sides (i.e. host and guests) have demonstrated the potential for positive impact of technology-enabled relationship building for CBT in rural Lebanon.

From a host perspective, the experience based mobile application, enabled the start of a relationship prior to arrival of guests at the destination or at the accommodation.

This can lead to better preparation for both hosts and guests, more tolerance and cultural sensitivity on the side of guests and the potential for hosts to better understand their customers and their wishes.

The engagement between the two parties that is created earlier in the travel process could help to strengthen host-guest relationships throughout the experience, which is seen as an important aspect mentioned specifically by hosts. This personal relationship is also said to contribute to openness to others, gaining new perspectives, broadening of horizons and personal development on the side of hosts. Some hosts even spoke of change in personality or personal growth, which could be eventually classified as inner self-impact and possibly as a transformative experience. Additionally, the facilitation of building relationships is expected to lead to more loyalty, word-of-mouth advertising, and eventually increasing visitation for local community. In fact, the main expected outcome of the surge in visitation is of course increasing revenue for local businesses and general contributions towards rural development. There is a visible potential for socio-economic development fostered by technology enabled relationship building between hosts and guests.

On the guests' side, there is the recognition of the positive contributions to their travel experiences through technology-enabled relationships with hosts. For one, they expect to discover new, unexpected places and get more personalized recommendations by locals. Learning and cultural understanding were other main topics in terms of impact, and as mentioned previously, the pre-trip contact with locals is expected to contribute to better preparation for a trip, including better understanding local norms and culture. Guest mentioned that being closely in touch with host and building a relationship with them could equally lead to self-reflection, consideration for your own values and those of others', and eventually shift your perceptions. Thus, transformation is expected to be facilitated through the technology mediated host-guest relationship.

Throughout analysis of interviews, it became clear that there is a certain interplay of both sides to the host-guest relationship with the common denominator being the transformative aspect of the relationship. Transformational experiences are deemed possible for both sides of the relationship and is expected to then lead to further outcomes for both hosts and guests (see Fig. 1. Technology-enabled relationship model).

The transformational nature of the relationship can further act as a catalyst impacting hosts at the personal, business, and community-levels (i.e. fostering socio economic developments and freedoms - Senn, 1999). Similarly, guests will be impacted by the transformational nature of the travel experience both at personal level and travel experiential level; also the transformation could be seen as impacting outside the actual travel experience. While transformation has potential for both hosts and guests, this is the main expected outcome for guests, whereas hosts are further expected to benefit from socio-economic development through the impact of the smart host-guest technology and the linked effects such as increasing visitation.

Smart host-guest technology

Impact levels:
1: Personal
2: Business and economic
3: Community and societal

Impact levels:
1: Personal
2: Travel experience
3: Transformation

Transformative Relationship

3 2 1 Hosts

- Awareness
- Adaptation
- Tolerance

- Intercultural understanding
- Self reflection
- Respect
- Changing perspectives

Guests 1 2 3

Socio-economic development

Transformative travel experiences

Fig. 1. Technology-enabled relationship model

6 Conclusion, Limitations, and Future Research

This study contributes to the understanding of how technology can impact relationship-building in a Community Based Tourism context, focusing on rural Lebanon. Host-guest relationships should foster mutual value creation. Framed within the rising stream of research at the intersection of tourism studies, development studies and information and communication technology (Inversini et al., 2015), this study contributes to existing literature by introducing the concept of smart host-guest relationship in emerging economies. Results show that technology can be seen as a tool that fosters host-guest relationships, pre-, during, and post trips. The impact is manyfold on both sides with a focus on potential transformation for both hosts and guests. This transformational relationship is further seen as an aid in reaching further impacts, for example in terms of socio-economic and community development on the side of hosts, or for experiential, educational, and transformative travel experiences for guests. As has transpired through the interviews, it is at times challenging to demonstrate the direct effect of technologies on certain elements of a host-guest relationship as opposed to for example what would simply be effects of increasing visitation.

Likewise, for transformative aspects, it remains difficult to fully understand causation, which is a topic to be further explored in future research specifically in relation to technology's role in transformative tourism. Lastly, this study focused specifically on Lebanon, and while similar results may be expected in the general Middle Eastern region, results should not be generalized to further geographic regions due to differences in local economic, cultural, and social situations.

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Meaning of Fun in Hotel Gamified Applications

Demos Parapanos[1](✉) 🆔 and Elina Michopoulou[2] 🆔

[1] Institute of Business, Industry and Leadership, University of Cumbria, Carlisle, UK
`Demos.parapanos@cumbria.ac.uk`
[2] Centre for Contemporary Hospitality and Tourism, University of Derby, Derby, UK
`E.michopoulou@derby.ac.uk`

Abstract. The hospitality industry faces significant challenges from the acceleration of travelers using mobile technology, especially in the Covid-19 aftermath. Consumer behaviour is changing in the service sector, creating new forms of mobilities and types of tourists. Users are taking advantage of the opportunity to access information easier and faster, anywhere causing new promotional strategies for hospitality businesses. However, it is recognized that the adoption of mobile applications does not guarantee competitive advantage. This research is inspired by the success of mobile games, and the importance of delivering fun. It explores hotel visitors' meaning of 'fun' when using a mobile hotel gamified application. This is to give mobile gamified application developers an indication on the fun elements that would make such a technology engaging with the users. Visual materials were used applying game mechanics and aesthetics in a hotel application helping participants understand how the fun elements are incorporated so they can focus/target on the elements they find more attractive.

Keywords: Gamification · Fun · Hotels · Hotel Visitors · Innovative Technologies

1 Introduction

The Covid-19 pandemic has left significant impact on the hospitality industry [1], one of them is the acceleration of travelers using mobile technology on the go [2]. The number of technology-savvy travelers using various mobile technologies increased after the pandemic, for activities like browsing the internet and pre-check into their hotel rooms [3]. As a result, consumer behaviour is changing creating new forms of mobilities and types of consumers that show specific traits. Users are taking advantage of the opportunity to access information easier and faster, anywhere resulting in the demand for new promotional strategies for service sector businesses [4]. For example, the hospitality industry will have to adapt to this new change and, apply innovative technologies at multiple stages of the customer journey [5]. Innovative technologies aim to increase engagement, through providing additional benefits to the end user, with game mechanics and gamification as the most popular trends in this respect [6].

Gaming behaviour is at its early stages in many industries, and the hospitality is a late adopter with few successful examples established, though focused on treasure hunts and

culture heritage applications [7]. Gamification is more favourable to be applied through technology means[8], capitalizing on the evolution of mobile technologies. Gamification is defined as the use of game design elements in a non-game context [9], and has been applied for several objectives, such as increasing brand awareness and encouraging consumer engagement [7]. Technology with gamified characteristics is relatively new in the service sector and factors enhancing behaviour have yet to be studied [10]. Fun in this case is taken as a perception of experience from the users' point of view and may be significantly instrumental in the consumption of products or services [11]. The concept goes further, considering quotations stating that fun is the future marketing [12].

Several studies tried to explain the meaning of fun in the gaming industry (see [13–15]), with different results depending on the type of game. Little has been done on the explanation of the meaning of fun in a gamified application [16], for the hospitality industry. Considering that gaming literature has shown different results exploring fun, it could be assumed that different results might be discovered looking at understanding the element of fun in the concept of gamified applications in the hospitality industry. This research tries to fill this gap and enlighten existing gamification research by exploring the meaning of fun for mobile applications with game design elements and attach game mechanics with each category. Exploring the meaning of fun could offer several advantages to hotels by providing relationship marketing and engagement, increasing revenue and strengthening customer loyalty.

2   Theoretical Background

The addition of game mechanics is used in various domains, such as e-commerce, mobile marketing and innovation [17] aiming to make the technology usage fun. Hospitality industry used such strategy also defined as gamification to encourage engagement and enhance tourist experience [18], taking advantage of the fact that a tourist is someone who has little or no knowledge of the environment, so using game mechanics to allow them to learn more about the local environment [19]. This interaction allows hotels to promote the history of the location around them to create an emotional experience between the visitor and Point of Interest [20], capitalizing on the increased use of smartphones altering marketing and location-based promotion, transforming mobile technology into a multi-functional tool providing yet more marketing opportunities [21].

Increased use of mobile technologies and the constant accessibility to information is changing the travel experience considering that visitors can change their plans during the trip, revolutionizing the tourism and hospitality industry and transforming both visitors and destinations[22]. Visitors have become more flexible since they can find information, make decisions on the go and share experiences using mobile devices [23] through applications. Mobile applications have several purposes in the tourism and hospitality industry from small daily activities like the distribution of rooms, to more strategic plans like customer relationship management and loyalty [24]. However, the widespread adoption of mobile application does not guarantee competitive advantage [22] putting in danger on the investment of hotels and destinations in those applications.

Games on the other hand can overcome those traditional boundaries in which they were confined [25] and find more ways to increase the engagement with the gamer. One

of the reasons of the widespread use of video games is the development of smartphones, which made gaming more attractive to a larger demographic of players [18], available in the hands of more people. Since 2007 and the introduction of smartphones and the widespread broadband connections mobile gaming opportunities have changed [26], becoming a multi-billion industry overcoming in revenue music and movie industries combined [27]. Since then, mobile games have become the most successful example of mobile applications. For example, in 2016, Apple's "App Store" and Google's "Google Play" announced that 19.2 billion mobile games were downloaded [28]. During the same year, it was announced that iPhone users spent on average $40 per device on premium applications (showing an increase from the previous year), with mobile games dominating the spending spree [28]. Two years later, Apple Store and Google Play announced that the number of mobile game downloads increased (21.8 billion) with reports estimating the numbers will only rise because of the addition of further features like socialising, personalization, stream quality and event attractiveness [29].

The technological advances are seen from the element of an aesthetic point of view, providing a sense of fun in at least two ways: the aesthetics are visually attractive, and they serve as milestones marking player achievement [30]. However, it is not only the technological advances of games that enhances the engagement between the gamer and the game. From the psychological standpoint, the concept fun is seen as the most important and necessary factor in game playing [31]. Considering the nature of games, gamers are only likely to return to the game if they found their experience positive [31], so game development create games with more attractive interfaces, better graphics and sound to provide a more appealing and satisfying gameplay experience, but also make the experience more fun. Understanding gamers' behaviour contributes towards engagement with games [10], hence similar results are expected building an effective gamified mobile application for hotels by understanding the meaning of fun for mobile applications with game mechanics and aesthetics to produce a new engaging strategy. Although there has been some research on video games and the meaning of fun [13–15], it is only focused on video games, and not enough research is done on the meaning of fun on gamified applications for hotels [16]. Even though fun has been found to influence engagement between games and gamers [13], they still differ per individual when deciding to play specific games.

Klug and Schell types – recognizes that players combine two or more types depending on the style of the game, meaning that the typology should not be seen as a generic form rather than guideline depending on the game design [14]. The typology classifies players as the *Competitor* (plays to be better than other players), the *Explorer* (plays to experience the boundaries of the play world), the *Collector* (plays to acquire the most stuff through the game), the *Achiever* (plays to not only be better now, but also better in rankings over time), the *Joker* (plays just for the fun through the social aspect), the *Director* (plays for the thrill of being in charge), the *Storyteller* (plays to create or live in an alternate world and build narrative out of that world), the *Performer* (plays for the show they can put on) and the *Craftsman* (plays to build, solve puzzles and engineer constructs).

Leblanc's taxonomy of game pleasure – recognizes that there are several kinds of pleasures per individual, hence it is useful to examine these different pleasures, as

different individuals place different values on each one [15]. The typology of pleasure understands *Sensation* as a pleasure of seeing something beautiful, hearing music, and smelling or tasting delicious food are all pleasures of sensation. *Fantasy* is the pleasure of the narrative of the imaginary world, being something, you are not. *Narrative* is the pleasure, which is not direct telling of a prescribed linear story, but instead a dramatic unfolding of a sequence of events. *Challenge* is a core pleasure through solving problems. *Fellowship* refers to everything enjoyable about friendship, cooperation and community. *Discovery* is the pleasure of finding something new any time in a game. *Expression* is the pleasure of expressing and creating things such as new outfits even though it does not help progress in the game. Finally, *Submission* is the pleasure of entering the magic circle, of leaving the real world behind and entering a new and more enjoyable set of rules and meaning.

Bartle types - identified four characteristics of gamers suggesting that the element of fun seemed to have different meaning in the game, based on players' profile. Most individuals leaned at least a little at all four, but each tended to have some preference. *Achievers* give themselves game-related goals and vigorously set out to achieve them. *Explorers* would try to find out as much as they can about the virtual world. *Socialisers* use the game as a communicative facility and apply the role-playing that these engender as a context in which to converse (and interact) with other players and *Killers* use the tools provided by the game to cause distress to other players.

Identifying the meaning of fun for the game industry results in the innovation and attachment of the appropriate game mechanic to stimulate the feeling. There is a variety of game mechanics a designer could add into a gamified system capitalizing on them for their success. For example, games like Angry Birds, Farmville, Pokémon or Words with Friends, build on different principles, utilizing different mechanics for their success. Commonly implemented game mechanics in gamification are points, levels [9], badges and leaderboards [32]. However, these are not the only tools in the game industry. Study by [33], recognize game mechanics as core components of gamification applications and reveal 12 mechanics (points, badges, leaderboards, virtual goods, avatars, user turns, skill tests, quizzes, tasks times, quests, groups and levels). Study by [34] exploring gamification in corporate training recognizes points, scoring, leaderboards, progress bars, ranks, rewards or incentive, story or narratives, goals, challenges, personalization, rapid feedback, visible feedback, freedom of choice, freedom to fail, achievement, social interaction, immersion experience and social engagement. Lastly, [35], looking into effective gamification design processes identify 58 game mechanics (achievement, avatar, badges, boss fights, built from scratch, challenges, collections sets, competition, count down, creativity tools, customization, development tools, easter eggs, exchangeable points, gifting, group guests, guilds, inventory, leaderboard, levels/progression, milestone unlocks, mini-guests, points, progress bars, sharing knowledge, social discovery, social network, social status, status points, virtual currency, and virtual goods) to link with motivators.

Game literature reveal studies categorizing gamers based on their explanation of fun playing games (see [13–15], but limited research is done on understanding the meaning of fun when using hotel gamified applications [16], especially from the hotel visitors point of view. With gamification still being at its early stages [32], further research

is required to understand the meaning of fun to make the experience more enjoyable, hence engaging in the hospitality industry. Doing so will help to attach appropriate game mechanics for each category of users to enhance fun and increase the usage, creating more engagement between the user and the company. Thereafter, this research aims to explore hotel visitors' meaning of fun when using a mobile hotel gamified application and attach game mechanics with each category.

3   Methodology

The aim of this research is to explore hotel visitors' meaning of fun when using a mobile hotel gamified application and attach game mechanics with each category. To achieve this aim needs to get in depth understanding towards opinions and reasons behind certain behaviours [33], hence qualitative inductive approach is more suitable. The qualitative approach allows to get in-depth understanding of peoples' opinions when exploring the meaning of when using a mobile hotel gamified application. This study used a purposive sampling technique, and part of the selection criteria focused on having prior experience with hotel mobile applications and being a hotel visitor within the last six years. To identify sample with these criteria snowball sampling was implemented.

Theoretical saturation [34] was achieved at 19 interviews, but 6 further interviews were carried out in case new information arose. Respondents were fairly equal in numbers: (11 male 14 female). The average length of gathered semi-structure interviews was between 35–45 min with probe and follow up questions prepared focused on concepts like gamification motives and gamification and gameplay. This research involves looking for patterns in the long list of codes to create a short list of themes, hence thematic analysis was used. The rational of this approach is to search for themes that occur across a data set helping to understand the key explanations of fun when using gamified applications to achieve the aim of the study. The use of thematic analysis is appropriate and valuable in tourism research because of the descriptive passages, narratives, and visual text form the empirical material for interpretation [35].

Since there is no existing mobile gamified application in the hospitality industry based on the literature review, visual material was designed based on the definitions of gamification, the game mechanics (i.e., points, badges) and game motives (i.e., exploring, achieving) (see Fig. 1). The scope of visual material is to help participants understand how the fun elements are incorporated in a mobile hotel gamified application, so they can focus on the elements they find more attractive and encouraging to use, making the discussion more focused. Using materials directly linked with the hospitality industry manipulated the conversation with participants in the meaning of fun specifically on the feeling on being hotel visitors. The outcome of this research is to provide mobile gamified application developers an indication on the fun elements that would make such a technology engaging with the users and the appropriate game mechanics for each typology.

Fig. 1. Example of visual material

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. Data reveal 7 categories (Socialising, Exploring, Achieving, Challenge, Competitiveness, Interactivity, and Personalization) of people towards the meaning of fun when using a mobile hotel gamified application. It also reveals 1 more typology the Disrupting which defined as people who find fun in bragging about their achievements and superiority within the system. Out of the 8 categories it is understood that one of them (Disrupting) is a negative behaviour within the system.

Very important generic findings for the implications of adding elements that would make the technology fun for the user is the fact that still participants clarify they enjoy the fun implementation in the technology however, they would not behave as gamers, but visitors: *["I see myself as a visitor and not a gamer" (I16)]*. This idea is linked a lot with another finding which highlights the importance of the reward as part of fun activities. *["Achievement, challenge and competitiveness are elements more lined to the reward site and I enjoy them. For example, when I am encouraged to explore the surroundings of the hotel I would do it because I like it and because this is the reason I am there anyway, so when I can get a reward out of this activity it makes it even more fun and engaging (I18)].* Thus, the application has to be more personalized to the individual's habits, encouraging activities that are already planned or scheduled by the individual, to enhance the element of fun without frustrating the user. This finding also indicates that users are more likely to fall into more than one typology of fun agreeing with the literature and [13] and [15], considering the interdependence of the tasks.

Previous literature found that mobile applications with gaming elements and mechanics focus on the power of competitiveness and achievement with the introduction of rewards, challenges and contests [36]. Finding of this research indicated more desirable elements that should be taken into consideration when designing a mobile hotel gamified application for hotel visitors.

Socialising – showed a significant importance towards the technology becoming fun and enjoyable: *["makes the application fun and probably it could make my holidays more enjoyable and memorable. Being able to socialise with others during my visit in a destination" (I7)].* The results agree with the literature as both [13], and [15] the interaction of players to empathize with people, joke, listen, sympathize and entertain. It is particularly important since users interested in parts of the system that enable them to socialize as they will promote and evangelize their internal social network. To do so it is recommended to use mechanics like chat box. The results highlight the importance of socialising through the application for the users to have fun, and it proves that it is a valuable element when designing the technology.

Exploring - appears to contribute towards the technology becoming fun and enjoyable: *["exploring is fun, since I am always a tourist visiting a foreign environment. Not so much in exploring the application itself but mostly the hotel and the local area of the destination" (I23)].* The results partly agree with the literature as [13, 14] and [15], all comment on the importance of exploring in a virtual environment to make the game fun. However, looking more in detail on the opinion of participants they all agree that exploring for a hotel visitor will not encourage exploring the virtual environment, but the physical environment near the hotel. This is to show that the technology should promote exploration of the destination when building the tasks.

Achieving – implementing game mechanics like levelling up and points will enhance achieving behaviour and make the mobile application more fun and enjoyable: *["I like the levelling up and collecting points and badges element. As I said it is giving me a feeling of achievement. […]. Achievement comes first as promoting the element of fun" (I13)].* The results of this phase agree with the literature [13–15]. However, for hotel visitors', achievement was further linked with tangible rewards to become more engaging: *["the achievement is there as you have achieved to move on in levels or move beyond certain people. If the tasks are physically possible to do and not something big or stupid to do during my holidays it is fun and combine it with tangible reward gets because I will be expecting more from the brand" (I2)].* This result further highlights the importance of applying game mechanics like points, progress and badges to enhance achievement through the application for the users to enhance the fun element. It also explains that physical rewards are much, if not more, important for users and it is associated with the meaning of fun as it stimulates the excitement.

Challenge – users of such technology would like to have challenges to overcome, and it is helps to make the experience fun: *["the element of challenge is the more attractive as a fun element. I am a person who likes to be challenged and improve through a game or anything I do. I would like to be challenged" (I21)].* The results agree with the literature [15], and users would challenge themselves and improve their skills. Despite the urge to overcome challenges participants again clarify that the gameplay experience must be balanced as they see themselves as visitors, and they would not be engaged in case the challenge interferes with their plans, hence the tasks have to be related with experiences that promote the environment. This further shows that challenging tasks should be included in a mobile hotel gamified application to enhance the fun element.

Competitiveness – explains that having mechanics such as leaderboards and tasks to create competitiveness between users makes the technology more fun and enjoyable:

["competitiveness is important if reaching the top spot of a leaderboard and competing with others to reach there shows some form of acknowledgement. Then I would see how it will make it fun to me" (I11)]. This result agrees with the literature [14], and the urge to be better than others. However, it was explained that there is thin line between being competitive and frustrating. Participants agreed that reaching the top (or close to the top) should be something achievable and not frustrating. The results indicate that competing is important for users to enhance the fun element, with emphasize shown on the game mechanic of leaderboard as the most popular tool associated with behaviour. Hence, it is advisable to develop a leaderboard in a mobile hotel gamified application to enhance the fun element.

Interactivity – of the technology is explained to be a given, otherwise the system loses value and devalues the meaning of fun: *["I like this idea of having immediate feedback when something is asked" (I9)].* As a meaning of fun interactivity is a unique element probably because in games it is a given. For a mobile hotel gamified application as an innovative technology, creates significant importance, and it is translated to the mechanic of avatar. Almost every participant mention that the tasks being delivered by an avatar towards using this technology in promoting the fun experience: *["for me the most important characteristics here is the element of interactivity through the avatar. I mean it is more fun when you can act and achieve towards the reward rather than the boring current activities (I10)].* This is to show that adding an avatar interacting with the user will make it significantly more fun and highlights its importance in differentiating this technology from previous technologies.

Personalization – having mechanics to personalize the experience make the technology more fun and enjoyable: *["this element of personalization contributes towards fun because I like the fact that it talks to me and gives me the reward directly and immediately" (I5)].* This result agrees with the literature [14] and [15], recognizes that gamers want to see something of themselves in the game and so do the users of this technology. Participants do go further to explain that this innovative way of communicating tasks through the avatar based on previous experiences or behaviours makes the application more fun and engaging: *["it is talking directly to me it is sending me tasks more attractive to me. It creates that feeling that I am important as a person to the brand, which for me is more like how games have created that form of personalization" (I10)].* The results show that users want to create their personal journey on holidays, and they like the idea of having the fanciest avatar, to create the most personal experience. This is to show the importance of personalization for the system to be more fun and enjoyable experience.

Disrupting – Lastly an interesting result shows that participants recognize that in the system there is also a group of users who would like to show off their skills and achievements: *"show off is something I would not do and would not want others to do within the application. Let's say that someone is trying to brag about achievements he has done and try to minimize I would just stop using the application and delete it from the app no matter how good it looks" (I2)].* This outcome is also obvious in the literature [13] and [14], with gamers showing excitement on bragging about their achievements and superiority. However, all participants agreed that if they recognize other users with this behaviour, it is discouraging them to keep using the technology. Even though the results agree with the literature on recognizing this typology it disagrees on the importance of

them being in the environment. Users with this behaviour should be identified and either encourage them to change behaviour or ban them from the system as they promote no value for the system or other users.

The second part of the aim is to attach game mechanics with each category of fun meaning to help mobile gamified application developers attract each typology with the appropriate mechanics, based on the preferences and opinions of hotel visitors. To achieve that the following table attached game mechanics identified in the literature with the typology of fun as emerged from the data collection. From the table is excluded the typology of Disrupting due to hotel visitors' opinion that when users with such characteristics are identified in the system it leads them to discourage to use the system themselves and is seen as a negative factor. Instead, it is proposed for the system to isolate and ban hotel visitors that present this kind of behaviour for the benefit of the ecosystem (Table 1).

Table 1. Typology of fun and the linked game mechanics.

Fun typology	Proposed game mechanics
Socialising	Groups, Group quests, Social interaction, Social engagement, Gifts
Exploring	Easter eggs, Built from scratch, Inventory
Achieving	Points, Badges, Levels, Progress bars, Mini guests
Challenge	Skill tests, Goals, Challenges, Milestone unlocks
Competitiveness	Leaderboards, Ranks, Social status, Boss fights
Interactivity	Rapid Feedback, Visible feedback, Sharing knowledge
Personalization	Avatar, Narrative, Personalization, Freedom of choice, Freedom to fail

5   Conclusion

The tourism and hospitality industry have been affected by the acceleration of travelers using mobile technology on the go [2], due to the widespread adoption of technology. As a result, tourists' behaviour is changing creating new forms of mobilities and types of tourists. Users are taking advantage of the opportunity to access information easier and faster, anywhere resulting new promotional strategies for tourism businesses [4]. However, it is recognized that the adoption of mobile application does not guarantee competitive advantage [22]. This research inspired by the success of mobile games and the importance of delivering fun. The aim to is to explore hotel visitors' meaning of fun when using a mobile hotel gamified application to give mobile gamified application developers an indication on the fun elements that would make such a technology engaging with the users.

This research added to the knowledge of the meaning of fun since previous studies focused on understanding the meaning of fun when playing games [13, 14] and [15], but little on the explanation of the meaning of fun in a gamified application [16] for the

hospitality industry. Participants reveal 7 categories (Socialising, Exploring, Achieving, Challenge, Competitiveness, Interactivity, and Personalization) as the meaning of fun when using a mobile hotel gamified application. And 1 more typology the Disrupting which results negative outcome for the other 7 in the environment. It also reveals some managerial implications with significant attention on the interactivity and the mechanic of tasks towards the perception of fun. Users need to be able to access their account at anytime and anyplace and receive tasks appropriately constructed. Hence, the system must update users' accounts frequently, utilizing data collected from previous experiences and behaviours to enhance the element of personalization. Any delay of the information will undermine the users' experience and reduce the level of fun for users. Secondly, it highlights the importance for hotel managers to take advantage of the nearby unique sightseeing and the history of the location to provide a unique and fun content for the system. Furthermore, there is a second implication deriving from the meaning of exploration, as it highlights the importance to establish collaboration with local businesses. It is recommended that hotel managers will seek to develop a relationship with local business owners such as local restaurants, tourist guides, museums and transportation to create tasks that would benefit the local environment.

This study comes with inherent limitations. Sample's opinions are based on the visual material developed by the researcher, and not an existing product, due to the limited existing use of game mechanics in a mobile application by hotels. It is wQ2orth mentions that the sample age is younger hotel visitors so future studies should look into other age groups 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 meaning of fun appears. To provide generalisability, future studies should consider quantitative methodologies and it might also clarify different meaning of funs based on demographics and the purpose of staying in a hotel. Summarizing, considering the widespread adoption of mobile technologies has created a competitive environment for hotels when designing mobile applications and applying gamification and game mechanics is seen as a popular trend in this respect [37], highlighting the importance of the innovation for hospitality organizations.

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Riding Against the Algorithm: Algorithmic Management in On-Demand Food Delivery

Aarni Tuomi[1(✉)], Brana Jianu[2], Maartje Roelofsen[3], and Mário Passos Ascenção[1]

[1] Haaga-Helia University of Applied Sciences, Pajuniityntie 11, 00320 Helsinki, Finland
{aarni.tuomi,mariopassos.ascencao}@haaga-helia.fi
[2] University of Surrey, Stag Hill, Guildford GU2 7XH, UK
b.jianu@surrey.ac.uk
[3] Universitat Oberta de Catalunya, Rambla del Poblenou, 156, 08018 Barcelona, Spain
mroelofsen@uoc.edu

Abstract. In many countries, on-demand food delivery platforms (e.g. Deliveroo, Wolt, Uber Eats) have become an inseparable part of the hospitality and tourism ecosystem. A key area of interest in technology research has been how platforms algorithmically manage the interaction between task requesters (e.g. customers, tourists) and task fulfillers (e.g. restaurants and delivery couriers). However, there is a lack of research on how such algorithmic management practices impact workers and what strategies workers adopt to counteract the algorithm. To that end, this qualitative study explores forms of expressing algoactivism in the context of on-demand food delivery platforms by conducting interviews with delivery couriers (n = 5) and restaurant workers and managers (n = 7). It is found that both couriers and hospitality employees adopt specific behaviors to optimize and game the platforms' algorithms, and that some algorithmic management practices are perceived more negatively than others. Implications for e-tourism management and research are discussed.

Keywords: Platform · Algorithmic management · AlgoActivism · Food delivery

1 Introduction

Hospitality and tourism businesses instrumentalize digital infrastructures or 'platforms' to exploit labor and control resources they do not own and create value through facilitating interaction between different hospitality and tourism stakeholders [1]. These businesses then collect rent from those who interact on the platforms through e.g. user fees or commissions. In tourism and hospitality, digital platforms have transformed the accommodation sector (e.g. Airbnb), transport (e.g. Uber), and most recently, delivery of restaurant food (e.g. Deliveroo). Gig economy platforms (platforms that facilitate freelance on-demand work) in particular have received wide media coverage and research interest due to the ongoing debate of whether people working through such platforms should be classified as employees of the platform or self-employed contractors [2]. The European Commission [3] estimates that in Europe alone, 28 million people work through digital labor platforms.

On-demand food delivery platforms offer one of the most visible examples of gig economy work conducted through digital labor platforms in the context of hospitality and tourism [4, 7]. Spurred by the COVID-19 pandemic, Ahuja et al. [5] estimate that in the US, on-demand food delivery has more than doubled in value since early 2020. Convenience, ease-of-use, availability of choice as well as safety concerns with regards to eating in restaurants have been found as key drivers of consumer adoption of on-demand food delivery amidst COVID-19 [6]. From a hospitality management and e-tourism research perspective, the rise in demand for restaurant food delivery brings various new considerations to the forefront, e.g. when and what kind of a virtual or ghost kitchen should a restaurant operator open, how the delivery process should be organized, and what the ideal menu for delivery should be [7].

In terms of scholarly literature, studies looking at on-demand restaurant food delivery have thus far explored overall experience of working for a food delivery platform [8], logistics (e.g. optimizing courier routing) [9], impacts of using courier services on customer satisfaction and loyalty towards the original restaurant brand [10], the precariousness of couriers' working conditions [11], as well as strategies workers adopt to manage, optimize and game the algorithms that define how work on the platform is facilitated [12]. There is a general lack of research from hospitality management and e-tourism scholars vis-à-vis the ways in which couriers and partner restaurant employees navigate the competing interests of stakeholders (platform, its users, partnering restaurants) and affordances of technology (design decisions systems) [7].

Adopting a qualitative approach, this paper aims to explore what Jiang, Adam and Benlian [13] dub 'algoactivism', that is, the various actions workers perform to mitigate, counteract and undermine AI algorithms that control how work on digital labor platforms is conducted. Semi-structured interviews were conducted with on-demand delivery couriers (n = 5) and restaurant employees and managers who use delivery platforms as part of their day-to-day job (n = 7). The specific research questions this study addresses are: In what ways does worker-led algoactivism manifest in the context of on-demand food delivery platforms? How do algorithmic management practices affect workers?

2   Platform Economies of Hospitality and Tourism

The term "platform economy" arguably signifies a relatively new economic configuration that relies on digital infrastructures of connectivity and the internet to generate a wide variety of value-creating exchanges and activities [14]. The networking technologies that underpin platforms allow their users to communicate, interact, exchange, sell and buy goods and services, as well as contribute, circulate, and consume digital content. Their main aim is to bring together and govern so-called two-sided or multi-sided markets made up of two or multiple users [15, 16]. Within the context of tourism and hospitality, these markets may consist of e.g. short-term accommodation owners and their tenants, food delivery workers, restaurant owners and their customers, taxi drivers and transport seekers, and tour guides and tourists.

As a discursive construct, the term "platform" has meaning in different semantic areas, but – in reference to how the word is commonly used today– came into wider

circulation through the early and mid-2000s, initially in association with the proliferation of new spaces for digital social interaction, such as Youtube and Facebook [15, 16]. Platforms are "programmable" through an Application Programming Interface, allowing platform companies to make their content and functionality available to other third parties through data exchange (ibid.). For example, online travel agency and platform TripAdvisor and short-term rental platform Airbnb grant their users to log in with Facebook accounts, made possible through data-exchange between these respective platforms. This is a deliberate strategy that allows platform companies to expand their reach in other social spaces.

The business models that underline the platform economies of tourism and hospitality vary widely [17]. Some platforms are based on collaboration and promote non-monetized exchanges and are often associated with the so-called "sharing" or "collaborative economy". However, a substantial share of tourism and hospitality platforms now mirror "traditional" capitalist relations of production, having extraction, profit generation, expansion, and market monopolization at their core [17, p. 30]. Aside from charging their users commissions for each transaction, platform companies capture and accumulate data from the users of their digital infrastructures from which they derive value that is "dynamically determined" [18, 19].

3   From Algorithmic Management to AlgoActivism

The ever-growing role of artificial intelligence (AI) algorithms in allocating, overseeing and managing workers on digital labor platforms brings new considerations to conventional people management strategies. The term "algorithmic management" was coined to express how algorithms assume managing roles in organizations and enable organizations to essentially control a large and dispersed workforce [20]. In their review of algorithmic management, Kellogg et al. [21] highlight six mechanisms through which algorithms assert control over workers: directing workers by restricting and recommending, evaluating workers by recording and rating, and disciplining workers by rewarding and replacing. Further evidence illustrates that the unique features of algorithmic management such as persistent surveillance [22], continuous performance assessment [23], automated decision-making [12], little human-to-human contact [24], and poor transparency of algorithmic decisions [25] facilitate important power asymmetries between workers and management [26].

Like in other sectors, exchanges on tourism and hospitality platforms are governed through algorithms, which are "the instructions with which input data can be transformed in desirable output data" [17]. The central organizing role that algorithms might fulfill is one that would allow the market that the specific platform enables to "operate on itself". For example, the search engine of short-term rental platform Airbnb automatically executes guests' search queries (data inputs) to provide a ranking of accommodation listings (data outputs) based on a guest's desired dates, their budget, accommodation type, and data related to their prior interactions on the platform. The latter include review and rating data provided by their previous hosts about their past behavior as guests [19]. While review- and rating data may similarly "serve to discipline host performances according to corporate guidelines" by algorithmically ranking their listings lower in a

guest's search results [27, 28], users also increasingly deploy tactics to (collectively) challenge the algorithms employed by the company to govern the platform [27, 29].

In line with labor process scholars, who have made significant contributions at the intersection of organizational control and worker resistance as a response to power asymmetries [cf. 30], algorithmically managed workplaces are examined from a perspective of conflict between workers and management-implemented-algorithms [2, 31, 32]. Nevertheless, the addition of instantaneous, opaque, interactive and comprehensive algorithmic control mechanisms into the management process [21] in turn elicits more varying degrees of worker resistance. As a result, the concept of individual and collective resistance to such algorithmic control – "algoactivism" – has emerged [13]. Correspondingly, Möhlmann & Zalmanson [12] identify resisting, switching and gaming the system as forms of algorithmic resistance of workers, Ferrari & Graham [33] describe manipulation, subversion, and disruption and Jarrahi et al. [23] sense making, circumventing and manipulation as techniques for developing algorithmic competences.

In the context of on-demand delivery platforms, non-cooperation [34], tricking and reverse-engineering the algorithms [34, 35], social sensemaking of algorithmic functions [34], collective unionizing and organized strikes [31] have been recognized as varied forms of algoactivism. In view of this, we argue that employees interacting with and working on restaurant delivery platforms in particular have a greater potential for algoactivism owing to a number of platform-specific core variables that enable this. For operators, the delivery platform system often runs parallel to the restaurant's own point of sale system, adding increased complexity to the service process. For couriers, the inclusion of the restaurant as an extra stakeholder on the platform creates new forms of interaction, e.g. a common waiting zone in front of or inside the restaurant where users may gather and discuss their platform experiences [36]. This fosters common shared knowledge about the platform experience and a sense of solidarity among couriers. Finally, the visibility of riders in urban spaces impacts tourism experience, with increased social awareness, activated forms of unionism and widespread media coverage [31] reinforcing the public awareness for tighter regulation of gig labor.

4 Method

Data for this study were collected between April-August 2022 in Helsinki Metropolitan Area, Finland. The Finnish context of on-demand food delivery consists of two major platforms: Wolt (owned by US-based DoorDash) and Foodora (owned by Germany-based Delivery Hero). Both companies launched their Finnish operations in 2015. Two rounds of semi-structured interviews were conducted in English, with 1) on-demand food delivery platform workers (n = 5) and 2) restaurant employees and managers who, as part of their day-to-day job, interact with on-demand food delivery platforms (n = 7) (Table 1). In contrast with previous studies on algorithmic management and algoactivism, we include the restaurant as a stakeholder in our analysis to broaden the understanding of algorithmic control practices in the context of on-demand food delivery platforms. Table 1 illustrates basic characteristics of interview participants. Interviews were conducted online through a teleconferencing platform, and they lasted for 24 min on average. Interviews were audio recorded, automatically transcribed and

transcripts were manually checked for accuracy. Interview guide drawing on Kellogg et al.'s [21] conceptualization of algorithmic management practices was used. Data were thematically analyzed by one researcher, following a structured approach which systematically moved from open coding to axial and theoretical coding. Data were analyzed manually.

Table 1. Characteristics of participants

Participant ID	Role	Time worked with platform	Platform
P1	Courier	4 years	Wolt
P2	Courier	2 years	Wolt
P3	Courier	5 years	Wolt
P4	Courier	1 year	Wolt & Foodora
P5	Courier	3 years	Wolt & Foodora
P6	Cashier	1 year	Wolt
P7	Chef	2 years	Wolt
P8	Chef	2 years	Wolt & Foodora
P9	Supervisor	2 years	Foodora
P10	Manager	4 years	Wolt
P11	Waiter	1 year	Wolt
P12	Head Chef	4 years	Wolt & Foodora

5   Findings and Discussion

Four key themes illustrating how algorithmic control manifests in the context of on-demand food delivery platforms were found: 1) Optimizing the restaurant work process, 2) Surveillance of task completion, 3) Keeping up with system updates and finding loopholes, and 4) Emergent power asymmetries.

5.1   Optimizing the Restaurant Work Process

The introduction of on-demand delivery platforms brings changes to value creation in traditional food service business [7, 35]. Prior research has noted how such changes can influence work processes across the ecosystem involved in the production and delivery of hospitality service offerings [7]. In a similar vein, we found several concrete examples of workers optimizing their work processes to better capitalize on the affordances and constraints of the platform. In terms of front-of-house, changes included rethinking the service process and use of servicescape. In terms of back-of-house, changes included rethinking the composition and packaging of dishes. As put by participants:

"The front-of-house team directs the couriers to a separate line, where we've installed a pick-up locker for the delivery orders." P10, Manager.

"We always serve customers in the restaurants first, and only then take orders from the platforms. If the line in the restaurants gets too busy, we close the platforms for the day." P12, Head Chef.

"The platform has increased our delivery orders so much that we've made changes to some of the packaging that we use, to make it more sustainable and better able to keep the food looking proper during delivery." P7, Chef.

Beyond concrete changes to the restaurant service process, participants also expressed negative affect towards push notifications sent by the platform to algorithmically nudge them towards increasing their productivity [37]:

"Usually in a kitchen there's a lot of communication. You talk to the other chefs all the time. There [in a ghost kitchen] it wasn't like that […] people had headphones on, super focused on the job to meet whatever targets the system were giving. It felt like a production kitchen." P8, Chef.

"When it's busy, [the platform] will send you notifications to try to get you to work." P1, Courier.

"The platforms can be very difficult to use. For orders with multiple dishes, which is most orders really, you can't choose when you start preparing what dish, only the entire order as a whole. The system also gives unrealistic time targets for preparing the food, particularly bigger orders." P8, Chef.

Collectively, these different approaches to optimize work processes, given the on-demand food delivery platform's constraints and affordances, resonate well with Kellogg et al.'s [21] notion of using AI algorithms to restrict workers and recommend/nudge workers to behave in a certain way. Based on our interviews, such algorithmic nudges seem to primarily benefit the platform or the partner restaurant business rather than the worker in the restaurant or the worker completing the delivery task.

5.2 Surveillance of Task Completion

Besides restricting and recommending, the strongest evidence of the presence of algorithmic control mechanism as conceptualized by Kellogg et al. [21] was found to be algorithmic recording and rating for the purpose of evaluating workers. Most notably, participants' comments related to two distinct features one of the food delivery platforms that operates in Finland has [8]. First, the platform allows users ordering food to track in real time how the delivery of their order is proceeding; second, the platform allows users ordering food to rate the performance and professional conduct of the delivery worker (e.g. courier professionalism, delivery time estimate), along with a feature related to the product itself (e.g. taste, packaging). While participants seemed rather neutral about live tracking, performance rating caused them worry:

"The customer following the progress of my delivery route doesn't really bother me, as I can't really see what he or she is seeing on the other end. I'm just driving, the app is telling me that I have five minutes to make this delivery. If I'm late, [the platform] has this system that they let the customer know the order is going to be delayed." P3, Courier.

"Customers rating my performance, particularly with the contactless delivery [introduced during COVID-19], it doesn't sound that good to me, as I don't even meet the customer, I just go to the door, put the food there, and I leave. So I don't really know what are they rating. Whether I'm there on time or not? Of course if I'm not on time it's my own fault if I get a bad rating. But let's say I have a one on one interaction with the customer, then maybe the way I speak to them, how I present their food to them, how organized I look? How clean I look? That will impact the rating. But now, with contactless delivery, I don't even see the customer, I'm really worried, I've thought about this a lot, what are they rating me on? I don't consent to this, because you can't really rate me when you don't see me, when we don't have that interaction." P2, Courier.

5.3 Keeping up with the System Updates and Finding Loopholes

As Jarrahi et al. [23] point out, workers and platforms mutually shape each other, and as such, the overall system evolves. Indeed, participants reported several examples of trying to keep up with system updates and even proactively experiment with the platform's new features to find loopholes that could be exploited and in some cases informally shared with other workers. Drawing on Kellogg et al. [21], we find evidence of workers exploiting loopholes primarily related to rewarding, in this case to direct remuneration. Interestingly, no examples of algorithmic control related to replacing (e.g. deactivation or forced logout due to certain behavior, e.g. inactivity) were reported, despite other studies drawing attention to such practices [26].

"During the beginning of [the platform], the payment was not that attractive. We used to get paid by hours. I didn't really like the payment system at that time, so after a while I decided I'm not going to do it. And then when I came back two years ago the payment model had changed, and I had to recalibrate my thinking." P2, Courier.

"Some restaurants do free delivery, so it's worse for me too as I get paid less for that task, and then some restaurants have free delivery after a certain threshold, like after €40 it's free. So that's again a bad order, you should avoid that." P1, Courier.

"Drivers know the restaurants where orders are always late. It's a double-edged sword, when it's busy you actually lose money waiting there, but when it's quiet it pays off. So determining when to stay and when to go is key." P32, Courier.

"Nowadays, the app has an in-built system where after ten minutes delay from the restaurant's side, [the platform] gives you extra money because of the delay. So

if the delay is only like eight minutes, you feel sad as you almost got the delay money. In those cases I sometimes ask the restaurant to hold the order for a while longer." P5, Courier.

5.4 Emergent Power Asymmetries

Prior research has examined algorithmically managed work from the perspective of conflict between workers and management-implemented-algorithms [2], noting how the locus of control is deniably skewed towards the platform on which the algorithms operate [23, 26]. Similarly, our participants commented on this general power asymmetry, highlighting how, in their view, it originates from the lack of transparency on how different platforms' systems function. Specifically, they queried what data goes into the algorithmic decision-making process and how it is weighted. We found that platform workers' lack of ability to participate in the co-design of the system was a key point of frustration, as well as subsequent difficulties with time management and maintaining work-life balance. As put by participants:

"I think the algorithm gives you a task if it knows that you know the area well, you have been there before. Also task bundles are allocated based on this, so priority is given to drivers who have previous experience of delivering to that address." P2, Courier.

"At the beginning you could switch between many areas in [city], but now it's just available in [city]. Like you could look at e.g. [area] to see if it's busy, or the city centre, and then decide where you should go. And in the very beginning you could just go anywhere and start the app. Now you're locked to an area and have to ask them [the platform] for permission to switch areas." P5, Courier.

"When it's quiet, you have to wait for a long time, on a bad day, you have to wait for one hour without an order." P3, Courier.

6 Conclusion, Limitations and Further Research

Managers have always tried to monitor and optimize how work is conducted, i.e. oversee what workers do with their time in order to improve productivity [32]. From factories adopting scientific management principles in the spirit of Taylorism to call centers precisely measuring the quantity, quality and length of phone calls through what Fernie & Metcalf [38] dubbed the 'electronic panopticon', the rise of algorithmic control practices presents a logical continuation of this trend, whereby companies are still buying workers' time and therefore have an imperative to monitor what workers do with it [32]; cf. Tussyadiah et al. [39] for a comprehensive review of factors underlying organizational adoption of automation. However, a key difference in on-demand food delivery is that workers' time is split into smaller, locally tethered gigs that involve perishable products, and that performance is monitored in real time through the platform company's app and website e.g. by GPS [8, 35]. In response, research has found that workers develop algorithmic competencies [23] to exploit fissures in algorithmic power [33].

In this study, four forms of expressing such algoactivism in the context of on-demand food delivery platforms are identified. First, drawing on Kellogg et al.'s [21] conceptualization of algorithmic management, both restaurant and delivery workers involved with on-demand food delivery platforms adopt specific behavior to optimize the restaurant work process, that is, how the platform's algorithm restricts workers and recommends/nudges workers to behave in a certain way. Second, we find that worker performance is systematically recorded and rated. Our findings suggest that workers are neutral about the former, but apprehensive about the latter. Third, we find that workers and managers involved with on-demand food delivery make efforts to keep up with system updates and find loopholes, i.e. proactively experimenting with the platform and at times informally sharing lessons learned with other stakeholders. Fourth, we highlight emergent power asymmetries, most notably the lack of transparency about how on-demand delivery platforms' algorithms work and how this affects workers' time management and work-life balance. We call for more dialogue between platform stakeholders, including greater inclusion of platform users in the co-design of on-demand food delivery platforms' algorithms. Recently, in response to the European Commission's [3] tighter view on digital labor platforms, platform companies have started to alleviate concerns over transparency by publishing various transparency reports. In the context of on-demand food delivery, Wolt for instance released an algorithmic transparency report in February 2022. Such practices, while a commendable first move from a corporate social responsibility point of view, only affect sustainable change when one-way communication moves to comprehensive and systematic dialogue between all stakeholders on the platform, coupled with measurable indicators of impact.

In previous studies looking at algorithmic management and algoactivism in the context of delivery platforms, a key point of debate has been the tension surrounding platform worker status, i.e. should they be classified as employees of the platform or independent contractors [31]. The European Commission [3], along with many labor unions, seem to push towards the former; platform companies towards the latter. Interestingly, in our study the platform workers themselves did not hold much interest in the debate from the social security point of view (e.g. insurance, sick pay, holiday pay, parental leave). Instead, interviewees called for attention towards issues related to immigration, e.g. better recognizing work conducted on digital labor platforms when applying for or renewing immigrant work visas. As such, we join van Doorn et al. [40] in calling for more future research on the role of migrants in platform economy.

In terms of other avenues of future research, and to acknowledge the limitations of our study, we note the small and geographically limited sample. Future research could extend our work through quantitative methods, or by looking at on-demand food delivery platform operations in more rural areas or other countries. Further, future research could also adopt a more cross-platform view, examining workers' algoactivistic behavior across both locally-tethered (e.g. Deliveroo, Wolt) and virtual (e.g. Upwork) platforms. We note that algorithmic management is a continuum, whereby some platforms adopt more heavy and some more light versions of algorithmic control. As evidenced by prior research, the platforms analyzed here fall on the more lenient side [8]; future studies could aim to comparatively study more lenient and more heavily AI-controlled labor platforms.

Finally, from an e-tourism point of view, more research could explore how different platforms fare against the principles of decent work, making a connection to the body of tourism and hospitality literature that has highlighted worker precarity in relation to emerging technology [41]. We also note that currently, the food delivery platform economy and its infrastructure is mostly embraced by big cities, and therefore provide a potential for food tourism, whereby an increasing number of international travelers will use food delivery platforms whilst on holiday, particularly as the app's global reach expands. As the reach of these platforms expands, they will foster new forms of (oppositional and other) attitudes from tourists, locals, restaurant partners, and delivery couriers, for e-tourism researchers to study.

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"Domestic or International?" The Impact of Cognitive Absorption of Short-Form Videos on Tourists' Post-COVID Travel Intention: An Exploratory Study on Douyin

Han Zhou[1] , Tao Sun[2(✉)] , Yi Xuan Ong[3] , and Naoya Ito[4]

[1] Graduate School of International Media, Communications and Tourism Studies, Hokkaido University, Sapporo, Japan
hanzhou829@gmail.com
[2] Faculty of International Tourism Management, Toyo University, Tokyo, Japan
sun033@toyo.jp
[3] Wee Kim Wee School of Communication and Information, Nanyang Technological University, Singapore, Singapore
yixuanong91@gmail.com
[4] Research Faculty of Media and Communications, Hokkaido University, Sapporo, Japan
naoya@imc.hokudai.ac.jp

Abstract. The extant studies have attested to the effects of media experiences in shaping destination image and influencing the behavioral intentions of potential tourists. However, limited works have focused on the impact of holistic experiences during the interaction with destination-related short-form videos on potential tourists' negative emotional responses and post-COVID travel intention. This study aims to elucidate how cognitive absorption affects tourists' travel anxiety and post-pandemic travel intention in different travel settings (domestic versus international). The comparative results show that users' cognitive absorption when interacting with destination-related short-form videos can effectively influence the behavioral intentions of potential tourists. The result also identified that travel anxiety significantly contributes to higher post-COVID travel intention. This study expands cognitive absorption research in the contexts of tourism and short-form videos, offers an angle for future studies to positively interpret tourists' travel anxiety, and provides tourism practitioners with suggestions on the tourism industry's recovery in the post-COVID era.

Keywords: Cognitive absorption · Destination-related short-form videos · Travel anxiety · Travel desire · Post-COVID travel intention

1 Introduction

During the COVID-19 pandemic, people worldwide are constantly in the grip of infection, quarantine, and the fear of death, which directly or indirectly contribute to their long-lasting anxiety about travel [1, 2]. As a future-oriented negative anticipatory emotion, anxiety not only can lead to the reduction of travel desire [3] but also can anticipate some protective behaviors such as cautious travel and travel avoidance [4]. To revitalize

the tourism industry from the impacts of COVID-19 as soon as possible, it is of great value to probe into the possible factors that can alleviate people's travel anxiety and further trigger travel desire. This study aims to explore such factors in the context of short-form video services.

Short-form video services, led by TikTok (known as Douyin in mainland China), have developed rapidly around the world. It is influential enough to make an obscure destination become famous overnight [5]. As such, destination-related short-form videos on Douyin are becoming increasingly vital in building the destination image, mediating tourist experiences, and affecting potential tourists' behavioral intentions [6]. During the pandemic, travel videos on Douyin have played a crucial role in influencing users' future destination choices as an alternative to physical travel [7]. Despite the substantial promotional value of Douyin for destination marketing, tourism research related to Douyin is still in its infancy stage [7].

Furthermore, the perceptual accuracy and the perceptual serendipity of recommendations arise from the application design of Douyin (or TikTok) facilitate users' deep involvement and optimal holistic experiences [8]. This kind of deep involvement experience, also known as cognitive absorption, is thought to result in positive outcomes, including increased enjoyment, satisfaction of travel experiences, and reduced negative emotions such as stress caused by the pandemic [9–11]. Although the induced effects of cognitive absorption may play an important role in influencing users' subsequent travel behavior, for a long time, cognitive absorption research to date has mostly focused on its positive effects on individuals' belief formation and information technology usage intention [9, 10]. Little attention has been paid to discuss how users' interactions with tourism related short-form videos could influence their travel psychology and behavioral intention, particularly in the post-COVID context.

To bridge the aforementioned research gaps, variables such as cognitive absorption, travel desire, travel anxiety and post-COVID travel intention are integrated into a same theoretical landscape. This is significant as it not only embraces travel consumers' real-time travel psychology (i.e., travel desire and travel anxiety) during the COVID-19 pandemic [3] but also attempts to interpret such psychology and subsequent behavioral intention by considering their social media experience (cognitive absorption) during the pandemic. The proposed research framework specifically aims to answer the following two research questions.

RQ1: How does cognitive absorption interact with tourists' travel anxiety and travel desire during the pandemic and further affect post-COVID travel intention?

RQ2: Can the association in RQ1 be different in the contexts of domestic and international travel settings?

2 Literature Review

2.1 Hypothesis Development

Travel Anxiety, Desire, and Intention. As a state of tension and worry, anxiety is considered a negative psychological response to stress, risk, and unknown consequences, making it a key contributing factor to human behavior [1]. Because travel behavior is inherently risky and unfamiliar, people tend to make decisions after evaluating travel

risks [1]. Of which, health risks from the ongoing COVID-19 pandemic have increased uncertainty of travel behavior and heightened people's negative emotions such as anxiety and fear about travel [4]. Travel anxiety is deemed to be an emotion leading to a reduction in individuals' travel desires [3]. Several researchers have experimentally revealed the suppressive effect of travel anxiety on travel desires in various pandemic-related travel contexts [3, 12].

Pandemic-related contents on social media during the outbreak are thought to alter travelers' perceptions of risk, attitudes, and behaviors [13]. Negative media information may trigger travelers' fear and anxiety, while positive social media engagement may buffer the psychological distress to temper travelers' anxiety [14]. Travel anxiety is considered to predict for some protective behaviors, such as cautionary travel and the avoidance of travel [4]. An increase in anxiety can result in individuals to adopt cautious or avoidant behavior to reduce travel risk [3, 4]. In general, travel intention and perceived safety decrease when travel anxiety increases [15].

Desire and intention are similar but different. Desire is the motivation and goals of actions, while the intention is the initial commitment to perform actions [16]. Thus, intention has a clearer timeframe and stronger relevance to specific behaviors than the desire [17]. People will not make the commitment to take action if they lack desire [18]. In tourism literature, aroused travel desire was found to have a strong impact on people's travel intention [16, 19]. Hence, the following hypotheses are proposed:

H1. Travel Anxiety inhibits Travel Desire.
H2. Travel Anxiety negatively influences Post-COVID Travel Intention.
H3. Travel Desire positively influences Post-COVID Travel Intention.

Cognitive Absorption and Travel Anxiety. Cognitive absorption first appeared in information-system related literature. Defined as a kind of deep involvement state while using information systems, cognitive absorption was extended by Agarwal and Karahanna [9] from three concepts: the state of flow, the trait of absorption, and cognitive engagement. In recent years, cognitive absorption has also been used in the tourism literature. Recent research ascertained that deep involvement in virtual tours creates enjoyment, engagement, and satisfaction, which also reduces users' perceived stress towards the pandemic [11]. Travelers who are planning to visit unknown locations are thought to experience anxiety [20]. Especially during the pandemic, the crowdedness, sanitation, and the uncertainty about the destination may accentuate individuals' feelings of anxiety and concern about the bad consequences of the trip [21]. In the state of cognitive absorption, as individuals' self-efficacy increases and their cognitive load decreases, which in turn enables individuals to get more information about the destination and help to generate a real and clear destination image [20, 22]. Such process is generally considered helpful in alleviating travel anxiety about the unknown risks [20]. Thus, the following was proposed.

H4. Cognitive Absorption has an anxiety-relieving effect.

Cognitive Absorption, Travel Desire, and Intention. Previous studies have confirmed that media content can increase people's knowledge of the destination and familiarity with the destination; it can also escalate satisfaction with the destination-related media experiences, increase the desire to visit the place, as well as heighten people's

travel intention [16]. Meanwhile, the deeply involved immersive state while interacting with the destination-related media content can further promote users' enjoyment, engagement, and satisfaction [11]. Similarly, entertainment also plays a vital role in predicting users' satisfaction with media experiences [16]. In other words, in the state of cognitive absorption, heightened enjoyment is more likely to lead to positive attitudes toward the overall media experiences. Therefore, this study hypothesizes that the cognitive absorption while interacting with destination-related short-form videos can positively affect the desire and intention to visit a said destination.

H5. Cognitive Absorption has a Travel Desire-arousing effect.

H6. Cognitive Absorption positively affects Post-COVID Travel Intention.

Based on the above hypotheses, the research model of this study was developed, as shown in Fig. 1.
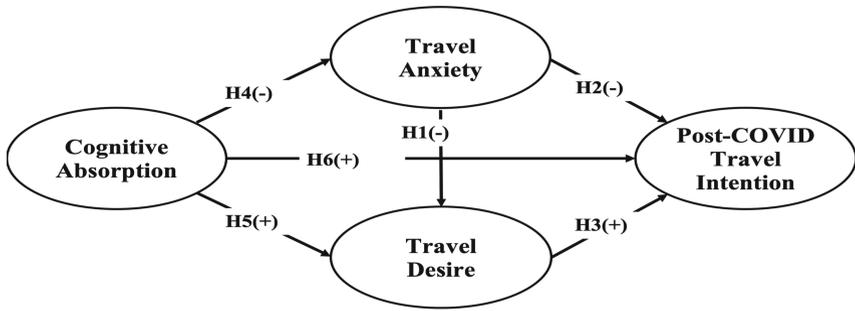
Fig. 1. Research model.

2.2 The Measurement of Cognitive Absorption

It is still inconclusive in current studies on establishing a measurement scale for cognitive absorption [9, 23]. Cognitive absorption was originally devised as a multi-dimensional concept, including five subdimensions: Temporal Dissociation (TD), Focused Immersion (FI), Heightened Enjoyment (HE), Control (CL), and Curiosity (CU) [9]. However, some researchers take a different view, such as Burton-Jones and Straub [23]. They argued that although cognitive absorption is regarded as a second-order reflex structure, focused immersion is the only substructure of cognitive absorption "measured with items that referred to being absorbed" [23, p.237]. To "balance completeness with parsimony", it is justified and appropriate to use five measurement items of FI instead of using all 17 measurement items of cognitive absorption [23, p.234, 237]. This study opts to follow Burton-Jones and Straub's [23] suggestion and measure cognitive absorption based on FI.

3   Methodology

3.1   Data Collection and Analysis

A web-based survey was conducted in August 2022 with the assistance of a market research firm in Mainland China. The survey only recruited informants who reported having watched destination-related short-form videos in the previous 12 months. Two sets of questionnaires were prepared, with scenarios distinguishing between different contexts of domestic and international travel desire and post-COVID travel intention (see Table 2). Respondents were further asked to recall the most impressive destination they watched recently, and the type of destination (domestic or international). A questionnaire was then automatically assigned based on the destination information answered by the respondent. Measurements were all adapted from existing studies (cognitive absorption [9, 23], travel anxiety [3, 15], travel desire [24], post-COVID travel intention [24]). A semantic differential scale was used to measure the items of travel anxiety (see Table 2). The remaining items were all evaluated on a seven-point Likert scale (1 = strongly disagree; 7 = strongly agree).

The measurement model and structural model were assessed through the partial least squares structural equation modelling (PLS-SEM) with the PLS algorithm and bootstrapping (5000 subsamples) techniques. PLS-SEM was chosen because it has fewer requirements for data normality and residual distribution, and it is more appropriate for predictive research such as the current study [25].

4   Results

4.1   Descriptive Statistics

A total of 477 and 392 valid samples were yielded from the domestic and international destination-based surveys, respectively. As shown in Table 1, approximately 70% of the respondents in both groups were in their 20s and 30s, which is in accordance with the proportion of Douyin's major users [26], makes the data even more relevant.

Table 1. Demographics of respondents.

Characteristics		Dom. (*n* = 477)		Int. (*n* = 392)	
		Frequency	%	Frequency	%
Gender	Male	176	37%	134	34.2%
	Female	301	63%	258	65.8%
Age	17–23	62	13%	76	19.4%
	24–30	271	56.8%	223	56.9%
	31–40	119	24.9%	76	19.4%
	Above 41	25	5.2%	17	4.3%

(*continued*)

Table 1. (*continued*)

Characteristics		Dom. (*n* = 477)		Int. (*n* = 392)	
		Frequency	%	Frequency	%
Occupation	Students	124	26%	131	33%
	Enterprises	279	58.5%	191	49%
	Administrative institutions	49	10.3%	43	11%
	Self-employed / Freelance	16	3.4%	17	4%
	Others	9	1.9%	10	2%

4.2 Measurement Model

The reliability and validity of the measurement model were tested by factor loadings, Cronbach's alpha, composite reliability (CR), and average variance extracted (AVE). As presented in Table 2, except for one item in Model $_{Dom.}$ (*I was immersed in the task I was performing*), all indicator loadings were higher than the recommended threshold of 0.70 [25]. The values of Cronbach's alpha and CR all exceeded 0.70 (Model $_{Dom.}$: 0.719–0.926; Model $_{Int.}$: 0.860–0.921), indicating acceptable construct reliability [25]. The values of AVE also turned out to be greater than the threshold of 0.50 suggested by Hair et al. [25] (Model $_{Dom.}$: 0.542–0.818; Model $_{Int.}$: 0.703–0.809). Given that both internal consistency reliability and convergent validity were achieved, the item with relatively lower loading (0.644) was thus retained [25]. The heterotrait–monotrait ratio of correlations (HTMT) was further employed to gauge the discriminant validity. The highest value of the HTMT across the two groups is lower than the stipulated value of 0.85 recommended by Henseler et al. [27] (Model $_{Dom.}$: 0.479; Model $_{Int.}$: 0.427), indicating satisfied discriminant validity.

Table 2. Measurement model for constructs.

Construct and item	Loading		Mean		SD	
	Dom.	Int.	Dom.	Int.	Dom.	Int.
Cognitive Absorption (CA)						
I was able to block out most other distractions	0.796	0.779	5.461	5.339	0.775	0.866
I was absorbed in what I was doing	0.792	0.828	6.006	5.827	0.815	0.892
I was immersed in the task I was performing	0.644	0.746	5.950	5.724	0.815	0.884
I got distracted by other attention very easily	0.828	0.837	5.688	5.477	0.893	0.947
My attention did not get diverted very easily	0.780	0.802	5.532	5.383	0.872	0.972
Travel Anxiety (TA)						

(*continued*)

Table 2. (*continued*)

Construct and item	Loading		Mean		SD	
	Dom.	Int.	Dom.	Int.	Dom.	Int.
Calm – Worried	0.876	0.883	3.650	5.240	1.633	1.423
Relaxed – Tense	0.924	0.892	3.713	5.509	1.749	1.434
Peaceful – Panicked	0.951	0.917	3.216	5.212	1.531	1.482
Comfortable – Frustrated	0.903	0.880	3.252	4.620	1.582	1.411
Travel Desire (TDS)						
I would like to do domestic/international travel in the near future	0.884	0.891	5.551	5.592	1.166	0.972
I am enthusiastic about domestic/international traveling in the near future	0.875	0.909	5.671	4.620	1.218	1.339
I hope to do domestic/international travel in the near future	0.866	0.917	5.964	5.176	1.159	1.234
I am eager to do domestic/international travel in the near future	0.817	0.880	5.901	5.240	1.103	1.261
Post-Covid Travel Intention (PCTI)						
I plan to do domestic/international travel after COVID-19	0.798	0.871	6.101	5.578	0.836	1.079
I will make an effort to do domestic/international travel after COVID-19	0.718	0.841	6.132	5.829	0.830	1.039
I have an intention to do domestic/international travel after COVID-19	0.715	0.864	6.314	5.995	0.737	1.010
I am willing to do domestic/international travel after COVID-19	0.710	0.833	6.363	6.031	0.750	0.939

4.3 Structural Model Evaluation and Hypothesis Testing

Built upon the sufficient reliability and validity of constructs, the structural model was further evaluated. The values of standardized root mean residual (SRMR) of the two models were lower than the recommended criterion of 0.08 (Model$_{Dom.}$: 0.058; Model$_{Int.}$: 0.052) [27]. The inner and outer values of variance inflation factor (VIF) across two groups were less than 5, eliminating issues of multicollinearity [25]. Blindfolding test was also applied to calculate the values of Stone-Gaisser's Q^2 for endogenous constructs. Results showed that the Q^2 values in both groups exceeded the requirement of zero (Model$_{Dom.}$: 0.023–0.051; Model $_{Int.}$: 0.002–0.164), indicating good predictive relevance [25]. As for the effect sizes (f^2), the cut-off points at 0.01, 0.06, and 0.14 are regarded as small, medium, and large, respectively [28]. As shown in Table 3, the domestic group received relatively acceptable effect size values (from small to large), whereas, in the international group, three out of six paths' effect sizes were detected as unacceptable. Yet it is still reasonable considering the influences of insignificant paths

[29]. R^2 values ranging from 0.02 to 0.12, 0.13 to 0.25, 0.26 and greater are described as weak, moderate, and substantial [30]. Across two groups, travel desire and post-COVID travel intention demonstrated moderate explanation power, whereas R^2 values of travel anxiety were relatively weak (see Table 3).

Table 3. Results of hypothesis testing.

Hypothesis	Model$_{Dom.}$				Model$_{Int.}$			
	β	t-Value	f^2	Result	β	t-Value	f^2	Result
H1. TA → TDS	−0.419	11.563***	0.216	Yes	−0.396	11.429***	0.187	Yes
H2. TA → PCTI	0.2000	4.835***	0.037	No	0.085	2.22*	0.009	No
H3.TDS → PCTI	0.355	7.440***	0.118	Yes	0.465	10.702***	0.246	Yes
H4.CA → TA	−0.168	3.801***	0.030	Yes	−0.058	1.103ns	0.006	No
H5. CA → TDS	0.315	3.108**	0.024	Yes	0.057	0.995ns	0.001	No
H6. CA → PCTI	0.202	3.995***	0.038	Yes	0.179	3.155**	0.041	Yes
	R^2				R^2			
TA	2.9%				0.6%			
TDS	21.4%				16.0%			
PCTI	15.4%				23.5%			

Note. * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$, ns = non-significant. β = Standardised regression weight. f^2 = Effect sizes. TA = Travel anxiety, TDS = Travel desire, PCTI = post-COVID travel intention, CA = Cognitive absorption. Yes = Supported, No = Unsupported.

The results of hypothesis testing are presented in Table 3. In the domestic group, most of the hypotheses were accepted except H2. However, three out of six hypotheses in the international group were rejected. To uncover whether the results of the two groups are statistically and significantly different, multigroup analysis (MGA) was also applied. Before the procedure of MGA, the measurement invariance of composites method (MICOM) consisting of three-step testing (the configural invariance, compositional invariance assessment, and equality of composite mean values and variances.) was conducted [31]. The combined data successfully fulfilled step 1 and step 2, indicating the establishment of partial measurement invariance. Thus, the MGA was administered. Results showed that only H2 (TA → PCTI) was attested to be significantly different ($\beta_{Dom.} = 0.199$, $\beta_{Int.} = 0.085$, $t_{|Dom. - Int.|} = 2.297$, $p < 0.05$).

5   Discussion

5.1   Conclusion

Impacts of Cognitive Absorption.   The results have revealed that the cognitive absorption of destination-related short-form videos positively affects people's post-COVID travel intention in both domestic and international tourism situations. In addition, the

results show that cognitive absorption of domestic destination-related contents not only relieve domestic travel anxiety but also stimulate the desire to travel to the domestic destination during the pandemic. Conversely, the effects of cognitive absorption on travel anxiety and travel desire in the international data group were not verified, unexpectedly. Although the differences between these two pathways failed to confirm in the MGA procedure, such results still make sense especially given the relatively high travel anxiety and low travel desire in the international data group (see mean values in Table 2). Especially during the data collection, Chinese people are still placed under the government's rigorous ban on 'non-essential' international travel [32] and a series of long-term citywide lockdowns resulting from the emerging virus variant [33]. These situations are likely to have depleted tourists' travel desires and confidence in international travel, curbed the impact of media experiences, and hence such results.

Higher Anxiety and Higher Intention. The most striking finding resides in that travel anxiety could significantly boost post-COVID travel intention across the two data sets. A plausible reason for this result might be linked to the potential pent-up travel demands caused by COVID-induced anxiety and stress [3]. This is rational, particularly in light of the significant inhibiting effect of travel anxiety on travel desire during the pandemic (H1). As predicted by several tourism scholars that once the green light for travel is given by the government, the potential travel demand, which is suppressed by anxiety for a long time, will escalate people's travel intentions exponentially [3]. In fact, revenge travel has exactly been observed in some European and American countries in the middle of 2022, where COVID-related travel restrictions have dropped [34].

Make Up for Lost Time by Starting "Nearby". The significant effect yielded from the MGA is also noteworthy. The impact of travel anxiety on post-COVID travel intention was found to be significantly stronger in the domestic group, denoting that the respondents prefer to do domestic travel to release their pent-up demands post-COVID. This result is also consistent with the new trend of "travel nearby" as indicated by some scholars [35]. Although the quarantine and social distancing during the pandemic are suggested to motivate individuals to go outside and meet others in post-COVID-19 [36], the long-term persistence of the pandemic may solidify some of the behaviors of people, such as choosing familiar destinations or routes to reduce health-threatening fears while travelling in post-COVID-19 context [35, 37]. Furthermore, factors such as tourist xenophobia, tourist ethnocentrism, continued de-globalization, and regionalism may make international travel more expensive and less hospitable, which may deter tourists in the post-COVID-19 era [35, 38] Besides, during the early stages of the post-pandemic period, the restoration of daily life and work is considered the first priority [36], as social and economic uncertainty and time shortages are likely to influence travelers' decisions as tourism constraints, potentially causing tourists to choose destinations close to home rather than long distances [39, 40].

5.2 Theoretical and Practical Implications

This study is one of the first to apply cognitive absorption theory to the context of destination-related short-form videos and interweaved users' short-form video experiences with the travel psychology in the context of the pandemic. It empirically verified

that cognitive absorption acts as a key trigger during the interaction with destination-related short videos and plays a predictive role in travel decision-making, such as users' travel intention to a destination. The findings enriched the knowledge framework of cognitive absorption while filling a gap in existing research on the role of cognitive absorption in predicting tourists' dynamic travel psychology (i.e., travel desire and travel anxiety) and behavioral intention within different travel settings during the pandemic. More importantly, this study has identified the paradoxical psychology of potential travel consumers (i.e., travel anxiety significantly contributes to higher post-COVID travel intention), providing an angle for future studies to positively interpret potential tourists' travel anxiety post-COVID. Furthermore, although this study only focused on Chinese users of Douyin, considering the similar functionality of Douyin and TikTok, the findings have also offered a theoretical framework for other short-form video researchers to understand how users' app usage experience can interact with their consumption psychology and behavioral intention.

Based on the results, this study suggests that practitioners of domestic destinations should catch on to the travel psychology of tourists and make the best use of short-form video platforms to promote their destinations. For example, introducing the destination's pandemic prevention strategies and hygiene regulations through short video content to reduce people's risk perception of the destination.

Meanwhile, tourism managers should also recognize the underlying opportunities for short-haul international travel (the proximal extension of domestic travel) in the near future. Particularly, practitioners are suggested to embark on the preparation for the "return" of tourists from neighboring countries and regions in the end of the COVID. In line with this, destination marketers should also take an early step to communicate well with destination stakeholders and work on establishing a hospitable destination atmosphere. To further amplify the positive impacts of cognitive absorption, short-form video platforms are suggested to collaborate with overseas destination institutions or travel influencers by promoting relevant professional content with an accurate recommendation algorithm. Together with this, the decentralized characteristics of Douyin's special algorithm could also be leveraged to push overseas high-quality travel content posted by grassroots users.

5.3 Limitations and Future Studies

Several limitations need to be further addressed in future studies.

First, this study explores on the benefits of cognitive absorption and without looking at the drawbacks such as fatigue and media anxiety. Future studies are recommended to delve into the negative effects of cognitive absorption on tourists' desire, anxiety, and behavioral intention. Second, there was no specific domestic or international destination designated in this study. Particularly, the number of infections and the disease prevention policy could vary in different countries or regions [3], making tourists' levels of perceived risk and anxiety distinct. Also, as discussed earlier, even in the same international travel scope, tourists' travel desires and intentions could fluctuate by the sense of distance. Thus, future studies are recommended to compare the effects of cognitive absorption while interacting with the content of a specific destination (short-haul vs. long-haul).

Last but not the least, the measure of cognitive absorption is insufficient, calling for a scientific measurement development in future studies.

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A Re-rank Algorithm for Online Hotel Search

Emanuele Cavenaghi[1]([✉]), Lorenzo Camaione[4], Paolo Minasi[4],
Gabriele Sottocornola[1], Fabio Stella[3], and Markus Zanker[1,2]

[1] Free University of Bozen-Bolzano, Bolzano, Italy
`{ecavenaghi,gabriele.sottocornola,Markus.Zanker}@unibz.it`
[2] University of Klagenfurt, Klagenfurt am Wörthersee, Austria
[3] University of Milano-Bicocca, Milano, Italy
`fabio.stella@unimib.it`
[4] Bravonext SA t/a lastminute.com, Chiasso, Switzerland
`{lorenzo.camaione,paolo.minasi}@lastminute.com`

Abstract. Recommender Systems were created to support users in situations of information overload. However, users are consciously or unconsciously influenced by several factors in their decision-making. We analysed a historical dataset from a meta-search booking platform with the aim of exploring how these factors influence user choices in the context of online hotel search and booking. Specifically, we focused our study on the influence of (i) ranking position, (ii) number of reviews, (iii) average ratings and (iv) price when analysing users' click behaviour. Our results confirmed conventional wisdom that position and price were the "two elephants in the room" heavily influencing user decision-making. Thus, they need to be taken into account when, for instance, trying to learn user preferences from clickstream data. Using the results coming from this analysis, we performed an online A/B test on this meta-search booking platform comparing the current policy with a price-based re-rank policy. Our online experiments suggested that, although in offline experiments items with lower prices tend to have a higher Click-Through Rate, in an online context a price-based re-rank was only capable to improve the Click-Through Rate metric for the first positions of the recommended lists.

Keywords: Recommender systems · Tourism · Meta-search booking platform · Online hotel search · Data analysis · Learning to rank

1 Introduction

Recommender Systems (RSs) [7] are algorithms developed for helping users to find items of interest. The massive volume of information available on the web leads to the problem of information overload and, thus, increases the need for delivering effective and timely recommendations. The main idea behind these methods is to estimate users' interests from their past interactions in order to recommend them new unseen items matching their preferences.

As recently surveyed in [18], RSs are extensively applied in the E-Tourism domain to recommend destinations/travel packages [23], points of interest [22] or restaurants [24]. When recommending accommodations it is fundamental to exploit both contextual features (such as season and place) as well as users' preferences. Over the last years, many RSs were developed in order to recommend hotels in the context of online booking. Some works applied traditional RSs techniques such as *Collaborative Filtering* [8,15] or *Content-Based approaches* [17,20]. Instead, other works proposed domain-specific approaches. For instance, [10] use textual reviews as the main source of information to make recommendations, [19] build specific topic models from textual reviews or [11] design an app where users can search and browse hotel reviews. Finally, another approach to recommend hotels is the *Learning to Rank* approach (see [12]) in order to automatically construct a ranking model using training data, such that the model can sort items according to their relevance, preference, or importance (e.g. [14]).

One work studying the influence of different factors on the user decision-making is the one in [1]. Here, the authors examined the impact of three main factors on converting searches into customers: impact of rated reviews, recommendations and search listings. They showed that a high rank position in the list, room price and hotel size had a significant effect on conversion rates. Instead, the rating of the location had a significant positive impact on conversion rates while service rating and star rating did not show a significant effect. These findings suggest that ratings are not always reliable as also found by [16]. They examined whether encountering reviews shared on social media containing disparity in the cost of same accommodation could cause regret and alter the intention to revisit from a retrospective point of view.

The first contribution of our work is to study the influence of several observable variables related to online hotel search in the context of a meta search engine, i.e. a platform that aggregates data from multiple *Online Travel Agencies* (OTAs)[1]. Specifically, we focus our attention on the following features of the properties[2]: (i) the rank position of accommodations in the recommendation list displayed to the user, (ii) the price, (iii) the average rating and (iv) the number of reviews. Based on the analysis of the impact of the aforementioned properties on users' click behavior, we tested a simple re-rank algorithm and report results from an online A/B test. Therefore, the research questions are as follows:

– **R.Q. 1:** Do the variables (rank position, price, rating and number of reviews) influence user decision-making?
– **R.Q. 2:** Does a price-based re-rank of recommended items lead to a higher Click-Through Rate (CTR)?
– **R.Q. 3:** Does the OTA associated with each offered property influence the CTR?

To answer the first research question, we analysed an historical dataset collected on a *meta-search booking platform* that aggregates offered properties from

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[1] The OTA is an external party which facilitates the booking a property.
[2] With the term property we refer to any type of accommodation like hotels, apartment houses, etc.

different OTAs. Instead, to answer the second and the third research questions, we ran an A/B test on the meta-search platform to compare the existing recommendation strategy of the meta-search platform with a local price-based re-rank algorithm. In both, the historical dataset and the A/B test, the company had no information about the anonymous users and their history of previous interactions with the site. Moreover, there was no explicit feedback (e.g., user ratings specific to properties), but we had to rely solely on implicit feedback [6], in our case user clicks.

2   Data Analysis

In this section, we report the results of our data analysis to provide an answer to the first research question: "Do the variables (rank position, price, rating and number of reviews) influence user decision-making?". The dataset has been collected on a meta-search booking platform, where the roughly $130,000$ recommended lists and the associated user actions (click-throughs) of different anonymous user sessions were recorded, each consisting of 25 properties/recommended accommodations displayed on the same page.

The data has been collected on searches about 14 Italian cities on a meta-search booking platform in the period between 11/2021 and 4/2022. Moreover, in searches where users applied a filter criterion we could not unambiguously map the clicks to the specific search and therefore we removed all searches with any filter applied. In every recommended list, each property can be associated with a different OTA. As a result, each property can be presented with different OTAs and in each list multiple OTAs are present. Given the small number of users that look beyond the first page, we restricted the analysis to the first page with 25 ranked properties.

Figure 1 reports the CTR computed for each of the 25 positions in the recommended list. In this and all the following figures, the shaded area around the line represents the 99% confidence interval computed by the *Seaborn*[3] python package using a bootstrapping technique. For the remainder of the paper, we will refer to the CTR distribution shown in Fig. 1 as the *a-priori CTR*. Instead, Figs. 2, 3 and 4, report the CTR distribution for values of price, rating and number of reviews that are higher than the 80% quantile and lower than the 20% quantile. For example, in Fig. 2, to obtain the CTR distribution for values higher than the 80% quantile, we took only the properties with a price higher than the 80% quantile into account within each recommended list, i.e. we removed all the properties with a price lower than the 80% quantile in each recommended list from the dataset. We chose this method to investigate the cheapest/best rated/most reviewed and most expensive/worst rated/least reviewed. We initially focused on the 10% and 90% quantiles, but due to the low number of samples we switched to 20% and 80% quantile in order to obtain statistically significant results.

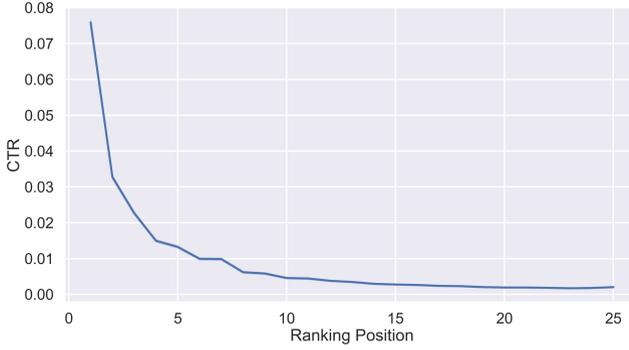---

[3] https://seaborn.pydata.org/.

Fig. 1. CTR for each rank position in the recommendation list. The y-axis reports the CTR achieved in each rank position. Due to the large number of observations, the confidence interval is very small and difficult to see in the image.

Influence of Rank Position. It is well documented in the literature that the rank position affects user choice [4, 9], and our analysis confirmed this assertion. From Fig. 1 it was clear that the rank position had a significant effect on CTR. In fact, the CTR for rank position k was always higher than the CTR for subsequent rank positions. For example, in our dataset, the CTR for the first rank position was around 5.75%, while the CTR for the last rank position was lower than 0.5%. This means that the probability of clicking the first rank position was about 12 times higher than clicking on rank position 25. However, while for the first 10 rank positions this was evident, the difference in CTR for the rank positions between 10 and 25 was close to zero. The answer to the research question: "To which extent does the rank position influence user decision-making?" is yes: the rank position clearly influenced user's choice.

Influence of Price. Figure 2 reports the results for price when considering only properties having a price above the 80% quantile and below the 20% quantile. For each rank position, the CTR was higher than the a-priori CTR if we considered properties with a price lower than the 20% quantile. This clearly means that lower prices positively influenced the users' propensity of clicking on a property and the opposite happened if we considered properties with a price higher than the 80% quantile: for higher prices the CTR was lower. The answer to the question: "To which extent does the price influence user decision-making?" is clearly yes. Price influenced the user decision-making both positively and negatively as also stated in [13, 21].

Influence of Rating. Figure 3 reports the analysis for properties with a rating above the 80% quantile and below the 20% quantile. While the influence of price was statistically significant for every rank position, for rating this difference was only significant for properties with a rating below the 20% quantile and only for the first seven rank positions. We expected that a higher rating would lead
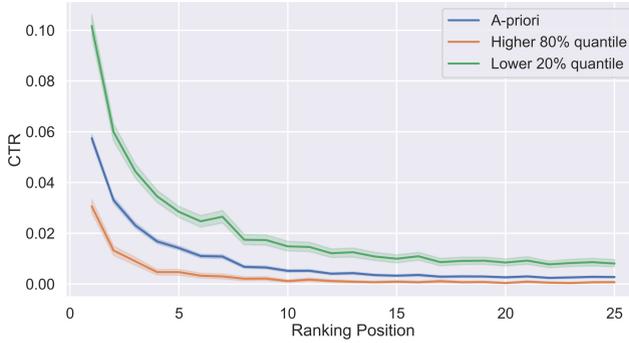
Fig. 2. CTR for each rank position in the recommendation list taking into account property's price.

to a higher CTR, while a lower rating would lead to a lower CTR. Instead, we observed the exact opposite phenomenon. Thus, the answer to the research question: "To which extent does the rating influence user decision-making?" is not so clear. While for rank position and price the effect was always relevant, for the rating it was more difficult to give a unique answer: the rating seemed to have a very weak influence or no influence at all. These results are in contrast with [5] and [2] that found that users were influenced by rating. However, these works ran user studies considering only rating and number of reviews, while for us price seemed to have a stronger influence that probably confounded the effect of rating.

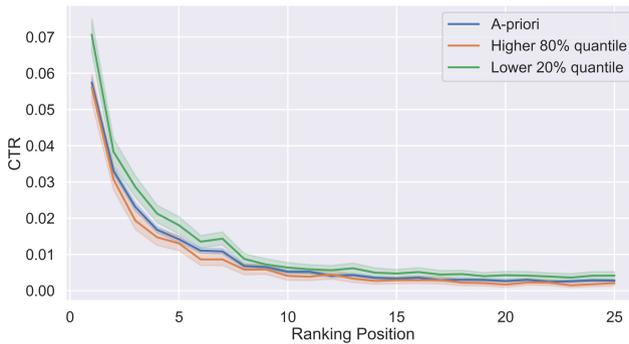**Fig. 3.** CTR for each rank position in the recommendation list taking into account property's rating.

Influence of Number of Reviews. Finally, we report in Fig. 4 the analysis for properties with a number of reviews above the 80% quantile and below the 20% quantile. In these cases, it was clear that the number of reviews did not

influence the user's choice at all. These results are in contrast to other studies in the literature, such as [2], where users tend to trust the rating of the items only if they are made up on a sufficient number of reviews. To verify the existence of a sufficient number of reviews above which users trust the rating, we compared the distribution of the CTR for properties with above and below 35 reviews. We found that there was a positive influence for properties above the threshold confirming our claims. Given our data, the last research question: "To which extent does the number of reviews influence user decision-making?" has to be answered as follows: the number of reviews did not influence user decision-making when the number of the reviews exceeded a specific threshold.
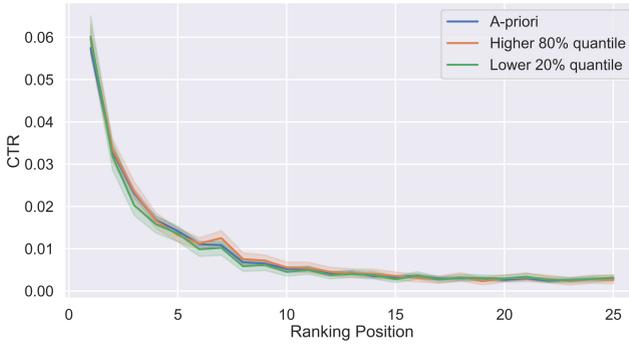
Fig. 4. CTR for each rank position in the recommendation list taking into account the number of reviews of each property.

3   Re-rank Algorithm

To answer the second research question, we implemented a simple and efficient algorithm to re-rank the top-25 list of offered properties as recommended by the current algorithm. Since the developed algorithm only re-ranks the top-25 items, it is ensured that all properties presented to users are of comparable quality with the baseline. To re-rank the properties, we computed a score and reordered the properties from highest to lowest score. The score, reported in Eq. 1, is composed by two logistic functions with two means:

$$y = \alpha \cdot \frac{1}{1 + e^{kx_i - \mu_1}} + \beta \cdot \frac{1}{1 + e^{kx_i - \mu_2}} \tag{1}$$

where $\alpha, \beta \in [0, 1]$ manage the weight of the two functions while $\alpha + \beta = 1$, y represents the score, x_i the price of the property i, and k controls the speed by which the function approaches the limits (i.e., 0 and 1). Finally, the two means, μ_1 and μ_2, represent respectively the mean price for the type of accommodation[4]

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[4] With *type of accommodation* we refer to the different type of properties, e.g., apartment, guest house, hotels with 3 stars, etc.

of the property i within the recommendation list and the median price of the properties within the recommended list (regardless of the type of accommodation). For μ_2, we used the median instead of the mean to reduce the impact of outlier prices, for instance, the price of 5-stars hotels. μ_1 allows us to account in a simple way the quality-price ratio, because a user may prefer to pay more for higher quality accommodations. While μ_2 controls for the absolute price of the properties, because, as showed in Fig. 2, users tend to click on properties associated with a lower price. In the following experiments, we use $\alpha = \beta = 0.5$. We select these values using the results from offline experiments on the dataset described in Sect. 2, because running multiples online experiments with different values of the two hyper-parameters was not possible.

4 A/B Test Results

The A/B test was conducted on the company's website for 20 days (between June and July 2022), and, in the end, nearly 1 million searches were conducted by users worldwide.
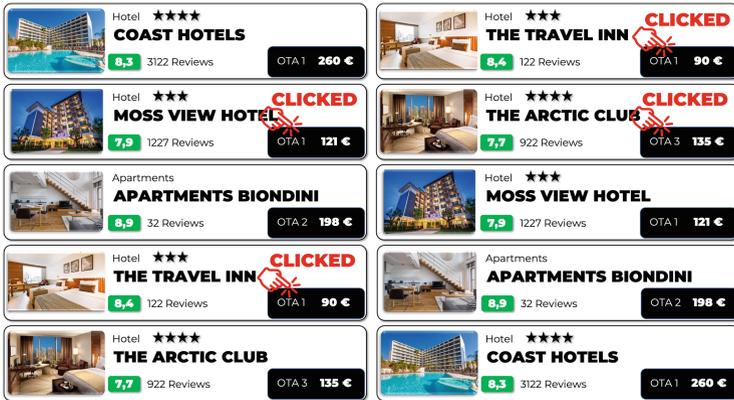
Fig. 5. Example of the A/B test. On the left is the list of properties recommended by the Baseline policy, and on the right is the list reordered by the Re-rank policy. The achieved NDCG are 0.651 (Baseline policy) and 1.0 (Re-rank policy) even if the number of clicks are the same.

We compared the Baseline policy used by the company, a linear regression that takes several factors into account and where weights are manually chosen by experts, with the Re-rank policy described in Sect. 3. Figure 5 reports an example of the A/B test on a 5 items list while the results, in terms of CTR for each rank position, are reported in Fig. 6.

Figure 6 clearly depicts that, for the first position, the CTR achieved by the Re-rank policy was statistically significantly higher (more than 2%) than the Baseline policy. Instead, for all rank positions after the third, the Baseline

policy achieved a slightly higher CTR, even if the difference was less than 0.5% and close to zero for bottom positions. The increase in the first position was expected, and the results confirmed our hypotheses. However, we also expected an improvement for more top ranked positions while from the third rank position we observed a decrease.

To further analyse the user click behaviour, given that we can not disclose the results in terms of conversion rates, we computed the CTR for search (SCTR). The SCTR is defined as the ratio between the number of clicked searches and the total number of searches: $\frac{\# \text{ of clicked searches}}{\# \text{ of searches}}$. A search is clicked if at least one of the recommended item received a click. The Re-rank policy achieved a SCTR of 23.48%, while the Baseline policy achieved a slightly higher SCTR of 24.16%. The difference between the two policies was very small and showed that the increase in CTR in the first position for the Re-rank policy was compensated by the decrease for all the other positions. Finally, we also computed the *Normalized Discounted Cumulative Gain (NDCG)* on the clicks in order to assess if the Re-rank policy improved the ranking quality w.r.t. the Baseline policy. The Baseline policy achieved a NDCG of 0.121 while the Re-rank policy improved the NDCG to 0.136. This further highlighted that the Re-rank policy was more effective in recommending more relevant properties in the top positions.
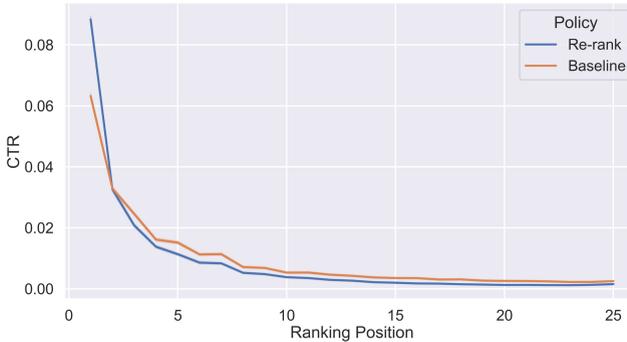
Fig. 6. Results from the A/B test in terms of CTR for each rank position. Due to the large number of observations, the confidence interval is very small and difficult to see in the image.

Given the results from the A/B test, the answer to the second research question, "Is a price-based re-rank of these offered properties sufficient to achieve a higher CTR?", is clearly yes if the main goal is to improve the CTR in the top position of the list. Despite the data analysis results, which showed that lower prices were a key factor to improve the CTR, a policy that re-rank items by price was only sufficient to improve the CTR w.r.t. the Baseline policy in the first position of the recommended list. However, since users usually pay more attention to the item in first position, this can be considered a good result even if the SCTR slightly decreased with the Re-rank policy.

5 Influence of the OTA

To further study the differences in CTR and SCTR metrics between the two policies, we analysed additional variables with potential influence on user decision-making. While the variables analysed before, i.e. average rating, number of reviews and price, behave similarly as before, the OTA presented with each property emerged as one of the key factors in the A/B test. Furthermore, this variable is very important to the company's business, so we focused our attention on it.
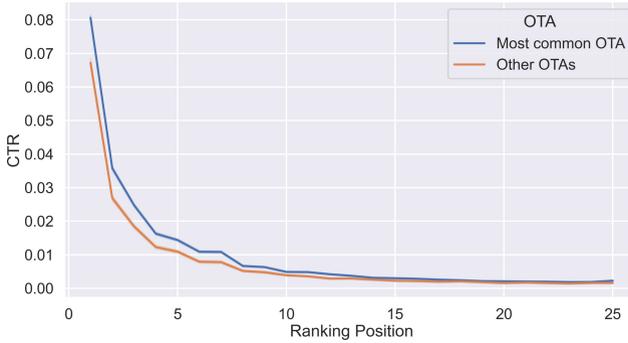
Fig. 7. CTR comparison for each rank position between the *most common OTA* and the *other OTAs*. Due to the large number of observations, the confidence interval is very small and difficult to see in the image.

Figure 7 depicts the CTR at each rank position for the *most common OTA* and for all the *other OTAs*. Since we can not disclose the names of the OTAs, we only distinguish between the *most common OTA* and the *other OTAs*. The *most common OTA* always had a CTR that was significantly higher than the CTR of the *other OTAs*, at least for the first 15 positions, which means that users preferred this OTA to the others. One reason for this preference could be that the *most common OTA* might be more trusted by users.

This difference in CTR between OTA groups, joined with the number of recommendations for each OTA group at each rank position, reported in Fig. 8, could explain the difference in SCTR identified between the two policies. From Fig. 8a, we can see that the Re-rank policy recommended properties with the *most common OTA* less frequently at top-ranked positions while favouring more frequently *other OTAs*, Fig. 8b.

Thus, by favouring lower price offers the Re-rank policy pushed less well-known OTAs to top-ranked positions and exposed them to higher levels of users' attention. Their lower likelihood of being clicked, however, seems to have neutralized the positive price effect and resulted in an overall decrease in the SCTR.

(a) Most common OTA.   (b) Other OTAs.
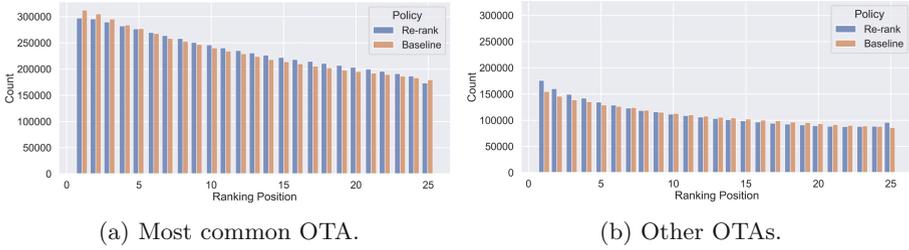
Fig. 8. Count of recommendations for the *most common OTA* and for the *other OTAs*.

The answer to the third research question, "Does the OTA associated with each offered property influence the CTR?", is yes. Although price and rank positions were identified as the most important features that influenced users' decision-making, there were also other factors, in our case the OTA, that could impact users' decision and thus overall performance metrics of a ranking policy. At the end, in our case, a price-based re-rank algorithm that also keep the balance for the OTA feature would probably have improved the baseline, whereas considering only the price was sufficient to achieve a marginal improvement.

6   Conclusions

In this paper, we studied how different variables affect the user click behaviour in online hotel search. Specifically, we took into account the following variables: (i) rank position, (ii) price, (iii) rating and (iv) number of reviews, and measured their influence by observing changes in the CTR distribution. We started by analysing a historical dataset collected in a *meta-search booking platform* in which as expected the rank position and the price heavily influenced the user's choice: a property in the top positions had a greater probability of receiving a click than a property in the last positions and a high price generally discouraged users.

On the other hand, differently from the previous literature, we found that the average rating had a weak influence on the user's choice. Probably, this influence was heavily confounded by the influence of the price because, as stated by [3], average ratings are influenced by price: products tend to have a higher rating when they have a higher price. Even regarding the number of reviews, we discovered that this variable did not have a significant effect on user's choice. This was because above a threshold, about 35 reviews in our case, the user trusted the average rating, and a larger number of reviews did not change the user's perception.

To further verify the influence of price, we ran an online A/B test on the company's website to compare a Baseline policy with a price-based re-rank policy that shuffles the top-25 offered properties in recommendation lists. The results showed that the re-rank policy improved the CTR for the first rank position,

confirming that price was a key factor that influenced users click behaviour. Furthermore, we observed that also the OTA associated with a property, influenced the user decision. For example, in our case the *most common OTA* achieved a higher CTR for every rank position compared to the *other OTAs* and seems to be favoured more by users.

This work consequently highlights the many influence factors and biases on users decision-making in online travel search that are disregarded in most offline datasets by presenting the outcome of a price-based re-rank strategy.

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Exploring Customer Experience with Service Robots in Hospitality and Tourism: Activity Theory Perspective

Olena Ciftci[(✉)] and Katerina Berezina

University of Mississippi, University, Oxford, MS 38677, USA
`ociftci@go.olemiss.edu, eberezin@olemiss.edu`

Abstract. Addressing a call for theoretical development in human-robot interaction research, this study introduces activity theory to the field of service robots (SRs) in hospitality and tourism. Activity theory was used as the foundation for the conceptual analysis of in-depth interviews with hospitality customers. The results of content analysis of the interviews and future research directions are presented based on each of the service activity system's components: object (customer experience (CE) with SRs in a hospitality unit), subject (customers), technology (SRs), rules (implementation procedures of SRs), community (customers, other customers, and employees), division of labor (a division of service), outcome (satisfaction, overall experience with hospitality establishments, and behavioral intentions), and context. The study provides future research directions in using activity theory in studies on human-robot interaction and CE with SRs in hospitality and tourism. Robot developers and hospitality professionals can use the data analysis framework proposed in this study to evaluate CE with SRs.

Keywords: Service robot · Activity theory · Customer experience · Human-robot interaction

1 Introduction

Research on service robots (SRs) in the hospitality and tourism industry has recently received significant attention. However, a need remains for further theoretical development. Jung and Hinds [1] call for creating more human-robot interaction (HRI) theories from the social sciences and interdisciplinary research combining robotics, design, and behavioral sciences. Most theories and conceptual models in HRI in service, hospitality, and tourism focus on robot design, features, functions, and performance when describing customer-robot interaction (e.g., the Service Robot Acceptance Model (sRAM) [2]) or a few aspects, like robot behavior, customer characteristics, and specific context of companies, that influence customer engagement and behavior [3, 4]. But those theories do not look at HRI in service as a whole system that changes during the service and over time. To close this gap, this study introduces activity theory [5–9] to the specific area of hospitality technology and hospitality robotics.

Activity theory has been frequently used in the fields of human-computer interaction (HCI) and technology design in diverse contexts [5] and service design [10–13]. For instance, activity theory has been deployed to study the design of interactional social robots [14], the concept of robot as a service in cloud computing [15], and the context of robot-assisted special education [16]. However, this is the first study to employ activity theory in the context of SRs in hospitality and tourism.

Activity is the central unit of analysis in activity theory [8]. Activity is described as "purposeful, social, mediated, multilevel, and developing interaction between actors ('subjects') and the objective world ('objects'). A central claim of the approach is that it is an activity that places the subject in objective reality and transforms the reality into a form of subjectivity" [5] (p. 609). The subject can be an individual or a group that participates in an activity and transform the object into outcomes using tools [17]. Both the object and tools can be tangible or intangible. In HCI, a tool is a computer or technology that mediates activity [8].

There are different interpretations and modifications of activity theory [5]. One of the most known and influential versions of activity theory in HCI research was created by Engeström [6, 7]. Engeström [6, 7] proposed activity theory for collective activities and a model for an activity system that includes the following components: subject, object, tools (mediators), rules, community, division of labor, and outcome. Components of activities are different in certain situations and specific contexts [6, 7], and they develop and transform over time [6, 8]. The analysis based on activity theory [6, 7] can help explore customer experience with SRs in the activity system of service in hospitality and tourism.

Customer experience (CE) with SRs is an important but understudied concept in studies about HRI in hospitality. There are many hospitality and tourism businesses that employ SRs. And with the current demographic trend of the aging population, robots will be employed in many services, including hospitality and tourism, and robot service experience will be a norm [18]. Enhancing CE can enhance service value and increase satisfaction, behavior intentions, and loyalty [19]. The service experience can also differentiate the business from its competitors [19].

Despite practical importance, academic literature still lacks in-depth knowledge about CE with SRs in hospitality and tourism. Only three studies explored CE with SRs based on content analysis of customers' online reviews on social media [20–22], and one study with a conceptual model of smart service experience in hospitality and tourism, including experience with SRs [23].

Thus, the aim of this research is: 1) to introduce activity theory to the field of SRs and demonstrate the application of this theory to CE with SRs in hospitality and tourism; and 2) to formulate future research directions for the investigation of HRI and CE with SRs in hospitality and tourism. This is the first study that introduces activity theory to HRI in the hospitality and tourism domain. It uses activity theory as a theoretical foundation for the conceptual analysis of in-depth interviews with hospitality customers from different countries and cultures that describe their experience with SRs in hospitality and tourism establishments. The analysis framework proposed in the study can be used by robot developers and hospitality professionals for the evaluation of CE with SRs. The study

also proposes future research directions for using activity theory in research in the domain of HRI and CE with SRs in hospitality and tourism.

2 Methods

2.1 Interview Operationalization and Sample

Thirteen in-depth interviews were conducted via Zoom with hospitality and tourism customers who had experience with service robots (SRs). To find qualified participants, an online survey was conducted on Prolific to identify those respondents who experienced SRs in hospitality and tourism. Their Prolific IDs were recorded in an Allowlist. Then, the invitation to participate in the interview was sent to qualified respondents from the Allowlist.

The identity of the interviewees was protected, only their demographic information and prolific IDs were recorded. The interviews were audio recorded and transcribed verbatim for further analysis. The interviews included questions about the customer experience (CE) with SRs, their satisfaction with their experience, service delivered by robots, and overall experience in hospitality and tourism establishments.

Residents of seven countries were interviewed. The sample had an almost equal representation of males and females. The average age of the interviewees was 29 years old. Please see the interviewees' profiles for more information.[1]

2.2 Using Activity Theory for Interview Analysis

Interviews were analyzed manually to identify patterns in data to develop themes and concepts that correspond to the study's goal. The data were analyzed using qualitative codes based on activity theory components in the activity system model by Engeström [6, 7]. Engeström's [6, 7] interpretation of activity theory is applicable to the analysis of CE with SRs in the hospitality and tourism environment because the focus of this theory is the activity system. The studies on CE design stated that CE forms an activity system or multiple activity systems [11, 13]. Engeström's [6, 7] activity theory interpretation was also a base for studies in designing robotic service systems [15], learning systems with robots [16], and other technologies [17, 24].

In the context of hospitality robotics and activity theory, the activity may be seen as a service delivery process by robots and human employees that form CE in hospitality and tourism settings. This study adopted the activity theory framework from [6, 7, 16] and adapted it to the study context (See Fig. 1). The elements of the activity system and codes for analysis in this study include subject, object, technology (tools), rules, community, division of labor, outcome, and context.

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[1] The table with the interviewees' profiles is available in the supplementary materials at https://drive.google.com/file/d/1WwyJrF0bYYeqJXrFWlC2-MFTkjV0Y-Sx/view?usp=sharing or upon request.
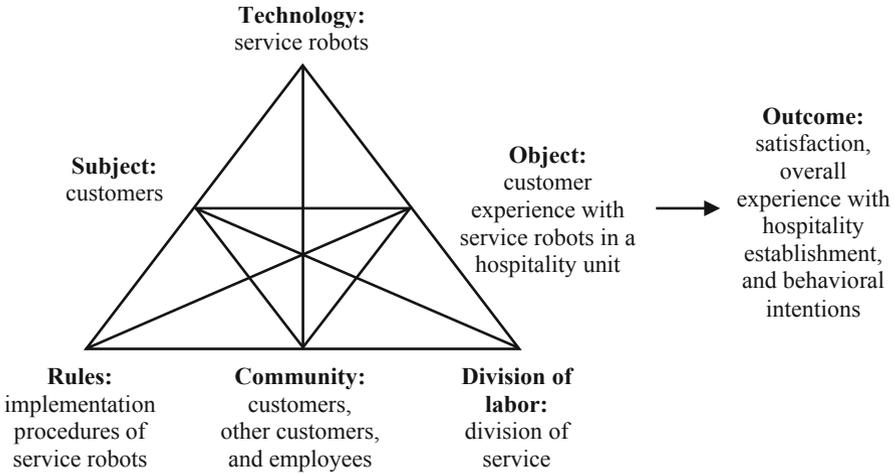
Fig. 1. Activity theory model (adopted from Engeström [6, 7]) for analysis of customer experience with service robots in hospitality and tourism.

The codes for analysis of CE with SRs in hospitality and tourism are described below.

Object includes CE with and an attitude towards SRs in a hospitality unit.

Subject refers to customers that received service from robots.

Technology refers to SRs that deliver service directly with or without the assistance of human employees or in combination with other systems. The robots may have different characteristics, roles, and tasks.

Rules include implementation procedures of SRs.

Community refers to customers, other customers, and employees that participate in service delivery or influence CE.

Division of labor refers to a division of service or, in other words, the separation of the tasks among customers, robots, and employees during service delivered by robots.

Outcomes of service delivery and experience with SRs are satisfaction, overall experience with hospitality establishments, and behavioral intentions.

Context is an important concept of activity theory that determines elements and the transformation of activity [7, 8, 25]. Depending on the context, the activity goals, tasks, rules, community, and objectives may change [7, 8, 25]. In this research, context relates to place (e.g., country, city), situation (e.g., a family reunion, friends gathering, travel), and hospitality setting, including different types of hotels, restaurants, cafes, bars, and airports.

The next section of this paper reports the analysis results of the interviews concerning each activity component.

3   Results and Discussion

3.1   Object (Customer Experience with Service Robots in a Hospitality Unit)

All interviewees stated that convenient, efficient, and quick service was the most impor-
tant factor of service delivered by robots. Many interviewees also described their experi-
ences as novel, interesting, fun, and entertaining. Interviewees evaluated their experience
with service robots (SRs) based on the task they needed to complete, the context, and
their prior perception of the robots' functions. They also described their experience with
SRs as a part of the whole experience with hospitality service, in particular hospitality
or tourism establishments. The interviewees' experience with SRs was affected by all
other activity components in the activity system model (Fig. 1), such as subjects' char-
acteristics, robots, community, rules (implementation procedures of SRs), division of
labor (a division of service), context, as discussed in this section of the paper. Further,
we discuss possible directions for research on customer experience (CE) and practical
implications in relation to each activity system component.

3.2   Subject (Customers of Hospitality Establishments)

Most of the interviewees described themselves as individuals interested in new technol-
ogy and robots. Such self-perception could be the reason that all interviewees evaluated
their experience as satisfactory or exciting. Most interviewees chose to patronize hotels,
restaurants, or a café because they wanted to try robot service. Only two interviewees
did not know about SRs working in the hotels at the time they chose their accommo-
dations. Interviewee 2 generally preferred to use self-service technology, so she found
robot service very convenient and comfortable. Interviewees 2 and 8 explained that, as
introverts, they enjoy robot service over human service.

   Previous experience with SRs influences customer perception and experience with
SRs. Customers who experienced robot service multiple times evaluate and describe
their current experience in comparison with previous experiences. When interviewees
experienced robot service for the first time, they used a comparison with their image of
SRs that was formed based on their imagination and other sources (e.g., movies, articles,
books).

   Demographic characteristics of customers also influence their perception of SRs and
their experience with the service. When explaining their experience with SRs, females
described their feelings and emotions, while males focused more on the functionality
and utilitarian characteristics of the robots. Thus, researchers should consider using
demographic characteristics, psychological traits, interest in technology, and previous
experience with SRs as moderators in robot hospitality research. Likewise, industry
practitioners should study their customer base carefully, understand their experiences
with and preferences toward robots, and educate customers about the role of robotics in
the hospitality industry (e.g., why robots are used and their impacts on employment).

3.3   Technology (Service Robots)

The interviewees had experience with different artificial intelligence-powered SRs: the
robots had different characteristics, roles, and tasks. When interviewees pictured their

experience, they described robots' physical appearance, moves, motions, and voice. Some interviewees compared the SRs with movie or cartoon characters (e.g., a "robot from Star Wars") or living creatures, like animals (pets).

The interface and functional features of SRs also were central factors of CE in all interviews. Interviewees 3, 8, and 11 noted that the robot service is uninformed and lacks customization and personalization. The interface also is a factor that can affect CE because, generally, interviewees want to interact with robots. Interviewee 8 was not impressed with the robot waiter's interface: all interactions with the robot were performed via "the monitor with a touchpad." Interviewee 8 suggested it would be better if the robot had a voice recognition system so that he could communicate with the robot by voice. Thus, robot developers and hospitality managers should consider that customers expect SRs employed in the hospitality industry to have a higher level of interaction and communication abilities.

The research showed that robot design is also important for customer attitude towards robot service failures [26]. There are already many studies on SRs' anthropomorphism effect on customers (users) behavioral intentions and HRI [27–29]. However, more empirical, experimental, and qualitative studies are needed to explore robots' physical and functional features on CE and satisfaction with robot service in hospitality.

3.4   Community

Community includes customers themself, other customers, and employees that participate in service delivery or influence CE. Positive attitudes and good service of human employees that assist robots or work with robots on service delivery can affect CE with robots and overall experience. Also, interviewees indicated that they enjoyed watching the interaction of other customers, their family members, or friends with SRs. Interviews 5 and 11 confirm that SRs are an attraction for children [22], and thus, they can be a motivation for families with children to patronize the hospitality business with robotic employees. Therefore, practitioners also may consider employing robots with kid-friendly interfaces and designs if their customers are families with children and it aligns with the concept and goals of the business. Furthermore, it opens one more research problem in identifying elements of the children-friendly design of robots and their interaction interface.

3.5   Rules (Implementation Procedures of Service Robots)

Customers who repeatedly patronize the same hospitality business with SRs may notice changes in the robot operations and evaluate the effectiveness of the changes. Interviewees 1 and 2 used food delivery robots multiple times on the university campus. They described some modifications in functionality and service delivery of the robots over time and evaluated the effectiveness of the changes when describing their experience with robots.

While customers may not have an idea about the robot's implementation rules, they may notice some of the failures in the robot's implementation. For example, Interviewee 11 also described a situation when a robot runner in a restaurant dropped a plate that was being delivered to another customer because it moved" wobbly." The customers may

also notice when the service takes longer than expected. Thus, to ensure service quality and a positive CE, managers should encourage customers to report any robot failure or unsatisfactory service. For example, they can employ a satisfaction survey displayed on the robot's screen or in their mobile app.

Similarly, Interviewee 1 explained why the food delivery robot hit her on a crosswalk: "Maybe they [robots] got … a better GPS [navigation], but, you know, it's not that precise." It shows that customers take robot failures easy. Many customers accept the fact that SRs are new technology and it is not perfect yet, and "any technology may fail or brake." Lv et al. [26] came to a similar conclusion: customers tolerate service failures by robots with cute designs. However, more attention from research is needed in the exploration of customer understanding of SR implementation and attitude towards SR failures.

3.6 Division of Labor (Division of Service)

Some hospitality businesses organize the division of labor in a way when SRs support services delivered by human employees. Some interviewees find self-service more interesting in this service arrangement. For example, Interviewee 11 liked taking their plates from a robot runner instead of a waiter doing it for them in a restaurant. In this situation, there is an opportunity for experience co-creation that should be organized by management to support a more memorable experience at their establishment. However, more research is needed on self-service and experience co-creation with SRs in hospitality and tourism.

Many interviewees associated unsatisfactory experiences with robot malfunctions. Thus, when SRs work independently, customers appreciate it when human employees are present and support the service delivered by robots or can quickly come and fix the failure of the robot service. Otherwise, the robots' errors or malfunctions may affect the overall experience with hospitality service. Choi et al. [27] also found that customers are more satisfied with service recovery when human employees apologize for nonhumanoid robot failure. Similarly, Wang et al. [30] results show that a human employee's apology for a service failure increases the intention to revisit a hotel while a robot's apology has no effect; however, reactions to human employees vs robot employees' apologies are different for younger and older travelers. Thus, there is a need for studies on robot service failure and the role of human employees in robot service failure prevention and resolution.

3.7 Outcomes

Outcomes of service delivery and experience with SRs are satisfaction, overall experience with hospitality establishment, and behavioral intentions. Interestingly, half of the interviewees said that robot service did not affect their overall service. It is one more piece of evidence that customers evaluate service experience in hospitality as a whole. A positive experience with SRs does not guarantee a positive or memorable experience with a hospitality business overall. Almost half of the interviewees also said they chose a hospitality establishment to experience robot service at first, but they may not patronize the restaurant or hotel in the future. So, SRs may be an attraction or motivation to choose

a service provider, but they do not guarantee repeat business. Thus, there is a need to investigate factors of CE in the hospitality business with robot employees that lead to an overall memorable experience, satisfaction with service, repeat patronage, and positive word of mouth.

3.8 Context

The subjects' objectives of activity when interacting with SRs may differ depending on the context (e.g., place, situation, and hospitality settings). Some interviewees would like to have more social interaction in hospitality settings, which was not possible with robots that they encountered, and human service was not available. But some interviewees did not want to interact with human employees for different reasons. Interviewees 2 and 3 found robot service and distance from human employees as a precaution against COVID-19 spread. This result supports the findings by Kim et al. [31] that the COVID-19 pandemic contributed to customers' more positive attitude to robot-staffed hotels versus only human-staffed hotels. Interviewee 2 was very tired after a long trip and was happy to receive an item from a robot butler in her hotel room and not have to talk to a human employee. Interviewee 2 stayed in a midscale hotel at that time. However, she would prefer more social interaction with employees in a resort or upscale hotel. Similarly, other interviewees also pointed out that they would prefer to use SRs in quick-service or chain restaurants with known menus, where little customization and personalization is offered. But they would choose a human employee service in a fine dining independent restaurant.

The interface of some robots was described as primitive but sufficient for the service tasks and roles that they performed, for example, robots used for delivery and luggage storage. However, the limited interface and lack of social interaction were identified as a problem for more complex services like providing information to travelers at airports. Thus, CE with SRs and robot acceptance factors should be investigated and compared for different contexts in hospitality and tourism. Given the interview results, engineers should cooperate with hospitality practitioners to create or customize robots according to the concept of the business where their robots will be employed and the specific task they are assigned.

4 General Directions on Using Activity Theory for Future Research

The results of this study showed that customers evaluate service robot (SR) performance and their experience with the robots based on robot design, context, specific task and environment, support from human employees, and specific customer needs and goals of the service. Thus, future empirical and experimental research should examine customer experience (CE), attitudes, satisfaction, and behavioral intentions with robots with different designs in different contexts. For example, future research should investigate what design elements of SRs contribute to positive CE, satisfaction, and behavioral intentions in different types of restaurants or hotels; what SR experience factors are important for customers of different cultures to form positive overall experiences and satisfaction with hospitality establishments.

Furthermore, activity theory can be used to build research on experience co-creation by customers, SRs, and employees. The results of the interview analysis in this study show that hospitality patrons want to interact with SRs during the service; they also desire interaction with human employees during or instead of robot-delivered service in different situations. In addition, in the systematic application of activity theory for HCI, Bødker [32] emphasized the important phenomenon for the analysis and design of technology that people act through technology rather than interact with it. Thus, empirical research is needed to investigate motivators and factors of experience co-creation with SRs in hospitality and tourism.

Following the results of this study and calls for future research from other studies, there is a need to investigate employees and SRs working in teams to create a better CE [1]. Future research may use activity theory to study human employee roles, tasks, and operations when they work with SRs to create memorable CEs in hospitality and tourism. In activity theory, it is also important to study how the employees' roles, tasks, and operations transform when they work with SRs.

There are different modifications of activity theory and models that are based on this theory [5], including cultural-historical activity theory (CHAT) [33], human activity modeling (HAM) [10, 12] that can be used in research about HRI and CE with SRs in hospitality and tourism. Many studies call for supplementing activity theory with other theories to create more specific technology [5]. Thus, there is a need for creating new theoretical models that are based on activity theory and other theories that fit the context of CE and experience co-creation with SRs in hospitality and tourism.

The development of systems as a result of an activity is one of the central parts of activity theory [5, 8, 9]. Development can be both an object of research and research methodology in studies that are based on activity theory [9]. The activity theory's principle of development allows for conducting a thorough analysis of complex phenomena [8]. It may include methods like field experiments and observations [8], "the formative experiment which combines active participation with monitoring of the developmental changes of the study participants" [9] (p. 159), and ethnographic methods [9, 33]. However, most HCI research, including studies on HRI, is based on traditional laboratory experiments [5]. Thus, research in the domain of SRs in hospitality and tourism should use more methods to capture the development of service systems that include SRs.

5 Limitations

The study employed in-depth interviews that allowed a conceptual understanding of customer experience (CE) with service robots (SRs) and an explanation of the application of activity theory in the research that studies this phenomenon. However, this method has a limitation of generalization of findings. While the interviewees experienced different types of SRs in various hospitality and tourism settings in different countries, there are still many more types of robots that the interviewees did not experience. So, more qualitative research on CE with SRs is encouraged. All interviewees identified themselves as interested in technology and excited about meeting robots. However, other customers are less interested in technology and robots. Thus, further research is needed to understand their experience with SRs in hospitality and tourism.

6 Significance of the Study

This study introduces activity theory to the domain of hospitality robotics research. It applies this theory to understand user experience with hospitality robots and forwards direction for further research that stands from this theory. The framework proposed in this study can be used by robot developers and hospitality professionals in the evaluation of service and customer experience with service robots. This study design also contributes to building the generalizable theory of HRI based on a study of different types of robots with different tasks in different contexts [1].

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How Do Affect the Infusion of Smart Technology and Mindfulness of Tourism SMEs on Competitiveness?

Estrella Diaz[1]([✉]) [iD], Águeda Esteban[2] [iD], Rocío Carranza[3] [iD],
Carlos Sánchez-Camacho[3] [iD], and David Martín-Consuegra[1] [iD]

[1] University of Castilla-La Mancha, Ronda de Toledo, 13071 Ciudad Real, Spain
estrella.diaz@uclm.es
[2] University of Castilla-La Mancha, San Pedro Mártir, 7, 45002 Toledo, Spain
[3] Universidad International de La Rioja, Av. de La Paz, 137, 26006 Logroño, Spain

Abstract. The purpose of this research is to analyse the effect of the infusion of smart technologies and the mindfulness of tourism small and medium-sized organisations (SMEs) in the use of smart technologies on several aspects related to the companies and their employees. Specifically, its effect on service advantage, value co-creation, employee job satisfaction, employees' perception of service cannibalisation and competitiveness of tourism companies is analyzed. The total sample obtained was 877 employees/managers of tourism SMEs located in Europe and the United States. The model proposed in the study was estimated with PLS-SEM, a variance-based structural equation modeling statistical technique. The results of the study offer important implications and recommendations to researchers in the tourism field, tourism organisations and destinations on the importance of using smart technologies.

Keywords: Infusion · Mindfulness · Smart technologies

1 Introduction and Research Aim

Smart technologies and their use by tourism small and medium-sized organisations (SMEs) are modifying the tasks performed by employees that are in contact with consumers/tourists [1, 2]. Technology infusion towards smart technologies is defined by [3] as the incorporation of smart technological elements by service organisations with the aim of modifying the customer experience by employees in direct contact with consumers/tourists. This area is of great relevance in companies and facilitates service encounters between people, from people to technology and between different technologies with each other [4].

On the other hand, organisational mindfulness towards digital transformation is of great importance in the incorporation of smart technologies, as it would help to proactively manage digital technologies and reduce the possibility of rigidity [5]. Organisational mindfulness is defined as the degree to which a company grasps differential details

about emerging threats and builds a capacity to act quickly in response to these elements [6]. The presence of organisational mindfulness increases the likelihood of digital transformation decisions by firms and enables more effective deployment of their resources to better implement smart technologies.

Although the key role of technologies has been increasingly recognised in the literature, the impact of infusion of smart technologies and mindfulness in the use of smart technologies on value creation, performance and competitiveness within tourism SMEs has been scarcely analyzed. In this sense, the main aim of this research is to examine the effect of the infusion of smart technologies and the mindfulness of tourism SMEs in the use of smart technologies on a series of aspects linked to the companies and their employees. Specifically, its effect on service advantage, value co-creation, employee job satisfaction, employee perception of service cannibalisation and competitiveness of tourism companies is analyzed.

2   Background and/or Conceptual Model

In the realm of digital transformation and the smart environment, infusion is defined as the extent to which consumer-facing employees use smart technology to its full extent to enhance their productivity [7]. Specifically, analyzing studies by [8], these authors define employee-applied technology infusion as any combination of hardware, software, information, and/or networks that support the co-creation of value between a service provider and the customer. Currently, smart employee-applied technology functions primarily as a resource that facilitates value creation in the exchange process between a customer and a service provider [9]. For example, Artificial Intelligence (AI) is increasingly reshaping service by performing various tasks, constituting an important source of innovation [10].

Another element linked to the use of technologies that has great influence is organisational mindfulness [11]. This concept represents the activities of actively searching for digital transformation opportunities, anticipating and evaluating business transformation, as well as providing alternatives for decision making. Key aspects of this variable include: anticipating digital technological change through the use of market intelligence [12], the company's strategic plan for technological change, choosing platforms (including hardware, network and software standards) that can accommodate technological change, and informing management of the most appropriate option before making a strategic technological transformation change decision [13].

The inclusion of smart technologies and their association to tourism refers to a platform where tourism organisations (managers and employees) and consumers/tourists use technologies to reinvent and strengthen their roles in the shared service economy and improve the quality of consumer/tourist experiences. The new smart tourism paradigm is centered on real-time consumer and value co-creation. Through interactions and assistance from the service provider, value is created [14]. Therefore, this study suggests that technology infusion will have a direct and positive effect on service advantage (H1), value co-creation (H2), employee job satisfaction (H3), and organisational competitiveness (H5). Likewise, increased awareness on the part of tourism organisations toward the use of smart technologies can have a direct positive effect on service advantage (H6), value co-creation (H7), employee job satisfaction (H8) and organisational competitiveness (H10).

However, several studies suggest that the use of ICT and smart technologies are raising doubts about the future of face-to-face employees, who perceive that their sales, market shares and roles are decreasing in favor of online channels [15]. In this sense, one of the consequences of technological infusion and the use of smart technologies in the tourism context is the perception of service cannibalisation (H4). Similarly, greater awareness on the part of tourism organisations toward the use of smart technologies could generate in employees who are in contact with consumers/tourists a greater insecurity in their role within the company, generating a perception of service cannibalisation (H9). In addition, some studies have determined the relationship between organisational awareness towards technology with greater innovation in the market and better performance of operations [16]. Thus, these variables (service advantage, value co-creation, employee job satisfaction and perception of service cannibalisation) can affect the competitiveness of tourism companies (H11, H12, H13 and H14). The following Fig. 1 gives a summary of all hypotheses.
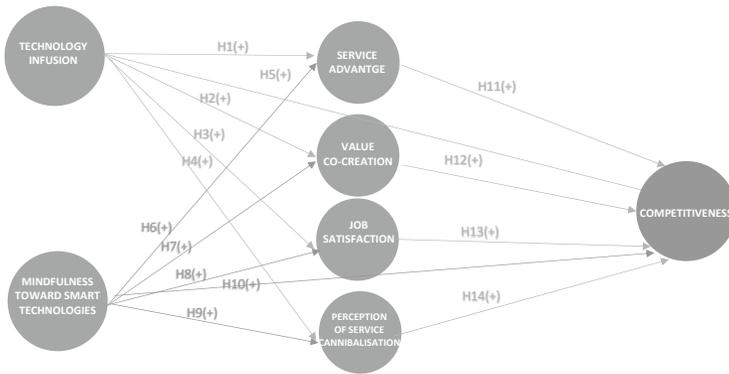
Fig. 1. Theoretical model

3   Methodology

The sample of the present study was obtained through quantitative primary research aimed at managers and employees of small and medium-sized tourism companies (hotels, travel agencies, etc.) located in Europe (nEU = 454) and the United States (nUSA = 423). Data were collected using a structured questionnaire consisting of closed-ended questions measured on 5-point Likert-type scales. To determine the relationships included in the proposed model, the PLS-SEM technique was applied using SmartPLS statistical software.

4   Results and/or Discussion and Contributions

The aim of this study is the creation of a model to analyse the effects that the infusion of smart technologies and the awareness of the organisation toward the use of these technologies have on some variables linked to tourism SMEs. From the context of Europe,

researchers found that smart technology infusion appears to be positive and significant on service advantage, value co-creation, employee job satisfaction, employee perception of service cannibalisation, and competitiveness. Similarly, the mindfulness toward digital transformation has a significant influence on service advantage, value co-creation, employee job satisfaction, employee perception of service cannibalisation, and competitiveness. Finally, service advantage, value co-creation, employee job satisfaction, and employee perception of service cannibalisation have a significant influence on competitiveness. When this model is examined for the United States, smart technology infusion appears to be positive and significant on service advantage, value co-creation, employee perception of service cannibalisation, and competitiveness. However, the relationship between smart technology infusion, and employee job satisfaction is not supported.

On the other hand, the mindfulness toward digital transformation has a significant influence on service advantage, value co-creation, employee job satisfaction, employee perception of service cannibalisation, and competitiveness. Finally, service advantage, employee job satisfaction, and employee perception of service cannibalisation have a significant influence on competitiveness. Nevertheless, the relationship between value co-creation and competitiveness is not supported in the model. When analysing the moderating effect of the context variable, the findings indicate that there were no significant differences between the American and European tourism SMEs regarding the consequences of smart technology infusion and mindfulness toward digital transformation, only in the relationship between value co-creation and competitiveness amongst both groups.

The results of this study demonstrate the impact that the use of smart technologies to their full potential and the organisations' mindset and/or awareness toward the use of technology have on service advantage, value co-creation, employee satisfaction and competitiveness. However, the use of smart technologies in tourism organisations can create more negative effects such as the perception of service cannibalisation among employees. Ultimately, this study helps to explain how smart technologies create different effects on employees in tourism organisations (hotels, tourist attractions and travel agencies), enabling the development of more tailored services to meet real consumer demands.

In addition to the contributions to academic research in this area, this study highlights several interesting implications for practitioners. This research advances the analysis of technological infusion, organisational awareness of smart technologies and their consequences for organisations. Smart technologies and connected objects are set to change service as we know it, and to have a significant impact on the other players in the service pyramid: consumers/tourists, employees, the organisation and the tourism destinations where these organisations are located. This study would confirm that the business value of technology is not only a tool to support the operational process, but also functions as part of the business for various business capabilities.

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User Experience and Spatial Presence in a Walk-In Augmented Reality 3D Model for Tourists

Timo Partala[✉] [iD], Mikko Kosonen, Tuomas Hellsten, and Henri Riissanen

South-Eastern Finland University of Applied Sciences, Patteristonkatu 3, 50100 Mikkeli, Finland
{timo.partala,mikko.kosonen,tuomas.hellsten,
henri.riissanen}@xamk.fi

Abstract. In the context of vulnerable tourist attractions, it is often the case that tourists cannot be allowed the enter all the premises of the attraction, which potentially has a negative impact on the visitors' experience. Virtual reality technologies are available for presenting the attraction for tourists in these cases, but the use of augmented reality (AR) also seems to have a role in certain use cases. The current paper presents our first experiment of using a walk-in augmented reality model to present an attraction to visitors near the original attraction. The tourist attraction visualized using AR was Mannerheim's Saloon Car dating back to World War II. Nine participants used a tablet-based AR application to examine a realistically sized three-dimensional (3D) model of the saloon car in the close vicinity of the actual tourist attraction and filled in a questionnaire, which probed their user experience, spatial situation model, and spatial presence when using the system. These early results suggested that viewing a 3D model of the attraction using tablet-based AR provided a positive user experience for the participants and that the tablet-based AR implementation was successful in supporting the participants' formation of a spatial situation model of the saloon car. The participants also gave relatively high ratings for spatial presence while viewing the 3D model using tablet-based AR.

Keywords: User experience · Spatial presence · Augmented reality · Tourism · Mannerheim's saloon car

1 Introduction

Augmented reality (AR) has long been a promising technology for tourism applications. While early systems were mostly different kinds of AR tourist guides with points of interest [1], the latest advancements in AR technology have made the development of more advanced AR applications feasible [2]. One interesting direction is related to using large 3D models such as models of entire buildings and letting the user walk freely inside the model and examine it using AR. Many important tourist attractions have already been modeled in 3D, and a model is thus readily available. This kind of feature is already available, for example, in certain real estate AR applications (e.g. [3]), and interiors of

ancient buildings can be examined in some archaeological tours with AR glasses (e.g. [4]). However, this approach is still less often studied in the field of tourism. Naturally, virtual reality technologies could also be used for visualizing interiors, however, it may be difficult to provide virtual reality equipment for tourists, for example, when the attraction is located outdoors.

The current paper describes our first experiment with an AR application, which allows its users to walk freely inside a 3D model of a tourist attraction and to view the model by using tablet-based AR. A user evaluation was arranged with nine participants. The aim of the evaluation was to understand, whether the current approach of using AR technology in tourism can result in positive user experiences. In addition, the goal was to study, whether the users can successfully form a spatial situation model based on viewing the model. Finally, we were also interested in whether the users experience spatial presence while viewing the 3D model with tablet-based AR.

2 AR Implementation of Mannerheim's Saloon Car

Mannerheim's Saloon Car is a historical train carriage that was used by field marshal and president of Finland Carl Gustaf Mannerheim during World War II, when it housed important historical events. The saloon car is nowadays a tourist attraction located next to the railway station in Mikkeli, Finland. Because of the vulnerability of the attraction, the interior of the carriage can be visited only once a year on a festival day. A detailed 3D model of the saloon car was created based on lessons learned from previous work [5, 6] regarding the salience of visual cues in 3D models. The textures were closely modeled based on photos, and the model included furniture as well as several detailed objects including newspapers, maps, decorations, and Mannerheim's personal items.

The augmented reality application for the saloon car was created using the Tarina augmented reality platform [7] developed by CTRL Reality. Using the platform, the 3D model of the saloon car was anchored to a location right next to the real saloon car (Fig. 1). Interaction was quite simple: the user saw the real size 3D model by looking through the tablet into the direction of the location, where the model was anchored. The model remained stationary, and the user could walk freely inside the 3D model, also through walls and furniture. The user could scan the 3D model by moving the tablet in his or her hands, or by moving or rotating her/himself, while looking through the tablet.

3 Methods

3.1 Participants

Nine Finnish participants (six males and three females; mean age 34.3 years, range 22–61 years) participated in the user evaluation. They rated their previous experience of using information technology as relatively high (mean 3.8 on a 1–5 scale), but their previous experience of AR applications as low (mean 2.0 on a 1–5 scale). They also rated both their interest in AR applications (mean 4.0 on a 1–5 scale) and their interest in historical tourist attractions (mean 4.2 on a 1–5 scale) as high. The participants received a small merchandise as a reward for their participation.

Fig. 1. AR implementation of Mannerheim's Saloon Car displayed next to the real saloon car (left). Screenshot from actual user evaluation (right).

3.2 Procedure, Materials, and Equipment

The participants were recruited near the real saloon car at the Mikkeli railway station with the goal of carrying out the evaluation with participants who represent the target group of the study (tourists, who are interested in the saloon car). Indeed, a clear majority of the participants showed spontaneous interest towards the saloon car before they were recruited. The rest were asked whether they were interested. In all the evaluations, three researchers participated in the implementation of the study: one was recruiting and instructing participants, one taking care of the AR application and technology, and one taking care of the post-test questionnaire. All the evaluations were carried out on a single sunny, hot, and slightly windy summer day. Most of the time, the railway station area was nearly empty, but some of the evaluations were witnessed by other persons.

The participants' task was to examine the 3D model of the saloon car using the tablet-based AR system. The participants were told that this can be achieved by looking through and moving the tablet and walking inside the model. The participants started using the system, and the test ended when the participant had walked through the whole carriage at least once and examined its objects using the AR system.

In the post-test questionnaire, a short version of Hassenzahl's AttrakDiff2 user experience questionnaire exactly as used in [8] was used for evaluating user experience using eight scales. The four-item scale from the MEC-SPQ spatial presence questionnaire [9] was used to study the formation of a spatial situation model and the eight-scale Spatial Presence Experience Scale SPES [10] was used for studying spatial presence. The scales were translated literally from English to Finnish so that the AR saloon car was defined as the object of evaluation.

A Samsung S7 tablet with 6 Gb of RAM memory and an 11″ display with a resolution of 1600×2560 pixels was used by the participants to view Mannerheim's saloon car in AR. The system was able to run the AR application and display the 3D model smoothly. The participants used another tablet to respond to the post-test questionnaire.

3.3   Data Analysis

Due to the distribution-free nature of the data, Friedman's rank tests were used to compare the ratings of the different user experience and spatial experience dimensions for significant differences, and Wilcoxon's matched pairs signed ranks tests were used in pairwise comparisons. Internal reliabilities were studied using Cronbach's Alphas.

4   Results

Mean ratings and standard errors of the means for the user experience dimensions and the spatial experience dimensions are presented in Table 1 below. Larger scores indicate better user experience or spatial experience.

Table 1. Mean ratings and standard errors of the means for the different user experience and spatial experience dimensions

User experience (scale 1–7)	Mean	SEM
Pragmatic quality	6.1	.2
Hedonic quality, identification	6.4	.2
Hedonic quality, stimulation	5.8	.2
Attractiveness	6.2	.2
Spatial experience (scale 1–9)	Mean	SEM
Spatial Situation Model (SSM)	7.5	.4
Spatial Presence: Self-Location (SPSL)	6.3	.7
Spatial Presence: Possible Actions (SPPA)	6.4	.5

The statistical analysis showed that there were no statistically significant differences between the different user experience dimensions. In contrast, there were significant differences between the three ratings related to spatial experience χ_F^2 (3) = 6.4, p < .05. Spatial situation model received higher ratings than both spatial presence: self-location Z = 2.1, p < .05 and spatial presence: possible actions Z = 2.2, p < .05. Internal reliabilities were on an acceptable level for all the components: spatial situation model α = .77; spatial presence: self-location α = .95; spatial presence: possible actions α = .90.

5   Discussion

The results of this first study indicated positive user experience for the tablet-based AR implementation of Mannerheim's Saloon Car on all main dimensions of the AttrakDiff2 scale: pragmatic quality, hedonic quality (identification and stimulation), and attractiveness. In addition, the results indicated that the participants could form a precise mental spatial situation model of the saloon car (the floor plan and the sizes of the different

rooms etc.). They also experienced relatively high spatial presence, even though they just used a tablet to view the 3D model instead of immersive technologies. It should also be noted that the tablet-based system was used on a sunny day, and the participants had low previous experience of AR systems, but the results were still good.

Some initial challenges related to the usage of the system were identified based on on-site observations, screen recordings of the tests, and the participants' post-test comments. A few users became briefly disoriented during the use of the system, which was mostly related to walking through inside or outside walls of the carriage instead of using doors and corridors. Two users started walking backwards, which also caused some disorientation. One participant also accidentally blocked the camera of the tablet briefly with his finger. However, the most important activities such as walking along the main corridor of the carriage and looking into the different rooms of the carriage could be performed well. Suggestions for improvement included more objects and interactivity with objects. Interactivity is an important challenge for the future, as current AR platforms do not do an especially good job in providing support for interactivity within 3D models in a tablet-based AR application.

Overall, the results suggest that the current approach, in which the users can walk inside the 3D model of a tourist attraction using a tablet-based AR application, can evoke a good user experience and is a noteworthy option to consider, when tourists cannot be let to enter the attraction itself. The AR approach could be especially useful in situations, in which virtual reality experiences cannot be effectively provided for the users, such as in the context of different unstaffed attractions located outdoors. Clearly, however, the findings from this experiment need to be confirmed by further studies.

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Spatial Spillover Effects of the Digital Economy on Tourism Demand: Evidence from China

Zhen Liu[1,2](✉) and Yoo Ri Kim[2]

[1] East China Normal University, Shanghai, China
[2] University of Surrey, Guildford, Surrey, UK
{zhen.liu,yoori.kim}@surrey.ac.uk

Abstract. Despite widespread concerns about the effect of the digital economy on productivity, few studies have examined the relationship between the digital economy and tourism demand. Based on 285 China's prefectural-level city statistical data and big data from 2011 to 2019, a comprehensive index of the digital economy is developed and a spatial econometric model is employed to investigate such relationship. The result shows that the growth of the digital economy has positive spatial spillover effects on tourism demand, contributing to extending the impact of the digital economy on tourism demand from the spatial perspective and providing insights for policymakers on regional cooperation in the digitalisation context.

Keywords: Digital economy · Spatial spillover effects · Tourism demand

1 Introduction

The growing importance of tourism to the economic system has caused obvious interest in identifying the fundamental factors that influence tourism demand. As different theories have been introduced, the significance of variables has been examined. Nevertheless, little light has been shed on the effect of the digital economy despite its potential to generate more than $300 billion in value for the tourism industry. Tourism may benefit more than any other industry from the digital economy due to the extremely high information asymmetry and transaction costs that have hindered the growth of tourism demand [2]. Recent empirical research has indicated that improved local digital capabilities have contributed to inbound tourism [1]. However, past studies have neglected externalities of the digital economy and its spatial effects [14]. The digital economy can reduce transaction costs and facilitate interaction between tourists and destinations, resulting in its impact not only being limited to the local area [9]. This research, therefore, examines the spatial spillover effects of the digital economy on tourism demand utilising panel data from China's prefectural-level cities between 2011 and 2019. Considering multiple data sources, a comprehensive index is constructed to measure the development of the digital economy at the city level. The spatial Durbin model is used to capture both the direct and spatial spillover (indirect) effects of the digital economy on tourism demand, thus increasing the understanding of the spatio-temporal relationship between the digital economy and tourism demand and enabling policymakers to adopt effective destination management strategies in the digitalisation context.

2   Literature Review

The digital economy refers to a new economic form that creates value via digital technology and infrastructure, digital industry, and engagement in utilising and creating digital services [6]. Due to the externality of the digital economy, it can have effects on both local and neighbouring regions as the digital economy effectively connects market participants across regions, hence generating spatial spillover effects [12]. On the one hand, the digital economy can have negative spatial spillover effects as it can reduce the transmission costs of explicit knowledge, resulting in an increasing demand for tacit knowledge and offline services [3]. On the other hand, the digital economy can have positive spatial spillover effects as it promotes user connectedness and becomes a feasible substitute for physical space [16]. In this case, the digital economy can better facilitate the matching of supply and demand across spatial regions [11].

According to existing studies, tourism demand is impacted by factors such as price and income [8], but spatial and temporal constraints experienced by tourists are ignored. As a result of the widespread adoption of digital technology, the digital economy has completely enhanced the interaction between tourists and destinations [15]. At the micro and tourist levels, previous research has highlighted the role of the digital economy in easing information asymmetry and promoting transactions [7]. As for destinations, providers' increasing reliance on ICT to build a "virtual link" with visitors can enable them to elevate the accuracy of tourism demand forecasting and rapidly supply products that meet tourists' needs, thus enhancing the attractiveness of destinations [5]. Moreover, the digital economy has blurred the boundaries between tourists and destinations; tourists become co-creators in the design of services, hence decreasing the cost of personalised services and enriching the tourism experience [4].

However, previous micro-level research employing qualitative analysis and questionnaires have argued that different aspects of the digital economy help reduce tourism uncertainty, hence influencing tourists' behavioral intentions. Direct evidence of the digital economy's effect on actual tourism demand at the macro level is still lacking. Recent research has examined the effect of the digital economy on local tourism demand at the national level [1]. Yet, few studies investigated the impact of the digital economy on tourism demand at a regional level. Given time and distance limits, inter-regional tourism is likely to be the most popular option for tourists, especially for a country with a wide territory like China, where inter-regional tourists accounted for 98% of total tourists in 2019 [10]. Moreover, due to the externalities of the digital economy, it becomes essential to examine the spatial effects of the digital economy on tourism demand. However, it is still unclear whether the digital economy has significant spillover effects on tourism demand across space and time and this study aims to fill this knowledge gap.

3 Methodology and Data

Considering the existence of spatial spillover effects, this research explores the relationship between the digital economy and tourism demand using the spatial Durbin model (SDM):

$$\ln Tourism_{it} = \rho_1 \sum_{j=1}^{285} \omega_{ij} \ln Tourism_{it} + \beta_1 \ln Dig_{it}$$

$$+\theta_1 \sum_{j=1}^{285} \omega_{ij} \ln Dig_{it} + \beta_2 X_{it} + \theta_2 \sum_{j=1}^{285} \omega_{ij} X_{it} + \delta_{ij} + \varepsilon_{it}$$

$Tourism_{it}$ is the tourism demand; ρ is the coefficient of the spatial lag of tourism demand; ω_{ij} is the spatial matrix; Dig_{it} is the level of the digital economy; X_{it} is other control variables that may affect tourism demand; β_i is the estimated coefficient of the explanatory variable; θ_i is the estimated coefficient of the corresponding spatial lag; ω_{ij} is the spatial weight matrix that represents the spatial relationship between different cities – queen contiguity-based and distance-based spatial weights matrices.

The independent variable is the digital economy. It is difficult to accurately capture the digital economy using a single indicator as it is a complex system. In this paper, we evaluate the level of the digital economy by developing a comprehensive index. With the availability of big data, we not only incorporate key indicators from previous research [1, 14, 16] but also introduce new indicators. The comprehensive index system includes three dimensions. The indicators and corresponding data sources are presented in Table 1. Indicators of the digital economy Considering these indicators are highly correlated, the principal component analysis (PCA) method is employed to transform multiple indicators into a comprehensive index by dimension reduction. Bartlett's sphericity and KMO tests indicated that the above indicators are statistically appropriate for PCA. This study identified three components based on the cumulative variance contribution of 80% and generated the index using the factor scores and weights.

Table 1. Indicators of the digital economy

Primary indicators	Sources
Adoption of digital facilities (e.g. internet users, mobile phone users)	CEIC database
Support from the digital industry	CEIC database
(e.g. number of employees, financial expenditure in technology)	TianYanCha enterprise database China City Statistical Yearbook
Engagement in digital activities	CEIC database
(e.g. digital finance, telecommunication services, patents)	Wanfang database Peking University

The control variables include: house prices and GDP per capita are added to illustrate the effect of the local price level and income on tourism demand; road density and

the high-speed rail reflect the level of local traffic condition; the proportion of tertiary industry to GDP as a measurement of localisation economics; and 5A top-grade tourist attractions authorised by the Ministry of Culture and Tourism of China. Data of these variables was gathered from China City Statistical Yearbook, CEIC database, China Real Estate Statistical Yearbook, and China's HSR network map.

4 Results

Various tests are run to determine which type of econometric model is appropriate for this study. The (Robust) LM Spatial error and Spatial lag statistics under various matrices were statistically significant at the 1% level. Both the Wald and Lratio tests were also significant at the 1% level, confirming that the spatial Durbin model was suitable for this study. Model 1 shows the results of the fixed effect model (Table 2). The coefficient of the digital economy is 0.5803 and statistically significant at the 1% level, showing that the digital economy has a significant positive effect on the rise of local tourism demand. The findings of the spatial Durbin model based on the queen contiguity-based spatial matrix (Model 2) and geographic distance matrix (Model 3) show that the digital economy has a positive spatial spillover effect that can increase both local and neighbouring tourism demand. This implies that the digital economy can contribution to inter-regional tourism. In addition, the coefficient of the spatial lag of tourism demand (Spatial rho) is significantly positive at the 1% level, indicating the existence of the spatial spillover effect of tourism demand. This implies that an increase in tourism demand in one city leads to an increase in demand in neighbouring cities. Thus, findings infer the importance of spatial effects of both tourism demand and the digital economy. Spatial spillover effects can also be observed in the control variables.

Table 2. SDM coefficient estimations

Variables	Model 1	Model 2	Model 3
Spatial rho		0.6091***	0.7838***
lnDig	0.5803***	0.0566**	0.0564**
lnHousing price	0.1008	−0.0770**	− 0.1101***
lnGDP	0.4758***	0.0421	−0.0679*
lnRoad density	0.1406**	0.0476**	0.0366**
Hsr	0.0687**	−0.0235**	−0.0144
lnStructure	0.7485***	0.2280***	0.2116***
lnAttraction	0.0152*	0.0068**	0.0055*

(*continued*)

Table 2. (*continued*)

Variables	Model 1	Model 2	Model 3
W*lnDig		0.2138***	0.1538**
W*lnHousing price		0.0291	0.0803
W*lnGDP		0.0999**	0.1710**
W*lnRoad density		0.0837**	−0.0610
W*Hsr		0.0834***	0.0946**
W*lnStructure		0.0141	−0.0552
W*lnAttraction		−0.0130**	−0.0236**
R^2	0.8485	0.8810	0.8812
Log-likelihood	542.9721	1270.6131	1287.1506
AIC	−1071.9443	−2481.2262	−2514.3012
BIC	−1030.9963	−2305.7348	−2338.8098
N	2565	2565	2565

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.001$

5   Conclusion

According to the results of the spatial panel Durbin model, the digital economy has the positive spatial spillover effects on tourism demand. The result remains robust under different matrices, demonstrating that the digital economy can strengthen the interaction of tourism between cities and significantly contribute to inter-regional tourism. To the best of the authors' knowledge, this study is the first to analyse the spatial spillover effects of the digital economy on tourism demand. Given the significance of the spatial spillover effects, tourism researchers are challenged to examine effects of the digital economy from the inter-regional perspective; otherwise, it could lead to estimation bias. Capturing and understanding spatial spillover effects of the digital economy on tourism demand can enable industry practitioners and destination management organisations to depend on digital technology to exchange market information, jointly build a cross-regional tourism collaboration system and achieve the connectivity benefits of the digital economy.

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Mobile Eye-Tracking as a Research Method to Explore the D/Deaf Experience at Arts and Cultural Venues

Vanessa Cumper[(✉)], Caroline Scarles, Hongbo (Daisy) Liu, and Albert Kimbu

University of Surrey, Guildford GU2 7XH, England
{v.cumper,c.scarles,hongbo.liu,a.kimbu}@surrey.ac.uk

Abstract. D/deaf activists have consistently lamented their exclusion from the decision-making process by service providers. Accessibility is only effective when designed with contributions from those affected by the perceived or known barrier. This paper redresses the historic absence of the D/deaf paradigm, and recenters the focus to the individual's perspective of accessibility requirements by developing a conceptual framework, constructed through the review of empirical and theoretical literature. The conceptual dimensions presented are from the D/deaf person's perspective as valued through shared power and ownership. The aim of this conceptual paper is to explore how D/deaf-centric research can be applied and qualitatively measured through the combination of self-report, observation and Mobile eye tracking (MET).

Keywords: D/deaf access · Mobile eye-tracking · Arts and culture

1 Introduction

People who are D/deaf continue to be a marginalised group. The accepted definition for D/deaf where the use of capital 'D' is used to describe someone who identifies as culturally Deaf, their first language is signed, not spoken, lowercase 'd' identifies everyone else who is living with a hearing impairment [1]. Despite the recognised opportunity to improve competitiveness and economic value of creating an accessible and inclusive tourism industry, accessibility remains a low priority [2–4]. The latest estimates [5] state that 1 in 6 people worldwide, have some form of hearing loss [6]. Previous research has focused on assumed communication barriers [7], without consulting their 'dehumanised subjects' [1], rendering D/deaf perceptions inconsequential, [8] this conceptual paper argues, there are substantive reasons to co-create solutions. Research conducted within an authentic setting of an art gallery presents an opportunity to fully understand how people who are D/deaf can participate in leisure, recreation, and cultural life [1]. D/deaf epistemology should be central to any research which pertains to an accessibility solution. A D/deaf-centric investigation challenges societal barriers, rendering D/deaf disabled or D/deaf problematic irrelevant, to develop an egalitarian relationship [1, 9].

This paper argues the advantage of the application of qualitative methodology of self-report in conjunction with Mobile Eye-Tracking (MET) data, accredits the D/deaf

perspective centrally within the research, empowering reciprocal communication. The Tobii 2 mobile eye-tracking (MET) hardware, video-records the temporal and spatial eye-movements, through the integrated forward and rear facing cameras. The collected data identifies points of interest, through the recognition of objects, location, and duration of the gaze. The concept of power and control is assigned to the wearer of MET, as data is gathered through their gaze, and instant playback enables accurate self-report dialogue of experience from their perspective [10]. Previous research which has relied on quantitative eye-tracking measurements [10, 11] is deficient in meaning without the clarity of the D/deaf perspective. Eye-tracking data collection is becoming more ubiquitous in the marketing, gaming, and medical industries. However, it has been neglected in the tourism industry in relation to a co-design approach to provide D/deaf accessible experiences. Building on review of existing literature, a conceptual framework of D/deaf centralism is constructed, with important future research directions indicated.

2   Deaf Experience

People who are D/deaf have been categorised by society as a non-contributing group according to D/deaf activists [1, 9, 12–15] asserting, society lacks the comprehension of D/deaf as a unique linguistic group. The frequency of stigmatization occurs within the audition and oral social parameters thus, obstructing access. Intensified by traditional exhibition curation expressly reliant on the principles of artistic merit, chronology, and taxonomy, in preference to the centrality of accessibility in the visitor experience [16]. The corresponding societal bias dictates the body as disabled, contrary to the preference of the body as different [9, 14]. Recognising D/deaf body as different legitimately implies how people who are D/deaf experience the world, and the indifference society has to their diversity, unique communication, and situatedness [1, 9, 14, 16]. Fixations on individual words and difficulty articulating their experience regarding known and perceived barriers, is by definition a barrier for people who are D/deaf. The importance of eliciting personal biographies from participants corroborates the complex influences of the various dimensions of identity, understanding and recognition[16]. Previous research has indicated ethnographic film making, observations and interviews are effective methods of data collection of D/deaf narratives [9, 14, 16]. Although these methods have been favored in social anthropology, psychology, and other disciplines the barriers discussed earlier remain unsurmountable, utilising traditional qualitative methods[9, 13, 15, 16]. Although previous research papers have discussed the overarching principle of visual acuity of people who are D/deaf, there is a deficit of comparative studies of gaze patterns or areas of interest for this group within tourism [17].

3   MET as Method

Recent research has indicated people who are D/deaf exhibit remarkably different gaze patterns in comparison to hearing people [17]. Through the deployment of MET the researcher can observe participants' decoding and comprehension, to formulate strategies to reduce perceived barriers, in accessing and engaging in tourism experiences[18]. The eye tracking software, iMotions in this instance, generates pictorial evidence of gaze

patterns and heatmaps. Gaze patterns consist of saccades and fixations. Fixations are the momentary pauses on an area that either consciously or unconsciously are found interesting [19, 20]. The saccades are the rapid eye movements between each fixation lasting a few seconds. Specific dependent variables of data will be collected with analysis of the correlations between fixations, matched by the analytical software to the photographs of the visual stimuli [20]. A group of fixations collectively create an area of interest (AOI). Participant interviews will reveal their conscious and unconscious AOI [18, 21, 22]. The salience of an AOI is calculated by the algorithm of the analytical software, iMotions, based on the duration before fixation on a AOI and the commonality or proportion of participants who fixate on an AOI. If the first fixation to AOI is brief, the salience is more relative in terms of participant interest and engagement [18]. Capturing meaningful qualitative data through MET provide clear indicators of participant engagement, relevant narratives and motivations with art and culture and the actualisation of intangible and tangible barriers are realized [19, 20], therefore, providing data to construct an impactful accessible solution [12, 18, 21, 22].

4 Conceptual Framework

The review of empirical literature has highlighted the absence of the D/deaf narrative when designing accessible experiences[2–4, 8, 16]. The traditional museum curation of object assemblage disregards the visitor perspective, incidentally, facilitating an inaccessible exhibition [23]. However, the proposed conceptual framework propounds a D/deaf-centric (Fig. 1) co-design paradigm [24]. Direct dialogue, moderates' opportunities to transform inaccessible experiences, into accessible experiences for a diverse population [12, 16]. The proposed experimental design places the participant in an authentic gallery environment with genuine artefacts for the purpose of the replication of natural behaviour [23, 24]. Meaning is applied through the careful consideration of observations in conjunction with MET, preceding and informing the semi-structured interviews. The qualitative instruments provide a unique opportunity to gain valuable insight of D/deaf situatedness[9, 14, 16]. Consequently, transforming D/deaf disabled into, valued D/deaf different, re-dressing the historical imbalance of power and autonomy[1].
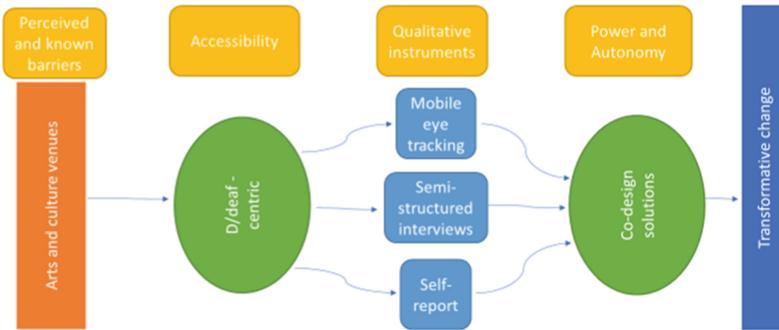

Fig. 1. Conceptual framework of factors positively affecting D/deaf-centric design.

5 Discussion

Although communication between D/deaf people and venues is a complex construct with indistinct variables, these can be overcome through the adoption of D/deaf body difference [9, 14]. This paper has argued the application of MET with semi-structured interviews and self-report, the person who is D/deaf is afforded the authority to co-design solutions to perceived and known barriers to participation in leisure, recreation, and cultural life [16]. The limitation of the conceptual framework is the propensity of singular MET observation, attributable to the immense volume of high-quality data manufactured through the data gathering process. For example, over 50,000 frames of data from studies lasting approximately 3 min, rendering this method prohibitive in some circumstances [10, 18–20]. Further prohibitions are the cost of hardware, software and licenses required, although these may diminish through higher demand, ubiquitous use, and technological innovation. However, the utilisation of MET in a qualitative field study can yield the D/deaf-centric perspective to perceived and known barriers, to design innovative solutions. Moving beyond the scope of this paper to conduct empirical research with diverse D/deaf communities framed within contemporary arts and cultural practice.

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The Effect of Purchasing Power Parity (PPP) and Cryptocurrency Use on Changes in the Transaction Utility of International Tourists

Ikram Nur Muharam[1,2]([✉]) and Iis Tussyadiah[1]

[1] School of Hospitality and Tourism Management, University of Surrey, Guildford, UK
{i.nurmuharam,i.tussyadiah}@surrey.ac.uk
[2] Department of Economics, Universitas Padjadjaran, Bandung, Indonesia

Abstract. This study investigates how exposure to local prices changes the transaction utility of international tourists, and the role of purchasing power parity (PPP) and the use of cryptocurrency in these changes. Findings indicate that tourists' transaction utility did not vary all that much when they visited a country with comparable PPP to their own. Meanwhile, when traveling to countries with a lower PPP, tourists enjoy a heightened transaction utility. Furthermore, using Bitcoin results in greater transaction utility than using fiat currency.

Keywords: Transaction utility · Purchasing power parity · Travellers behaviour · Cryptocurrency · International tourism · Bitcoin

1 Introduction

Transaction utility represents our perceived value of getting a good deal [12]. This topic needs to be better understood and requires more investigation [3]. However, this topic was rarely touched, notably in the tourism and hospitality literature. This study thus seeks to extend past research on the topic by investigating transaction utility in the context of international tourism. It takes a novel approach by evaluating the changes in tourists' transaction utility before and after exposure to local prices, exploring how the changes were affected by the destination's purchasing power parity (PPP), and measuring the effect of Bitcoin usage in hypothetical scenarios.

As everyone tends to something familiar [15], it was anticipated that tourists' perceptions of the prices of goods and services in an unfamiliar international destination would initially be based on the prices of goods and services in their home country. The expected scenarios were that tourists overestimate prices initially (the transaction utility is high) when visiting countries with lower PPP than their home country; then, it decreases as they become familiar with the destination (i.e., its currency and prices). In a different scenario, when tourists visit countries with PPP comparable to their home country, the transaction utility probably will not change much.

2 Literature Review

2.1 Transaction Utility

Transaction utility is the difference between the reference and actual prices [12]. It is a significant predictor of perceived service value, and omitting it from a model will significantly diminish its explanatory power [5]. While perceived value emphasises acquisition utility (residual pleasure) and transaction utility [12], the former better portrays post-consumption circumstances; therefore, this study focuses on the latter, which can describe pre-consumption conditions that match the context of this study.

The reference price is a person's perception of a fair price before being exposed to new information. In this study, the international travellers' reference prices are the prices of similar goods and services in their own country. A higher reference price than the actual price indicates a good deal, as the actual price is cheaper than expected. If the reference price is lower than the actual price, the transaction utility is negative, suggesting the actual price is more expensive than expected. Investigating how the transaction utility changes when international tourists are exposed to local prices will supplement existing research on transaction utility in tourism and hospitality, which has primarily focused on the context of hotels [5, 7] and restaurants [6, 8].

2.2 Purchasing Power Parity (PPP) and Type of Currency

An awareness of PPP and its related aspects will benefit stakeholders in tourism and hospitality. [4] used a price variable based on PPP to show that domestic tourism in less elastic conditions than outbound tourism can be improved with a pricing strategy, notably during a low season, or by enhancing innovation. [1] found that significant exchange rate volatility could diminish tourism inflows in the long run, probably because international tourists will have difficulty estimating prices in such a destination. Also, understanding this issue will help policymakers utilise tourism to balance PPP [14]. This study itself will add extant literature on PPP in tourism and hospitality by assessing its influence on changes in the transaction utility of international travellers.

Furthermore, as tourism and hospitality stakeholders must also stay up to date with the latest trends, this study explored the use of Bitcoin, measuring its impact on the changes in transaction utility. Many tourism vendors have begun accepting cryptocurrency [13], and some nations have even begun regulating its use [11].

3 Methods

This study uses a 2 × 2 experimental design with treatments of a country's purchasing power parity (lower or similar) and currency type (fiat or cryptocurrency) (See Table 1).

Participants were recruited through Amazon's Mechanical Turk (MTurk), the most often utilised online data collection method [10]. They were US citizens selected using a convenience sampling method. This study anticipated 120 participants (30 for each scenario). More survey slots (150) were opened to accommodate unusable responses, as suggested by [2]. Two participants did not complete the survey, and 23 responses were

Table 1. Experimental conditions

Experimental condition	Purchasing power parity	Type of currency
Bali (Indonesia)	Lower	Fiat currency (IDR)
Bali (Indonesia)	Lower	Cryptocurrency (BTC)
Amalfi Coast (Italy)	Almost equal	Fiat currency (EUR)
Amalfi Coast (Italy)	Almost equal	Cryptocurrency (BTC)

unreasonable and eliminated (the price reference was 100% greater or smaller than the actual price). The total participant used in the analysis was 125.

At the beginning of the experiment, participants were asked to state their perceived standard (fair) prices for budget and luxury hotel rooms (in USD). Participants were then randomly allocated to 1 of 4 scenarios and showed some tourism products/services in local currency (a currency converter was provided). After being exposed to local prices, participants were given photographs of a budget hotel and a luxury hotel (without name and brand) and asked to estimate the price of a standard room in those hotels.

Non-parametric approaches were used since not all subgroups (experimental conditions) satisfied normality and homogeneity assumptions. Non-parametric alternatives of ANOVA, Wilcoxon paired test and Mann-Whitney test [9] were used to compare transaction utility before and after exposure to local prices and to compare experimental conditions.

4   Results and Discussion

4.1   Changes in Transaction Utility

The results presented in Table 2 confirm the initial assumption that tourists visiting destinations in countries with lower purchasing power parity (PPP) initially overestimate prices. This is especially evident for budget hotels, where transaction utility before being exposed to local prices reaches 6 times the actual price. Even after seeing local prices, transaction utility remains positive (>1), which explains that the actual price was a good deal. Same goes for luxury hotels, but with a lower scale of change. Otherwise, in both budget and luxury hotels, the Wilcoxon paired test shows a significant difference in transaction utility before and after exposure to local prices.

Meanwhile, for visitors visiting countries with comparable PPP, in the case of budget hotels, the tests demonstrate no significant difference in transaction utility before and after exposure to local prices. In the case of luxury hotels, the Wilcoxon test yielded significant results, and the Mean value shows that transaction utility turned negative (<1). This means that tourists perceive that luxury hotel pricey after being familiar with the local prices.

The Mean value after exposure to local prices was higher in the cryptocurrency subgroup than the fiat-currency subgroup. This could be a sort of risk mitigation from tourists due to the high volatility of cryptocurrencies, in which when using cryptocurrencies, it is sensible to budget higher.

Table 2. Wilcoxon paired test results

	Mean (Before)	Mean (After)	Asymp. Sig. (2-tailed)
Budget Hotel			
Lower PPP	6.032	1.210	<0.001
Equal PPP	1.235	1.296	0.429
Fiat Currency	3.424	1.003	<0.001
Cryptocurrency	3.499	1.522	<0.001
Luxury Hotel			
Lower PPP	1.808	1.006	<0.001
Equal PPP	1.742	0.844	<0.001
Fiat Currency	1.741	0.733	<0.001
Cryptocurrency	1.806	1.114	<0.001

4.2   The Effect of Purchasing Power Parity and Type of Currency

The Mann-Whitney test using the difference in transaction utility before and after being exposed to local prices reveals that variations in the transaction utility of budget hotels were strongly affected by purchasing power parity (Asymp. Sig. [2-tailed] $=$ <0.001). However, the difference was not statistically significant for luxury hotels (Asymp. Sig. [2-tailed] $= 0.2497$).

The use of fiat currency or cryptocurrency had no significant effect on changes in transaction utility in both budget and luxury hotels (Asymp. Sig. [2-tailed] $= 0.3232$ and 0.4587, respectively).

5   Implication and Future Research

This study adds to the existing literature on international tourism by explaining changes in transaction utility before and after exposure to local prices in the destination country, as well as providing an overview of the effect of purchasing power parity (PPP) and the use of cryptocurrency in these changes.

In practice, this study provides information that stakeholders can utilise to examine target markets and pricing strategies. For example, destination management organisations (DMOs) and budget hotels can consider targeting international tourists from countries with higher PPP; the high transaction utility before being exposed to local rates implies a big gap that providers can exploit to sell at higher prices, and at the same time, the transaction utility that remains high after exposure to local prices also benefits these tourists. The results may also encourage early adopters of cryptocurrency in tourism and hospitality because it has been discovered that utilising cryptocurrency results in tourists having a higher fair pricing estimate than when using fiat currency.

Future research can include the intention to purchase the deal or assess post-consumption factors such as acquisition utility, perceived quality, or deal evaluation

to obtain a complete picture of the effect of PPP and the use of cryptocurrency. A lab-based experiment employing biometric devices will also be highly intriguing because it will demonstrate whether the provided settings (e.g., the use of Bitcoin) elicit distinct emotional reactions.

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Daily Deals Usage in the Pandemic Context of the Slovenian Hotels: Technology Adoption Perspective

Miha Bratec[1] , Petra Zabukovec Baruca[1(✉)] , and Katarzyna Minor[2]

[1] Faculty of Tourism Studies—Turistica, University of Primorska, Portorož, Slovenia
`{miha.bratec,petra.zabukovec}@fts.upr.si`
[2] Tourism, Hospitality and Events Department, Cardiff Metropolitan University, Wales, UK
`kminor@cardiffmet.ac.uk`

Abstract. This paper analyses the usage of Daily Deals (DDs) in the COVID-19 pandemic context. A constructivist approach and grounded theory methodology are applied to study the managerial DDs usage in Slovenian hotels. The results show a predominance of organisational and external environmental factors, such as government regulation, linking structures, and industry characteristics, on the usage of DDs. These are shown in a conceptual DDs usage model. The study contributes to the hotel digital marketing literature by merging the two leading technology adoption frameworks to explain the formation of attitude and usage of DDs in a specific pandemic context.

Keywords: Daily deals · Flash sales · Coupon marketing · Technology adoption · TAO · UTAUT · COVID-19

1 Introduction and Study Rationale

In traditional coupon marketing, discounts and offers are used to attract new customers. More recently, online coupons have proliferated. Despite this, they have received limited attention in the literature [1]. Daily Deal websites (DDs), also known as Flash sales, are coupon-based online marketplaces combining benefits for merchants with discounts for customers. They are typically characterised by advance-purchase conditions, limited purchasing time (7–14 days usually) and a discount (between 20 and 50% of the regular price) [2]. Budler et al. [3] distinguish between generic DDs with local reach (Groupon), which mostly rely on coupon redemption, and niche DDs, which have real-time availability features and capture mainly international markets (Secret Escapes).

Few studies with a customer-centric focus have addressed DDs, yet their managerial usage perspective (e.g. [4]) is lacking. Further, the research so far has failed to answer why hotels adopt and more importantly use DDs. Considering the arguably positive relationship between DDs and the crisis, this research aims to explore the hotel industry's use of DDs through the pandemic, made even more peculiar due to governmental intervention in Slovenia, where staycation vouchers were issued to all its residents (200 EUR

in 2020, and 100 EUR in 2021), to stimulate domestic travel demand [5]. Meanwhile, most hotels faced reduced marketing budgets, a lack of staff and an inability to rely on established foreign tour operator cooperation. This paper aims to inductively analyse the antecedents of DDs usage amidst the pandemic, present an abduction-based conceptual model rooted in technology adoption literature and discuss its explanatory power.

2 Technology Adoption Frameworks

Technology adoption has been a common focus of Information Systems (IS) research. The tourism field mostly relies on Davis' [6] dated Technology Acceptance Model (TAM). The more recent IS models look at adoption from the individual's cognitive or broader organisational perspective. The influential Unified Theory of Acceptance and Use of Technology (UTUAT) is used to describe user intentions towards using technologies and usage behaviour via four key variables, which are performance expectancy, effort expectancy, social influence, and facilitating conditions [7] proving itself useful to explain the adoption of various e-commerce phenomena [8]. Yet, the framework does not address the conditions that influence behavioural intention and use significantly [9]. Therefore, to encompass the pandemic-affected business context, Tornatzky and Fleisher's [10] Technology-Organisation-Environment Framework (TOE), a classic organisational framework offers itself as a more suitable choice [11]. It includes three contexts, namely: technology development [12]; organisational configuration [13]; and industry environment [14]. The TOE has been tested in e-commerce and has earned substantial validations as well as the widespread impact of government involvement (staycation vouchers) that fueled hotel marketing in Slovenia during the pandemic [15].

3 Methodology

Using the constructivist paradigm and Charmaz and Thornberg's [16] version of grounded theory, this research allows for the exploration of literature pre- and post-data collection. The questions for the focus group were designed to be broad and exploratory in nature. 4 senior S&M managers representing 4 medium to large hotel companies, reached a total sample of over 25% of Slovenian hotel room capacity. Their attitudes toward DDs and the actual use of DDs during the pandemic were examined.

We analysed the data using thematic analysis [17] by manually and inductively coding first- and second-order codes. These were manually aggregated into third-order themes and further abductively fit into the structure of the two above-presented technology adoption frameworks.

4 Preliminary Findings and Conceptual Model Proposal

We present our findings in a conceptual model (Fig. 1) explaining the use of DDs. We fit the third-order constructs arising from data coding into the three main contexts of the TOE framework. Moreover, UTAUT's Performance Expectancy and Effort Expectancy

were placed in TOE's Technological and Organisational contexts. The particularities in the usage of DDs are indicated by the following key TOE contexts:

– In the technological context, the characteristics of DDs as a distribution channel for discounted sales conflict with the goal of the Slovenian hotel industry to maintain rate parity across all e-distribution channels. This reduces the importance of any type of price promotion.

– The organisational context links structures at formal and informal levels concerning the work process. This takes the form of staff shortages in marketing and operations departments, which diminished the attractiveness of DDs usage. Further, it was argued that DDs: (a) increased operational tasks that require manual work; (b) brought undesirable, 'inferior' discount consumer profiles; (c) caused communication problems linked to the questionable reputation and image of hotels featured on DDs, especially the generic ones operating on the domestic market.

– Within the environmental context government regulation with intervention in the form of lockdowns in 2020 and 2021 and staycation vouchers influenced marketing. With the "government-sponsored" vouchers, there was enough domestic demand to fill the capacity at rack rates. Industry characteristics and market structure related to the regulation of terms and conditions adopted by the DDs (who for the pandemic period adopted flexible booking conditions) increased the risk for hotels that were used to working with DDs on non-refundable terms. Lastly, we identified issues with inadequate technological support infrastructure related to dynamic pricing. In addition, we identified the lack of integration of DDs with the channel manager and CRS systems used in Slovenian hotels.
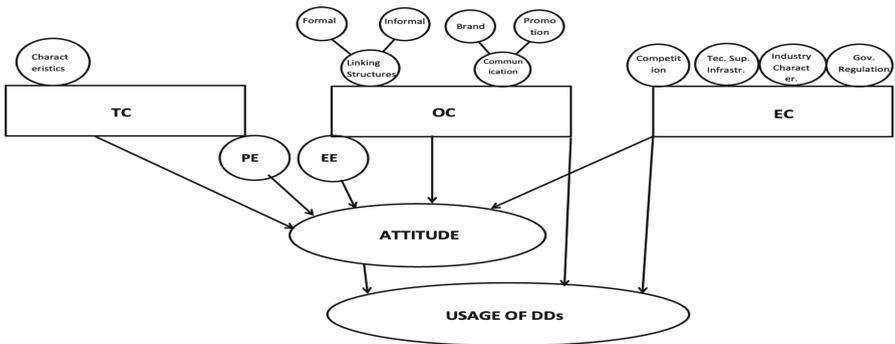

Fig. 1. Conceptual model of pandemic DD usage based on merging TOE & UTAUT;

Legend: TC…Tech. Context; OC…Org. Context; EC…Env. Context – TOE structural dimensions; PE…Performance Expectancy; EE…Effort Expectancy – UTAUT constructs.

5 Discussion and Future Research Directions

Even though DDs originated in the previous recession and were designed to stimulate demand and advertise hotels to new audiences, our results exposed their certain weaknesses for usage in the current pandemic context. Particularly in times of staff shortages, the UTAUT construct of effort expectation seems problematic. Furthermore, the Performance Expectancy UTAUT construct, which is part of the Technological Context of our conceptual model, raises questions, i.e. Slovenian hoteliers were arguably focused on attracting guests from Slovenia and could therefore only rely on generic DDs. However, these offer no instant booking feature, resulting in additional work for understaffed reservation departments, as well as reducing the brand image of featured hotels. Surprisingly, our analysis identified only two of the four core UTAUT constructs. This is because Social Impact and Facilitating Conditions did not emerge from the data analysis. Therefore, this will require further exploration.

When used in the context of a pandemic, DDs require a more holistic approach than psychological-factors-based models that do not take the external business environment into consideration. The organisational TOE framework thus proved to have stronger explanatory power for our analysis. We further confirm the claims of Andersen and Henriksen [15], noting that Organisational & Environmental contexts have a more direct influence on the usage of certain technology. Data analysis indicates their direct influence on usage, while the technological context appears to only affect managerial attitudes toward DDs. As depicted by one of our respondents "actually I find DDs extremely useful, but the volume of domestic demand made us capable of filling our rooms directly at rates well above the usual pre-pandemic ADR level". Consequently, even if managers develop positive attitudes toward DDs, the manual work (Organisational context) and the focus on domestic markets due to governmental intervention (Environmental context) will hinder their use. Therefore, they both have a more direct and significant influence on usage intention than the characteristics and Performance Expectancy of DDs (Technical context), as shown in Fig. 1, thereby forming a valid contribution to theory.

Using the TOE framework while integrating UTAUT constructs allowed us to properly explain the (lack of) DDs adoption in Slovenia amidst the pandemic. This clearly indicates the potential of IS research frameworks (and their combinations) - often absent from the theoretically weak hotel marketing research, to explain the usage of e-marketing channels and solutions in hospitality and tourism. Hence, this affirmation forms our main contribution to theory. In terms of limitations, we recognise our proposed model is very context-, time- and place-specific and needs further refinement and empirical verification. We aim to collect additional data in the future to reach data saturation and cover at least 50% of the Slovenian hotel population as part of a longitudinal study that takes into account post-pandemic recovery conditions as well as the emerging economic crisis. We will further refine the data analysis with the use of computer-assisted tools and the application of AI-based text analysis methods to explore potentially hidden links between the contexts, the attitude and the actual usage intention.

Last but not least, practitioners will benefit from learning of critical factors that DDs and their supporting technology infrastructure providers need to overcome in order to strengthen their role in the e-distribution mix post-pandemic.

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Social Media and User Generated Content

Factors Influencing Users' Content Sharing Intention in Travel-Related Consumer Generated Media

Jiao Li[1] , Kaige Zhu[1] , and Juhyeok Jang[2(✉)]

[1] Graduate School of International Media, Communication, and Tourism Studies, Hokkaido University, Sapporo, Japan
[2] Research Faculty of Media and Communication, Hokkaido University, Sapporo, Japan
`jang.juhyeok@imc.hokudai.ac.jp`

Abstract. Travel-related consumer generated media (CGM) plays an increasingly important role in travelers' decision-making process. Strenuous effort has been dedicated to explore CGM's impact on users' travel behaviors. However, little is known about the motivations that drive users to post information on travel-related CGM. By combining the technology acceptance model (TAM), theory of planned behavior (TPB), and uses and gratifications theory (U&G), this study aims to delve into such motivational factors. The results revealed that users' perceived ease of use when posting content significantly affects perceived usefulness. Additionally, users' gratification derived from entertainment, information sharing, and rewards could positively influence their attitudes toward content sharing. Moreover, attitude, subjective norms, perceived behavioral control, and perceived usefulness jointly determine users' intention to use travel-related CGM for content sharing. However, the impacts of perceived usefulness, perceived ease of use, status-seeking, socializing, and passing time on their attitudes toward content sharing were insignificant. This study tests the possibility of combining the TAM, TPB, and U&G to expand their application in the field of travel-related CGM, and provides suggestions for travel-related CGM managers to improve their services.

Keywords: Travel-related CGM · Content sharing · U&G · TAM · TPB

1   Introduction

With the development of information technology, travel-related consumer generated media (CGM)—platforms for users to share information through voluntary participation [1]—have become increasingly significant in the travel planning and decision-making process [2, 3]. The number of related studies is growing in parallel with the popularity of travel-related CGM, as represented by Tripadvisor. Examples include the perceived impact of CGM on the decision-making process of travelers [4], users' intention to continue using CGM [5], methods to reduce the switching intention of Generation Z users [6], and credibility measures of CGM [7].

However, very few studies have explored content creation. Yoo and Gretzel [2] and Gretzel and Yoo [8] investigated the relationships between the personal characteristics

(e.g. age and gender) of the creator, their personality, and content creation, noting that the content was mainly provided by a few users. Yoo and Gretzel [3] explored users' motivations for commenting online. User-provided content is the basis of travel-related CGM [1], because millions would not visit Tripadvisor without the tips, recommendations, and advice from fellow travelers [9]. Moreover, as the impact of COVID-19 has subsided after two years, the number of planned trips in 2022 is expected to exceed that of actual trips in 2019 [10], and therefore, the use of travel-related CGM may significantly increase. Additionally, reviews of travel-related CGM, particularly long-form reviews, are helpful to potential travelers [11] to ascertain the destination's COVID-19-related safety, security, and cleanliness standards [12]. Therefore, it is necessary to determine the factors that influence users' intentions to use travel-related CGM to create and share content.

2 Theoretical Background and Research Hypotheses

2.1 Content Sharing

In this study, content sharing refers to the behavior of users posting word-of-mouth, reviews, and tips, based on their travel experiences and knowledge rather than the behavior of forwarding others' content. Several studies have explored the motivations for content sharing. Yoo and Gretzel [3] examined whether helping service providers, concern for other consumers, the need for enjoyment/positive self-improvement, and venting negative feelings were motivations for users to post online travel reviews. However, the four aforementioned factors do not adequately cover all motivations; additional factors may also impact content sharing intention. Shao [13] suggested that users continue to use CGM because of its utility. Gagné [14] confirmed that ease of sharing may influence people's intention to share. Therefore, the technology acceptance model (TAM) was chosen, which considers the relationships between perceived usefulness and ease of use of information technology and continued use [15]. Additionally, Park and Lee [16] argued that motivations for content sharing were divided into personal and social purposes. The uses and gratifications theory (U&G) describes the reasons why individuals use media from the perspective of gratification or psychological needs [17]. The theory of planned behavior (TPB) considers the influence of social and psychological factors on consumer behavior [18]. Both theories include factors related to personal and social purposes. Therefore, we constructed a research model using three theories; the possibility of their combination has been tested by a few studies [19, 20]. The combination of these three theories provides a more comprehensive understanding of the determinants of content sharing intention in travel-related CGM and how these factors influence users' sharing intentions.

2.2 Technology Acceptance Model (TAM)

The TAM was proposed by Davis [15] based on the theory of reasoned action (TRA). Its purpose is to analyze the motivations of users of information systems to use new technologies; it has five components: perceived usefulness, perceived ease of use, attitude, behavioral intention, and system use. Perceived usefulness refers to the extent to

which individuals believe their performance will improve by using a particular system [15]. Perceived ease of use implies the extent to which individuals believe they can effortlessly use a particular system [15]. Attitude is influenced by perceived usefulness and ease of use. The intention to use is influenced by perceived usefulness and attitude, and perceived ease of use also directly influences perceived usefulness. The TAM views information systems such as the Internet as a tool for improving user performance [21]. Fari [22] noted that despite the complexity of information sharing and knowledge sharing activities and processes, the TAM is a strong guide for knowledge sharing research. Using the TAM, this study intended to determine whether travel-related CGM would facilitate the sharing of travel-related information by users and increase their efficiency. Therefore, we propose the following hypotheses:

H1: Perceived usefulness positively influences users' intention to share travel content.
H2: Perceived usefulness positively influences users' attitude.
H3: Perceived ease of use positively influences users' attitude.
H4: Perceived ease of use positively influences users' perceived usefulness.

2.3 Uses and Gratifications Theory (U&G)

The U&G, proposed by Katz et al. [17], is primarily used to examine why and how individuals use media to meet their requirements. This theory propounds that individuals possess the ability to select media use [23]. Moreover, differences in media and information environments can result in different user gratifications [23]. Consequently, each study selects different dimensionalities to examine the factors that influence media use, depending on the nature of the media and purpose of the study. To examine users' information sharing intention, Lee and Ma [24] investigated the effects of information seeking, socializing, status seeking, and entertainment on college students' intentions to share the news on social media. Based on Lee and Ma [24], Thompson et al. [25] added the factor of passing time and modified information seeking to information sharing to examine whether the role of those gratifications differed across contexts, using ordinary social media users as subjects [25]. Additionally, Park and Lee [16] confirmed that reward is a powerful tool to motivate users to post content. However, these studies have only examined the relationship between gratifications and sharing intention; few studies have considered the relationship between gratifications and attitude. Wu and Kuang [23] confirmed that status seeking, social interaction, the norm of reciprocity, and information needs have a positive effect on attitude toward sharing health information using WeChat. They also noted that users with positive attitudes are more likely to share information [23]. On the basis of the aforementioned studies, and considering the characteristics of travel-related CGM, we hypothesized the following:

H5: Status seeking positively influences users' attitude.
H6: Socializing positively influences users' attitude.
H7: Entertainment positively influences users' attitude.
H8: Information sharing positively influences users' attitude.
H9: Passing time positively influences users' attitude.
H10: Reward positively influences users' attitude.

2.4 Theory of Planned Behavior (TPB)

The TPB, also a derivative theory of the TRA, was first introduced by Ajzen [26] as a psychological theory linking beliefs to behavior. There are five components of the TPB: attitude, subjective norm, perceived behavioral control, intention, and behavior. Subjective norm refers to the social pressure that individuals perceive when engaging in a particular behavior [27]. Perceived behavioral control implies an individual's perception of the ease of engaging in a particular behavior [27].

To date, the TPB has been widely applied to explore information sharing behavior. Chen et al. [28] categorized perceived behavioral control into knowledge creation and web-specific self-efficacy. Finally, attitude, subjective norm, and web-specific self-efficacy were confirmed to have a positive effect on the intention to share knowledge [28]. Kuo and Young [29] examined how the TRA, TPB, decomposed TPB, and revised TPB predicted knowledge sharing behavior. It was shown that in the model, which had applied the TPB, all three concepts positively influenced the intention to practice knowledge sharing behavior [29]. However, the factors that influence users' behavioral intentions vary across media and topics. Therefore, this study explores the relationships between attitude, subjective norm, perceived behavioral control, and intention to share travel-related content. The following hypotheses are thus proposed:

H11: Attitude positively influences users' intention to share travel content.
H12: Subjective norm positively influences users' intention to share travel content.
H13: Perceived behavioral control positively influences users' intention to share travel content.

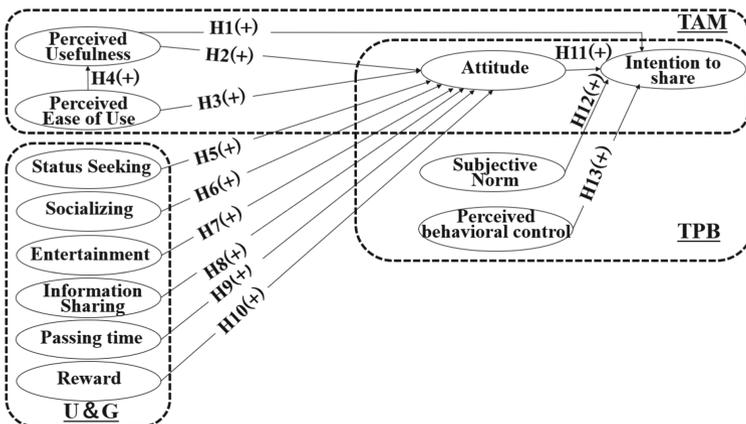Hypothetical relationships in this study are shown in Fig. 1.

Fig. 1. Research model

3   Methodology

3.1   Data Collection Procedures and Respondents

This study was conducted in Japan—a key market for Tripadvisor [10]. A screening questionnaire was distributed to 6,000 Japanese people by the Japanese research company FREEASY in August 2022. Based on data screening, we observed that although the largest proportion of respondents had posted travel content on Tripadvisor, there were also a certain number of users of local Japanese travel-related CGM. A total of 484 respondents who posted travel-related content on travel-related CGM in the past year were selected and surveyed. A total of 410 samples were collected, and after filtering out outliers and pattern answers, 355 valid responses were retained.

3.2   Measurement

This study used the scales validated in previous studies and modified them to fit the research scenario of travel content sharing on travel-related CGM. The original scales, in English, were translated into Japanese and reviewed by several scholars (including native Japanese speakers) who were familiar with both English and Japanese to ensure content validity, equivalence of meaning, and authenticity of expression. The TAM and TPB scales were adapted from Wu and Kuang [23], Davis [15], Park et al. [30], and Thompson et al. [25]. The items for the U&G were adapted from Wu and Kuang [23], Park and Lee [16], and Thompson et al. [25]. These items were rated on a 7-point Likert scale, ranging from "Strongly Disagree" to "Strongly Agree."

3.3   Data Analysis

This study used SPSS Statistics version 26.0 for descriptive analysis. A partial least squares structural equation modeling (PLS-SEM) analysis using SmartPLS was then conducted to test the proposed hypotheses and model fit. The measurement and structural models were evaluated using the PLS algorithm and bootstrapping (5000 subsamples), respectively. As the research model in this study is complex and predictive, PLS-SEM is more flexible in dealing with complex models, small sample sizes, and non-normal data for predictive research [31]. Therefore, PLS-SEM is a more appropriate analytical tool in this study.

4   Results

4.1   Respondents' Profiles

The respondents' demographic characteristics are listed in Table 1. There were approximately 20% more male (60.28%) than female respondents (39.72%). Respondents were spread across a wide age-range, with a clear majority between the ages of 20 and 49 years. The frequency of using travel-related CGM to post content also varied from person to person, with 83.38% of the respondents posting content no more frequently than every 2–3 months. They also used a variety of websites, Tripadvisor being the most popular.

The content posted by the respondents on the website was also highly informative (for content options, we referred to Yoo and Gretzel [2]). Commonly posted content includes personal experiences, local people, food and culture, practical travel information about destination, and general destination facts.

Table 1. Demographic characteristics of respondents ($n = 355$)

Characteristics		Frequency	Percent
Gender	Male	214	60.28%
	Female	141	39.72%
Age	Under 20	27	7.60%
	20–29	100	28.17%
	30–39	105	29.58%
	40–49	90	25.35%
	Above 50	33	9.30%
Frequency of use	Once a year	105	29.58%
	Once every half year	92	25.91%
	Once every 2–3 months	99	27.89%
	1–3 times a month	34	9.58%
	1–3 times a week	11	3.10%
	4–6 times a week	9	2.53%
	Every day	5	1.41%
Used travel-related CGM	Tripadvisor	169	47.61%
	4travel	145	40.85%
	UTRAVEL NOTE	108	30.42%
	Arukikata	91	25.63%
Contents	Personal experiences	138	38.87%
	Practical travel information about destination	127	35.77%
	Local people, food and culture	131	36.90%
	General destination facts	117	32.96%
	People they met while traveling	74	20.85%
	Warnings and tips for others	46	12.96%
	Evaluations of travel-related services	31	8.73%

4.2   Evaluation of the Measurement Model

First, Cronbach's α and composite reliability (CR) were used to assess the reliability. As shown in Table 2, Cronbach's α, CR values, and factor loadings were above the recommended threshold of .70 [31], ensuring internal consistency across all the constructs. Convergent validity of the model was also tested. All average variance extracted (AVE) values were greater than .50 [32], indicating no problems with convergent validity. However, when examining discriminant validity, the correlation coefficients for information sharing (IS) and socializing (SO) (.848) were higher than the square root of the AVE for IS (.832) and SO (.841); therefore, the discriminant validity was not satisfactory [32]. It is likely that the respondents were confused when answering because the two factors were conceptually proximate. Therefore, we conducted a chi-square difference test using AMOS [33] to assess the discriminant validity between IS and SO. The results showed that $\Delta\chi^2 = 8.372, p < .01$. Therefore, the discriminant validity can be reasonably accepted.

Table 2. Measurement model for constructs

Construct and item (In this table, travel-related CGM is omitted as CGM)	Loading	Mean	SD
Perceived Usefulness (PU) (Cronbach's α = .887, CR = .922, AVE = .747)			
PU1: Using CGM would enable me to share travel content more quickly	.852	4.330	1.470
PU2: Using CGM would make it easier to share travel content	.875	4.490	1.470
PU3: Using CGM in sharing travel content would increase my productivity	.869	4.366	1.436
PU4: Using CGM would enhance my effectiveness in sharing travel content	.862	4.341	1.444
Perceived Ease of Use (PE) (Cronbach's α = .831, CR = .899, AVE = .748)			
PE1: Sharing travel content through CGM is simple and not complicated	.877	4.254	1.415
PE2: Learning to use CGM for sharing travel content is easy for me	.848	4.327	1.486
PE3: It would be easy for me to become skillful at using CGM in sharing travel content	.868	4.211	1.482
Status Seeking (SS) (Cronbach's α = .824, CR = .895, AVE = .740)			
SS1: When I share travel content through CGM, I want others to perceive me as respectable	.860	4.031	1.477
SS2: When I share travel content through CGM, I want others to perceive me as knowledgeable	.873	4.155	1.507

(*continued*)

Table 2. (*continued*)

Construct and item (In this table, travel-related CGM is omitted as CGM)	Loading	Mean	SD
SS3: When I share travel content through CGM, I want others to perceive me as positive	.847	4.273	1.513
Socializing (SO) (Cronbach's α = .862, CR = .906, AVE = .707)			
SO1: By sharing travel content through CGM, I can talk about something with others	.862	4.197	1.460
SO2: By sharing travel content through CGM, I can interact with others	.861	4.363	1.461
SO3: By sharing travel content through CGM, I can exchange ideas with others efficiently	.850	4.285	1.450
SO4: By sharing travel content through CGM, I can keep in touch with others	.789	4.248	1.479
Entertainment (EN) (Cronbach's α = .856, CR = .902, AVE = .698)			
EN1: Sharing travel content through CGM is entertaining	.854	4.442	1.418
EN2: Sharing travel content through CGM is funny	.842	4.544	1.380
EN3: Sharing travel content through CGM is exciting	.825	4.414	1.448
EN4: Sharing travel content through CGM is enjoyable	.820	4.476	1.452
Information Sharing (IS) (Cronbach's α = .852, CR = .900, AVE = .692)			
IS1: By sharing travel content through CGM, I can obtain others' opinions from feedback	.819	4.346	1.506
IS2: By sharing travel content through CGM, I can obtain useful information from others' feedback	.840	4.485	1.423
IS3: By sharing travel content through CGM, I can share information that might be useful to others	.849	4.431	1.466
IS4: By sharing travel content through CGM, I can express myself freely	.819	4.293	1.438
Passing Time (PT) (Cronbach's α = .833, CR = .900, AVE = .750)			
PT1: By sharing travel content through CGM, I can pass the time away	.874	3.896	1.615
PT2: By sharing travel content through CGM, I can relieve boredom	.902	4.054	1.548
PT3: Sharing travel content through CGM is a habit, just something to do	.820	3.994	1.531
Reward (RE) (Cronbach's α = .835, CR = .901, AVE = .752)			
RE1: By sharing travel content through CGM, I can get some monetary reward	.864	4.242	1.493

(*continued*)

Table 2. (*continued*)

Construct and item (In this table, travel-related CGM is omitted as CGM)	Loading	Mean	SD
RE2: By sharing travel content through CGM, I can earn money	.877	4.225	1.481
RE3: By sharing travel content through CGM, I can get points	.860	4.242	1.447
Subjective Norm (SN) (Cronbach's α = .827, CR = .897, AVE = .744)			
SN1: My family and friends would think I should share travel content through CGM	.896	4.304	1.435
SN2: People who are important to me would think I should share travel content through CGM	.855	4.330	1.429
SN3: It is expected of me that I share travel content through CGM	.835	4.313	1.334
Perceived Behavioral Control (PBC) (Cronbach's α = .755, CR = .860, AVE = .671)			
PBC1: I have the confidence that if I want, I can share travel content through CGM	.820	4.439	1.357
PBC2: I have the confidence and ability to respond to others' related comments through CGM	.820	4.403	1.430
PBC3: It is mostly up to me whether or not I share travel content through CGM	.818	4.580	1.326
Attitude (ATT) (Cronbach's α = .844, CR = .906, AVE = .762)			
ATT1: For me, sharing travel content through CGM is good	.867	4.465	1.405
ATT2: For me, sharing travel content through CGM is beneficial	.875	4.546	1.323
ATT3: For me, sharing travel content through CGM is valuable	.877	4.403	1.361
Intention to share on CGM (INT) (Cronbach's α = .835, CR = .901, AVE = .752)			
INT1: I intend to share travel content through CGM in the future	.862	4.515	1.358
INT2: I plan to share travel content through CGM regularly	.875	4.380	1.348
INT3: I am willing to share travel content that I think is valuable to others through CGM	.864	4.279	1.472

Note. CR = Composite Reliability; AVE = Average Variance Extracted; SD = Standard Deviation

4.3 Structural Model and Hypotheses Testing

Before testing the structural model, the inner and outer variance inflation factors (VIF) were calculated and found to be less than four (1.488 –2.446), indicating no issues with multicollinearity [34]. The structural model was then assessed. The value of standardized root mean squared residual (SRMR) was .047, which was lower than the threshold of .05 [35]. Furthermore, all Q^2 (predictive relevance) values were greater than zero (PU:0.518, ATT:0.520, INT:0.518), indicating that the exogenous latent variables had good predictive relevance [36]. Moreover, the proposed research model accounted for 69.9% of the variance in perceived usefulness, 69.3% in attitude, and 69.5% in the

intention to share on travel-related CGM, signifying substantial R^2 (explained variance) values [37]. This indicates that the goodness-to-fit of the structural model was good.

The results of hypotheses testing are shown in Fig. 2. Thirteen hypothesis paths were proposed in this study, of which five proved to be insignificant. Regarding the TAM's component concepts, perceived usefulness ($\beta = .084$, $p > .05$) and perceived ease of use ($\beta = -.103$, $p > .05$) had no effect on attitude, thus, not supporting Hypotheses 2 and 3. Status seeking ($\beta = -.001$, $p > .05$), socializing ($\beta = .022$, $p > .05$), and passing time ($\beta = .104$, $p > .05$) in the U&G also had no effect on attitude, thus not supporting Hypotheses 5, 6, and 9.
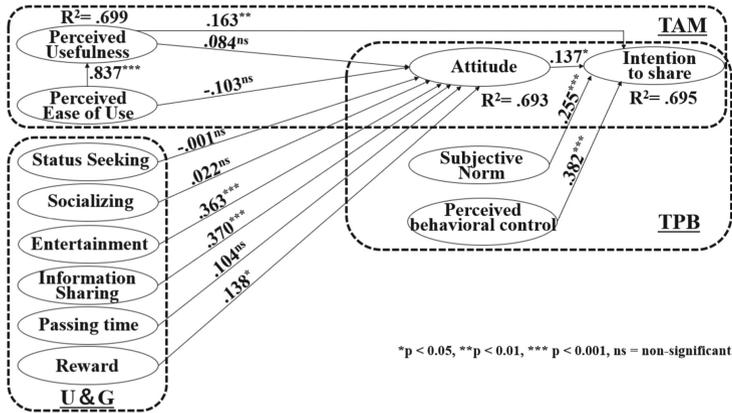

Fig. 2. Results of structural equation model

5   Discussion

Based on the analysis in the previous section, we obtained the following results: among the constituent concepts of the TAM, perceived usefulness significantly and positively influenced users' intention to share. Perceived ease of use also had a significant impact on perceived usefulness and had the strongest influence of all paths—that is, the easier it was for users to operate, the more likely they were to perceive travel-related CGM as useful when sharing travel content. This makes travelers more likely to continue using websites to share content. However, perceived usefulness and perceived ease of use did not significantly affect attitude—a result that differed from expectations. In this era of information technology, most people have posted information online at some point of time, be it in the form of text or images. Therefore, the usefulness and ease of use perceived by users may not be strong enough to influence their attitudes toward using travel-related CGM to share content.

Among the six paths associated with the U&G, entertainment, information sharing, and rewards directly influenced users' attitudes. Furthermore, the relationships between status seeking, socializing, passing time, and attitude were insignificant. This suggests four things. First, users can gain pleasure from content sharing. Second, they are willing

to express themselves by sharing content and obtaining useful information from others' feedback. Third, they want to receive some financial benefits from sharing content. Fourth, gaining reputation and visibility, acquiring social satisfaction, and alleviating boredom are not significant influencing factors for users' attitudes. Probably the main reason for this result is that the majority of respondents do not post content through travel-related CGM very frequently, which makes it difficult to achieve higher status and find communication opportunities with others. Meanwhile, it hardly provides the effect of passing time in daily life. Another possible reason for the differences is the cultural background. When Liu et al. [38] used the New Orleans dataset for analysis, it indicated that when Tripadvisor members were at a lower status, they were eager to improve their rank and gain knowledge as they communicated with others. This differs from the results of our study, which necessitates further research.

Attitude, subjective norm, and perceived behavioral control in the TPB have all shown to significantly and positively influence users' intention to share. These results are consistent with those of previous studies. This implies that those who hold a positive attitude toward content sharing are more likely to share information on travel-related CGM. Those who are supported by the people around them, particularly those who are confident of their abilities, also tend to share information.

6 Conclusion

6.1 Implications for Theory

This study makes three contributions from a theoretical perspective. First, it extends the U&G, TAM, and TPB to the context of content sharing by travel-related CGM users. It also examines the factors that influence users' intention to create and share content on travel-related CGM from three perspectives: technical, social, and psychological, and how they influence it. The results again test the possibility and validity of combining the TAM, TPB, and U&G. The TAM and TPB can be used to understand the different factors that influence behavioral intention; however, they do not consider the impact of users' voluntariness. Mohebbi et al. [19] argued that much of the background to supporting research related to these two theories is mandatory adoption. The U&G suggests that users actively choose to use a medium to satisfy their wants and requirements [17], which compensates for the limitations of the TAM and TPB. Next, previous studies have mostly examined the direct relationships between gratification-related factors and behavioral intention or actual behavior [21, 25], and few studies have examined the relationships between gratification-related factors and attitude. This study provides a solid theoretical basis for this hypothesis.

6.2 Implications for Practice

This study has several practical implications. Based on the data analysis, this study makes the following suggestions. First, according to the evaluation objects, different description dimensions can be shown in the input box for users to choose. For example, the evaluation of a restaurant can be set as the dimensions of service, taste, and hygiene. Suppose users

choose a service dimension, the system automatically populates "Service:" and users can then directly write their views. It can provide some convenience when writing, as well as encourage users to provide more details. Second, it is significant to enable users to feel happy and express themselves through content sharing. Content posted by users can be judged by a human or machine to determine if it is worthy of recommendation. Thereafter, big data will filter out people who may be interested/have similar experiences based on historical browsing records, dwell time, liked and favorited content, etc., and recommend the content to them. This allows reviewers and other users to exchange views, share positive emotions, or release negative ones. Third, travel-related CGM can be associated with mainstream social media because subjective norms affect intention to share. This allows users to share the content they create with those around them and receive a more diverse range of opinions from relatives and friends. A few local Japanese travel-related CGM such as 4travel and UTRAVEL NOTE offer the service of sharing reviews via Twitter or Facebook, whereas on Tripadvisor, users can only share via email or links. Fourth, Liu et al. [39] demonstrated that reviewers with high-level badges posted more content, but the quality of the content was lower. This study found that rewards increase users' positive attitudes toward content sharing. Therefore, it is advisable to collaborate with other booking platforms to offer better discounts to high-level reviewers who consistently provide high-quality content, than to merely high-level reviewers. Additionally, regular contests should be held to reward or offer extra points to the most valuable newly posted content and reviews. Travel-related CGM managers can also organize regular events, such as "Write a Review Day" [11]. Guidance on writing reviews can improve reviewers' narrative skills and self-confidence, thereby encouraging them to produce more and higher-quality content. Through these methods, administrators can not only retain and motivate experienced users, but also attract novice users to share their travel experiences. This will increase user activity throughout the site, improving site sustainability.

6.3 Limitations

This study has a few limitations. First, separate studies have not been conducted on different websites. Each website has its own characteristics, and different services bring different experiences to users; therefore, separate investigations are required to obtain more focused conclusions. Furthermore, the Japanese market was used as the subject of this study; however, Tripadvisor [10] has revealed many differences in usage between users in Japan and other countries. The cultural context of each country may lead to different results. Therefore, further analyses in other countries are required to verify the generalizability of the results. Finally, there are many types of gratification within the U&G, but only six were selected for this study. Future studies should explore whether other types of gratification also influence users' intention to share content.

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Exploring the Possibility of Short-Form Travel Videos for Cross-Border Promotion in Rural Tourism During the COVID-19 Pandemic: A Case Study of Ganzi Tibetan Autonomous Prefecture, China

Kaige Zhu[1] , Jiao Li[1] , and Juhyeok Jang[2(✉)]

[1] Graduate School of International Media, Communication and Tourism Studies, Hokkaido University, Sapporo, Japan
[2] Research Faculty of Media and Communication, Hokkaido University, Sapporo, Japan
jang.juhyeok@imc.hokudai.ac.jp

Abstract. The impacts of short-form travel videos (STVs) on destination marketing have been widely acknowledged in recent years. Although there have been many prior studies on short video platforms, the mechanism and research system of the impacts of travel contents in short-form videos on users are not clear. This study aims to reveal the possibilities of STVs in cross-border tourism promotion and to develop research models and survey methods applicable to research related to the contents of STVs. Therefore, a scenario-based experiment was designed using STVs related to Ganzi (甘孜) destination. The findings (N = 456) highlighted that users' attitudes towards STVs have a direct impact on destination image and travel intention, while users' emotional resonance (self-reference, sense of presence) and cognitive resonance (perceived esthetics, credibility, and entertainment) jointly determine users' attitudes towards STVs. With the application of stimulus-organism-response (SOR) theory as a basic framework, this study explains the influence mechanism of STVs. The possibility of cross-border promotion and destination image building in impoverished areas was explored using a scenario-based experiment.

Keywords: Short-form travel videos (STVs) · Destination marketing · Cross-border promotion · Emotional resonance · Cognitive resonance · SOR theory

1 Introduction

The outbreak of the COVID-19 pandemic led to severe damage to the international tourism industry, but it can also be a transformational opportunity [1, 2]. As tourists' travel behaviors change, destination marketing and management face new challenges. Some destination marketers are increasingly using digital marketing methods (e.g., short promotional videos on YouTube) to ensure that potential future visitors will remember

and visit the destination when tourism recovers in the future [3]. For example, on the Douyin (Chinese version of TikTok) platform, the number of users interested in travel has exceeded 270 million [4]. In particular, the total content of STVs has increased by 65%, and the consumption of STVs have increased by 117% compared to the period before the COVID-19 [4]. These studies and practices demonstrate the potential and importance of short-form travel videos (STVs) in destination marketing digital transformation strategies during the COVID-19 pandemic.

Considering the above, this study constructs a research mechanism based on SOR theory by using a scenario-based experiment related to Ganzi (甘孜) destination. This study aims to develop a research model that is applicable to STVs content, and to design a new survey and quality control method appropriate for STVs research. Furthermore, the purpose of this study is to explore the possibility of using STVs for cross-border promotion of rural tourism.

2 Literature Review and Hypothesis Development

2.1 STVs and Destination Marketing

The importance of STVs for destination marketing and tourism is increasing in the COVID-19 era. For example, Du et al. [5] verified the continued growing influence of the short-form video platform TikTok in shaping destination image and changing tourists' behavioral intentions through qualitative analysis methods (such as interviews). Although the role of STVs content in terms of entertainment, multi-sensory experiences, and re-experience memories has been highlighted [5], a quantitative research model has not been constructed. In addition, it has been found that influencers and celebrities [6] who produce tourism content on short video platforms stimulate users' travel interests and travel intentions. This provides evidence that short video marketing has an important impact on destination marketing. However, the impact of the unique attributes related to short video content has been overlooked.

Moreover, although these studies argue that STVs or vlogs have an important impact on destination marketing, the definition of the concept of STVs is not clear, it is not appropriate to define the concept of STVs only by dividing it from the duration of 15 s to 60 s [5]. Additionally, the framework and factors of the research model were not adjusted according to the characteristics of the STVs as visual stimuli. Therefore, the results may be affected by subjective cognitive and memory bias [7].

Among the few destination-specific studies, Cao et al. [8] emphasize that short videos are an effective tool for destination marketing and tourism marketing. In particular, the immersive experience of STVs content can positively impact destination brand attitude. However, the mechanism by which STVs affect destination image and tourists' travel intentions has not yet been developed. Cao et al. [8] used only one user-generated short video for the survey, which was not representative. Furthermore, the influence of the platform and the users' possible inherent attitudes toward the destination were also not fully controlled, which may have impacted the study results.

To clarify the impact of STVs on destination image and potential tourists' travel intentions, STVs can be defined in terms of the following three points based on the prior studies: (i) Cheng et al. [7] emphasized that natural, authentic, and unique elements of

destination-related content are the essential influence of STVs. Therefore, inclusion of tourism elements unique to the destination (such as scenery, ethnic culture, and food) is defined as the first point; (ii) Based on the different scenarios of destinations and SNS platforms, the expression of STVs in terms of content requires using post-editing for integration [5, 7, 8] (e.g., background music, special effects, etc.). Hence, multi-angle expressiveness (such as content presentation that incorporates background music and video post-editing) is defined as the second point; and (iii) The prior studies highlighted the importance of sociality [7, 8] and shorter duration [5] for the attraction of STVs. Therefore, applicable to the short video platform and within 1 min in duration are defined as the third point. Based on the above key characteristics of STVs, this study introduces a framework to illustrate how STVs content stimulates tourists' emotional resonance and cognitive resonance formation and how it influences destination image perception and travel decision-making processes.

2.2 SOR Model

The Stimulus-Organism-Response (S-O-R) model [9] originated in the field of environmental psychology and explains that when an individual is stimulated by the environmental stimuli (S), the individual's emotional states will be affected (O), and then affects the individual's response (R). Existing consumer behavior models, such as the technology acceptance model (TAM) and theory of planned behavior (TPB), have limitations in explaining the emotional side of consumers, while SOR theory, as a complement, is superior in users' emotion research [10]. Thus, it has been widely used in consumer marketing [11] and tourism research [12]. Recently, literature has explored the use of SOR theory to examine the impact of STVs on users' travel behaviors [10, 13]. However, mature research models and scales have not yet been developed for STVs content.

Therefore, the research model of this study is based on the SOR theory, with reference to four realms of an experience [14] and the theory of resonance in travel vlogs [7], and elaborates on the Organism and Response stages: (i) Organism. According to the characteristics of STVs, key factors related to emotional resonance and cognitive resonance are selected as the subjects of the Organism stage, and finally, the attitude towards STVs is formed to influence the Response. (ii) Response. In the context of tourism, the response stage was divided into two parts: destination image and tourism intention.

2.3 Emotional Resonance and Cognitive Resonance

Cheng et al. [7] emphasized that emotional resonance (such as inspiration) and cognitive resonance generated by users while viewing STVs can have an impact on their engagement behavior and travel intention. The research model and related factors were adjusted by considering the research context of STVs and the possible heuristic resonance [8, 15] from visual stimuli. According to Cheng et al. [7], emotional resonance is based on the factors that aroused by the audiences' feelings, passions and desires of the audience. When short video consumers watch STVs, self-reference and sense of presence are the main psychological feelings that may be evoked [8, 15]. These two feelings are very important for emotional resonance, because they allow the STVs consumers to escape

from reality for a short period of time and create emotional involvement [7]. Thus, self-reference and sense of presence were included in the emotional resonance dimension. Self-reference is defined as the recall and memories of one's past travel experiences inspired by the viewing experience of STVs. Sense of presence is defined as a psychological state in which the travel experience or destination in STVs is experienced in a sensory or non-sensory way as a sense of reality.

Meanwhile, Klimmt and Vorderer [16] emphasized that the user's memory and familiarity with scenes and spatial associations can have an impact on the sense of presence created by media products. Moreover, since factors related to inspiration in STVs (e.g., narrative structure) influence the sense of presence [8], and self-reference belonging to inspiration-related factors [15], this study hypothesizes that:

H1: Self-reference positively affects sense of presence.

Cognitive resonance was based on the object's attraction to audiences' values, beliefs, and understandings [7]. According to Cheng et al. [7], aesthetic fatigue may weaken the impact of cognitive resonance. Furthermore, Cheng et al. [7] also demonstrated the importance of source credibility. Considering the research context and user's perspective of STVs, this study argues that the value of STVs content is also reflected in entertainment experience [16, 17]. Therefore, aesthetic experience [14, 15], credibility, and entertainment experience were included in the cognitive resonance dimension of STVs. Moreover, perceived aesthetics is defined as users' aesthetic perceptions of the overall elements of STVs content, video credibility is defined as users' demonstrated trust in STVs content; and perceived entertainment is defined as perceptions of entertainment-related elements in STVs content.

According to the findings of prior studies, cognitive experiences related to entertainment and aesthetics are closely linked to immersion [14], and the effect of immersive video on perceived entertainment and credibility is mediated by the sense of presence [17]. Therefore, the sense of presence stimulated by STVs content may have an impact on perceived entertainment, video credibility, and perceived aesthetics. Meanwhile, the sense of presence may become a key mediator factor connecting emotional resonance and cognitive resonance. Based on the above, the following hypothesis is proposed:

H2: Sense of presence positively affects (a) perceived esthetics, (b) video credibility, and (c) perceived entertainment.

2.4   Attitude Towards STVs and Response

Attitude towards STVs is the final factor formed at the organism stage. According to SOR theory, it is the key factor that influences the subsequent user's response.

On the other hand, the effects of the three cognitive resonance factors (perceived esthetics, video credibility, and perceived entertainment) on users' attitudes have been examined in many prior studies. For example, users' attitudes towards videos on YouTube are influenced by the credibility of the video content [18], the perceived aesthetics of travel-related content has a direct impact on users' attitudes [15], and entertainment

content on the video platform has a significant impact on users' attitudes [19]. Therefore, the following hypothesis is proposed:

H3: Perceived esthetics affects attitude towards STVs.
H4: Video credibility affects attitude towards STVs.
H5: Perceived entertainment affects attitude towards STVs.

In the context of tourism, the response stage was divided into two parts: destination image and travel intention. In fact, destination image is defined as an individual's overall impression of a place [20]. Meanwhile, many studies have shown that destination image has an impact on users' travel intentions [e.g., 21]. In this study, destination image is defined as the overall perception of the relevant destination in STVs after viewing them.

According to prior studies, users' attitudes towards destination marketing campaigns or content can impact destination image and travel intention [22]. Therefore, as a potential destination marketing tool or content, STVs may impact the destination image and travel intention of potential tourists. Currently, the research related to the impact of STVs marketing on destination image and tourism intention is increasing [10, 13]. Additionally, the perceived risk associated with the COVID-19 pandemic has an in-creasing impact on users' travel intentions. Rather [23] verified that perceived risk during an epidemic may moderate users' travel intentions. Therefore, it can be hypothesized that:

H6: Attitude towards STVs positively affects the (a) destination image, (b) travel intention.
H7: Destination image positively affects the travel intention.
H8: Perceived risk of traveling during COVID-19 moderates (a) the relation between destination image and travel intention, (b) the relation between attitude towards STVs and travel intention.

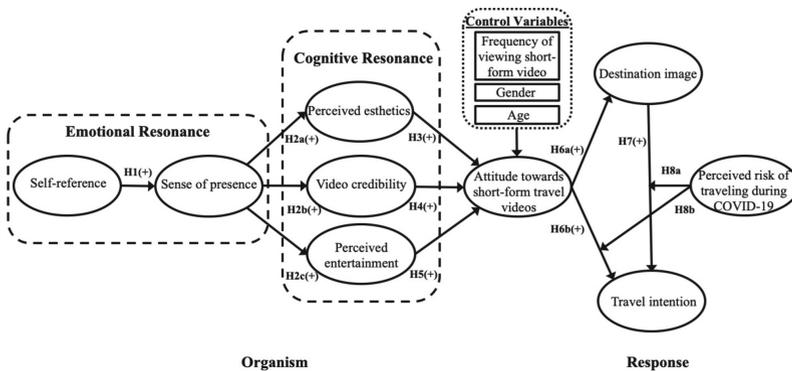Based on the above, Fig. 1 shows the hypothesis model of this study.

Fig. 1. Research model.

3   Methodology

3.1   Research Design

This study was conducted in Japan, and the survey respondents were Japanese people who had travel experience in the last three years (2019–2022) but had not been to the Ganzi destination. Moreover, the research design was divided into two main parts. The first is the selection of the destination and respondents. The destination was set as Ganzi Tibetan Autonomous Prefecture, located in Sichuan Province, China. This is because Ganzi as a destination is currently not well known to international tourists, providing good conditions for research design and exploration. Meanwhile, although Ganzi was once the lowest known and poorest region in China, during the COVID-19 pandemic, it was able to lift itself out of poverty by promoting the local tourism industry through STVs [24]. Therefore, using Ganzi as a destination is meaningful for solving the problem of cross-border tourism promotion in regions (especially rural areas) during the COVID-19 pandemic. The respondents of this study were Japanese because Japan is one of the world's top outbound tourist source nations [25]. Second, the selection of sample videos and research methods (e.g., quality control methods) was improved to exclude the influence of platform attributes, users' inherent perceptions.

3.2   Data Collection and Quality Control

In August 2022, two questionnaires were distributed with the help of the local research firm FREEASY in Japan. The first was a screening questionnaire to select the main questionnaire respondents. The second was the main questionnaire with a scenario-based experiment. In addition to the measurement items, respondents were provided with five sample STVs and a question related to the content of the videos. Considering that this study was a scenario-based online experiment, many quality control methods were used in the research design and survey implementation.

Stage 1 (screening questionnaire) was as follows. To accurately exclude non-target respondents, the respondents were not asked directly whether they had been to Ganzi, but several destinations were mixed in the options from which the respondents could choose. In addition, respondents were asked about the frequency of their use of short videos and their travel during COVID-19. As a result, 792 respondents were identified as suitable for the main questionnaire, from which 600 responses were collected.

Stage 2 (selection and processing of sample STVs) was as follows: (i) To balance the influence of the attributes of STVs authors, user-generated STVs and professional-generated STVs were selected according to the characteristics of the destination image, not based on the popularity of the short video platform. (ii) To avoid the influence of users' inherent perception of China, only 2 sample videos were slightly adjusted. Meanwhile, in order to ensure the viewing experience, and accurately test the impacts of original STVs contents without the interference of foreign language, some of the video content (location tag in Chinese) and back-ground music containing Chinese were post-edited, blurred, or converted into Japanese. (iii) To avoid the influence of platform attributes and video resolution, proprietary video links were used, and video resolution was controlled to be consistent when playing.

Stage 3 (the main questionnaire) was as follows: (i) Respondents must click on the links of the five sample STVs videos to watch all videos completely (the system will automatically monitor them). In addition, only the respondents who correctly answered the questions related to the sample STVs content could continue to fill out the questionnaire. (ii) Each ID account can be submitted only once. (iii) Reverse-worded (RW) items were used (e.g., the items of "video credibility" in the Table 1). (iv) The standard deviation of all responses must be greater than 0.5.

After the stage 2 and 3, 456 valid responses were obtained from 600 responses.

3.3 Measurement and Analysis

Measurement. Measurement items were developed from existing literature using a seven-point likert scale (1 = strongly disagree; 7 = strongly agree). The scales used in this study were those that have been validated in prior literature and modified specifically to fit the research context of STVs. Meanwhile, because the original questionnaire items were in English, all items (Japanese version) were confirmed by several professional scholars proficient in English and Japanese (including native speakers) to ensure the accuracy of the translation. Items measuring self-reference and perceived esthetics were adapted from Hsiao et al. [15], whereas items for sense of presence were derived from Cao et al. [8]. The measurement items for video credibility were adapted from Li [13]. The items for perceived entertainment were developed from Cheng et al. [7] and Chen et al. [19], while items for attitude towards the short-form travel videos were derived from Xiao et al. [18]. The measurement items for destination image and travel intention were adapted from Ong et al. [22]. Furthermore, items measuring the perceived risk of traveling during COVID-19 were adapted from rather [23].

Analysis. Descriptive analysis was performed using spss software. Subsequently, the measurement and structural models were examined using partial least squares structural equation modeling (PLS-SEM). PLS-SEM is appropriate for predictive studies and has the flexibility to handle complex models, small sample sizes, and non-normal data [26]. PLS-SEM was selected because of the predictive nature of this study and the complexity of the research model. Moreover, the measurement and structural models were evaluated via SmartPLS, using the pls algorithm and bootstrapping (5000 subsamples).

4 Results

4.1 Descriptive Statistics and Measurement Model

After 15 days of data collection, 456 valid responses were obtained from 600 Japanese people who had travel experience in the last three years (2019–2022) but had not been to Ganzi.

The respondents included 220 males and 236 females. 15.1% of the respondents are aged 15–19, 13.2% aged 20–29, 15.1% aged 30–39, 18.2% within the 40–49 age range, 19.3% who are aged 50–59, and 19.1% are aged 60–70.

The measurement model was evaluated in terms of internal consistency reliability, convergent validity, and discriminant validity of the constructs. As presented in Table 1, only one indicator loading was 0.670, but this was retained [27] for theoretical reasons. Except for this, all indicator loadings were between 0.748 and 0.932, which was greater than the threshold of 0.70 [26]. Cronbach's α and composite reliability (CR) exceeded 0.70, indicating sufficient construct reliability [26]. All values of average variance extracted (AVE) were between 0.634 and 0.817, surpassing the stipulated threshold of 0.50 [28], showing a satisfactory degree of convergent validity. Moreover, the square root of AVE for each construct was higher than the correlations between the constructs [28]. Based on the above, the measurement model successfully satisfied internal consistency reliability, convergent validity, and discriminant validity.

Table 1. Measurement model for constructs.

Construct and item	Mean	SD	Loading
Self-reference (SR) (Cronbach's α = 0.832, CR = 0.898, AVE = 0.746)			
When I watch these short videos,			
(1) I thought about similar travel events which my friends had experienced	4.020	1.390	0.862
(2) I thought about my past travel experiences	3.763	1.468	0.869
(3) I felt that I have similar travel experiences	3.603	1.482	0.861
Sense of Presence (SP) (Cronbach's α = 0.925, CR = 0.947, AVE = 0.817)			
(1) While I was watching these short videos, I felt that destination was right in front of me	4.827	1.311	0.882
(2) While I was watching these short videos, I couldn't help feeling that I was in destination	4.469	1.368	0.932
(3) While I was watching these short videos, I felt present in the scene	4.355	1.411	0.924
(4) When these short videos ended, I felt like I had travelled to destination	4.197	1.451	0.876
Perceived Esthetics (PES) (Cronbach's α = 0.898, CR = 0.929, AVE = 0.766)			
(1) I think that these short videos look esthetic	5.535	1.063	0.884
(2) I think that these short videos look pleasant	4.827	1.213	0.827
(3) I think that these short videos look fascinating	5.221	1.183	0.911
(4) I think that these short videos look clear	5.603	1.065	0.876
Video Credibility (VC) (Cronbach's α = 0.846, CR = 0.892, AVE = 0.675)			
(1) These short videos were credible	4.750	1.188	0.889

(*continued*)

Table 1. (*continued*)

Construct and item	Mean	SD	Loading
(2) These short videos were trustworthy	4.719	1.187	0.877
(3) These short videos are false (RW item)	5.215	1.138	0.761
(4) These short videos are fake videos (RW item)	5.191	1.163	0.748
Perceived Entertainment (PEN) (Cronbach's α = 0.910, CR = 0.937, AVE = 0.787)			
(1) I think that watching these short videos helped me to pass time	4.195	1.381	0.866
(2) I think that watching these short videos relaxed me	4.590	1.301	0.873
(3) I think that watching these short videos helped me to combat boredom	4.232	1.395	0.919
(4) I think that watching these short videos was entertaining	4.623	1.376	0.890
Attitude towards STVs (AT) (Cronbach's α = 0.854, CR = 0.896, AVE = 0.634)			
These short travel videos are			
(1) Not fun / Fun	4.708	1.354	0.831
(2) Dull / Exciting	4.774	1.403	0.903
(3) Not delightful / Delightful	5.215	1.300	0.800
(4) Not thrilling / Thrilling	4.318	1.395	0.670
(5) Not enjoyable / Enjoyable	4.842	1.298	0.758
Destination Image (DI) (Cronbach's α = 0.870, CR = 0.920, AVE = 0.793)			
The destination in these videos is			
(1) Favorable / Unfavorable	5.265	1.171	0.886
(2) Positive / Negative	5.300	1.210	0.892
(3) Interesting / Boring	4.914	1.306	0.894
Perceived Risk of Traveling during COVID-19 (PR) (Cronbach's α = 0.855, CR = 0.911, AVE = 0.774)			
(1) In the current situation, I prefer to avoid traveling to foreign countries/destinations	4.776	1.671	0.841
(2) I feel more averse to traveling due to the risk from the COVID-19 pandemic	4.697	1.574	0.918
(3) In the current situation, I prefer to shorten the duration of my potential trips	4.371	1.532	0.879

Table 1. (*continued*)

Construct and item	Mean	SD	Loading
Travel Intention (TI) (Cronbach's α = 0.881, CR = 0.926, AVE = 0.807)			
(1) I am very likely to visit the destination recommended in these short videos in the future	3.432	1.436	0.878
(2) I definitely will visit the destination recommended in these short videos in the near future	3.868	1.556	0.920
(3) I plan to visit the destination recommended in these short videos	-	-	-
(4) These short videos make me want to travel to the destination	4.300	1.472	0.896

4.2   Structural Model and Hypothesis Testing

The structural model was evaluated using a series of statistical indices based on PLS estimation. The standardized root mean residual (SRMR) was 0.070, lower than the stipulated criterion of 0.08, indicating a good model fit [29]. The inner and outer values of the variance inflation factor (VIF) were between 1 and 4.309, which was less than 5, indicating no multicollinearity [26]. The effect sizes (f^2) of most paths exceeded 0.15, indicating medium-to-large effects [30]. The proposed research model manifested relatively moderate explanatory power (SP = 0.441, PES = 0.293, VC = 0.149, PEN = 0.371, AT = 0.596, DI = 0.633, and TI = 0.312) [30]. Moreover, the results of the blindfolding test showed that, all values of Stone-Gaisser's Q^2 for endogenous constructs exceeded the minimum requirement of zero (0.456–0.675), implying good predictive relevance [30]. The results of the hypothesis testing are presented in Table 2. Eleven of the 12 hypothesis paths were confirmed to be significant and supported. The mediating effects of five factors (SP, PES, PEN, AT, and DI) were significant and supported. In addition, the effects of the three control variables (frequency of viewing short videos, gender, and age) on AT were not significant and unsupported.

Table 2. Results of hypothesis testing.

Hypothesis	Path	β	t Value	f^2	Result
H1	SR —> SP	0.664	21.377[***]	0.790	Supported
H2a	SP —>PES	0.541	13.714[***]	0.415	Supported
H2b	SP —> VC	0.385	7.728[***]	0.174	Supported
H2c	SP —> PEN	0.609	15.471[***]	0.589	Supported
H3	PES —> AT	0.353	8.197[***]	0.142	Supported

(continued)

Table 2. (*continued*)

Hypothesis	Path	β	t Value	f^2	Result
H4	VC —> AT	0.094	2.481[*]	0.013	Supported
H5	PEN —> AT	0.439	11.120[***]	0.274	Supported
H6a	AT —> DI	0.796	40.598[***]	1.726	Supported
H6b	AT —> TI	0.396	5.718[***]	0.083	Supported
H7	DI —> TI	0.160	2.161[*]	0.013	Supported
H8a	DI * PR —>TI	-0.163	2.336[*]	0.017	Supported
H8b	AT * PR —>TI	0.122	1.862[ns]	0.010	Unsupported

Note. $*p < 0.05$, $**p < 0.01$, $***p < 0.001$. β = Standardized regression weight. f^2 = Effect sizes. SR = Self-reference, SP = Sense of presence; PES = Perceived esthetics, VC = Video credibility, PEN = Perceived entertainment, AT = Attitude towards short-form travel videos; DI = Destination image, TI = Travel intention, PR = Perceived risk of traveling during COVID-19

5 Discussion

The findings attempted to demonstrate that the influence mechanism (organism and response) of STVs content (stimulus) on users' travel-related behavioral intentions can be divided into three main phases.

Emotional resonance is the first phase of an organism that embodies the process of evoking emotional resonance of the user in a short period of time. Meanwhile, it is also the most important phase that motivates users to continue watching STVs content and determines whether users can continue to evoke cognitive resonance and travel behavioral intention. This is consistent with the fast-paced, fragmented nature of short videos. Users complete the initial reception of STVs content in this phase. In addition, SR is the key factor in stimulating users' emotional resonance and immersion experience, while SP is the key mediating factor in connecting emotional resonance and cognitive resonance. Cognitive resonance is the second phase in an organism. PES, VC, and PEN jointly build the cognitive resonance framework and work together to influence AT. PES and PEN have a mediating effect, and in this stage, users complete the deep reception and reprocessing of STVs content. In the third phase (response), AT is the final output factor that affects the users' travel intentions and destination image. Meanwhile, although PR has a moderating effect on the path from DI to TI, it does not have a direct impact on the path of AT to TI. This finding reconfirmed the potential effectiveness of STVs marketing during the COVID-19 pandemic [5].

6   Conclusions

6.1   Theoretical and Practical Implications

Theoretical Implications. Based on the prior studies, to exclude the interference factors that may affect the results, this study attempted to refine the research design and methods for STVs by determining the selection criteria of sample videos, conducting a scenario-based online experiment, and developing possible quality control methods. Furthermore, this study attempts to provide a convenient and reliable research method for researchers engaged in STVs and SNS content, and also contributes a fundamental theoretical framework with feasibility for future research related to short video content.

Practical Implications. These findings highlight the potential of STVs as important tools for destination marketing and cross-border tourism promotion during the COVID-19 pandemic. First, according to the findings, to engage users in the first moment of viewing STVs content, it is important to inject more emotional resonance into STVs content to quickly create a connection with users. For example, destination marketers can produce more STVs from a first-person perspective or actively use user-generated STVs for a real travel experience. Through this type of content production, users' travel-related memories can be better inspired, thereby enhancing the impact of sr. In addition, video content can be processed through technical means, such as post-editing and video effects, allowing users to gain a stronger sense of immersion and enhance the impact of SP. Meanwhile, destination marketers must focus on improving the aesthetics, entertainment, and credibility of STVs content when producing STVs. These factors related to cognitive resonance can lead to the formation of positive attitudes towards STVs content, thus creating a good destination image and inspiring users' travel intentions. The above findings provide useful references for regions and countries that use STVs to design and implement cross-border tourism promotion. Secondly, taking ganzi as an example, this study attempted to demonstrate the possibility of STVs for international promotion and destination image building in impoverished regions.

6.2   Limitations and Future Studies

This study has some limitations because the research model and survey methods related to STVs are still in the basic stage, and the reusability of the methodologies needs to be further explored or improved in the future.

For future research, it is necessary to make a larger experiment with different control groups (e.g., different destinations and respondents from various countries), because this study was conducted with only 1 sample group of 5 STVs due to objective conditions. Also, in order to determine if STVs are indeed significant in terms of impact, the impact of STVs needs to be compared to the other media (e.g., images or text) based on the confirmation of baseline or ground truth. Meanwhile, as the practice and theory related to STVs are still in the development stage, more relevant influencing factors, such as video quality, narrative transportation, and perceived interactivity, may need to be identified to extend the research model and theoretical framework. Especially, with the easing of COVID-19 restrictions, the impact of STVs should be further explored through offline surveys.

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Can TikTok Sound Enhance Tourism SMEs' Engagement?

Risqo Wahid[(✉)] [iD], Heikki Karjaluoto [iD], Dandison Ukpabi [iD],
and Kimmo Taiminen [iD]

School of Business and Economics, University of Jyväskylä, Jyväskylä, Finland
`risqo.m.wahid@jyu.fi`

Abstract. This study explores the role of sound and its interaction with marketer-generated content (MGC) (i.e., emotional, informational, transactional) in influencing customer engagement (CE) (i.e., views and shares) in the context of tourism SMEs and TikTok. Content analysis was conducted to analyze data from 7 travel guide services in Indonesia. The final dataset comprised 660 TikTok videos, 4,092,289 views, and 10,920 shares. The results confirm that cover sound has no direct effect either on views or shares. Also, cover sound has no interaction effects with any MGC in impacting CE (i.e., views and shares). Individually, the MGC of emotional content has significant and positive effects on views, while informational and transactional posts have no significant effects on views. Further, transactional social media posts have significant and positive effects on shares, while informational and emotional posts have no significant effects on shares. Theoretically, this study expands content marketing and tourism CE literature by investigating factors driving CE in the context of tourism SMEs and TikTok. Practically, findings from this research can assist tourism SMEs in optimizing their content marketing strategies on TikTok.

Keywords: Tourism SMEs · TikTok · Content marketing · Customer engagement · Social media

1 Introduction

Customer engagement (CE) can bring ample benefits to tourism firms (see a systematic review of So et al. [1]). Among others, CE can improve value creation, customer trust, brand loyalty, and relationship quality [1, 2]. In the social media domain, the enhancement of CE depends on the quality of social media content shared by tourism firms [2]. This suggests that knowledge of content marketing is imperative. Content marketing assists firms in formulating and distributing content that can satisfy their customers, which eventually leads to an increase in CE on social media [3]. One of the constructs that can influence CE on social media is nonverbal information. In interactive technology, nonverbal information may include pictures, videos, and sounds [4].

Content marketing scholars have examined how nonverbal information can impact CE [3, 5]. Despite the attempts, some limitations are still present. To begin with, the focus

was merely on photos and videos. Research has neglected the audio aspect (e.g., sound) of nonverbal information. In fact, in marketing in general, studies about how sound and music on social media play a role in shaping consumer behaviour remain unavailable. Knowledge about this matter is still waiting to be discovered. Given such a situation and the ubiquity of sound-based social media (e.g., TikTok), there is a need to explore the role of sound in content marketing. Another literature gap worth investigating is the fact that the object of content marketing research was never explicitly tourism small and medium enterprises (SMEs). Compared to their larger enterprises counterpart, tourism SMEs have a limited understanding of deploying social media as a marketing tool [6]. This situation highlights the necessity to study content marketing strategies and CE on social media in the context of tourism SMEs to enhance theory and practice. In addition, content marketing literature only concentrated either on Facebook or Instagram (see e.g., [3, 5]). To the best of our knowledge, content marketing studies involving TikTok remain absent. Because CE differs across social media platforms [7] and TikTok's global monthly active users have been growing exponentially in recent years (i.e., from 689 million in 2020 to more than 1 billion in 2021 [8]), content marketing scholars need to scrutinize TikTok.

Based on the literature lacunae above, this study aims to explore the role of sound in influencing CE (i.e., views and shares) in the context of TikTok and tourism SMEs. Theoretically, this study enriches tourism CE and content marketing literature. Practically, insights from this research can help tourism SMEs strengthen their content marketing strategies on TikTok.

2 Literature Review

2.1 Sound

In this explorative study on TikTok, we define sound as all the audio formats present on marketer-generated content (MGC; e.g., monologues, music, songs, movie dialogues, and other formats). Based on its sources, we categorize sound into two: cover and original. Cover sound originates from other sources (e.g., Justin Bieber songs and sounds that other TikTok users create), while original sound is created by firms themselves.

Extant social media and content marketing scholars drew on media richness theory [9] when studying the effects of nonverbal information on CE. The theory contends that rich media formats can enhance understanding and stimulate senses. Communication media containing various elements (e.g., videos) are rich, whereas those with fewer attributes (e.g., photos) are low in richness [3]. In this study, we classify cover sound as high richness media because the sound consists of sound effects, music with various tones, or noises. Meanwhile, we consider original sound as low richness media because it usually involves simple sound, such as people speaking.

Findings on the topic of nonverbal information from the lens of media richness theory remain inconclusive. For instance, while rich media (i.e., videos) are significantly positive for likes, they are insignificant for comments [10, 11]. Also, while Moran et al. [5] discovered that all rich media formats positively influence CE, Cvijikj and Michahelles [12] found varying effects. Considering such contrasting evidence, there is no guarantee that cover sound can enhance CE albeit the use of it is pervasive on TikTok.

2.2 Marketer-Generated Content

As mentioned above, sound materializes along with MGC on TikTok. Thus, it is important to analyze the interaction between sound and MGC in impacting CE. MGC in this research corresponds to firms' messages created and distributed through social media [13], which we divide into three categories: emotional, informational, and transactional. Emotional content relates to affect-laden MGC aimed to elicit sensory and emotional reactions [3]. Informational content is those social media posts conveying information (either related or unrelated to firms' products and services) in a non-promotional fashion. Transactional social media content involves those messages containing giveaways, promotions, donations, sales, and other monetary benefits [7].

2.3 Customer Engagement

CE refers to "a consumer's positively valenced brand-related cognitive, emotional and behavioral activity during or related to focal consumer/brand interactions" [14]. In this study, the spotlight is the behavioural facet of CE consisting of views and shares. TikTok is still in secrecy about how its algorithm delivers content to its users [15], and thus how the counts of views can be increased remains questionable. Due to this reason, it is substantial to inspect factors driving views on TikTok. Additionally, we concentrate on shares because the more people share content, the more the content reaches current and potential customers, making marketing efforts more efficient [16].

3 Methods

Following extant relevant studies [3, 5, 7], we conducted content analysis on Tik-Tok. We collected data from all the posted content of seven travel guide services for a highly visited mountain in Indonesia, Mount Bromo. The services are Bromo Project (@bromoproject.id), Yuk Bromo (@yukbromo), Hai Bromo (@haibromo), Bromo Creative.com (@bromocreative.com), Tripjawaindah.com (@bromopedia), Bromo Hore (@bromo_horee), and Bromo Full Senyum (@bromo250k). We used these services as our sample because they are highly active on TikTok. Two research assistants coded the data, and they must adhere to the coding instructions we have created. Particularly for the three MGC constructs, we only considered the texts written on the TikTok videos. This decision manifested as a result of our observation prior to the data collection. We noticed that all the travel guide services shared entertaining videos on their accounts. Therefore, if we code the types of videos, our study will yield less meaningful results (i.e., we only compare the informational and transactional posts). We then further observed the videos and found that the services mostly delivered written messages on their videos. Because the texts are in the forms of emotional, informational, and transactional, we captured these types of texts as MGC. Besides MGC and sound, we also recorded branded hashtags (no branded hashtag as the baseline) and days of posting (weekend as the baseline) as our control variables. Also, while all other constructs are mutually exclusive, MGC is non-mutually exclusive. This means that one TikTok video can contain one or more MGC types (e.g., a TikTok video can be emotional and transactional simultaneously).

After removing outliers (i.e., extreme high views and shares), our final dataset comprised 660 TikTok posts, 4,092,289 views, and 10,920 shares. These data were then analyzed using negative binomial regression (NBR). According to research [17], NBR is more efficient and appropriate than other regression methods when (1) the dependent variables are count data with positive-only integers (e.g., views and shares); and (2) the Poisson assumption of equidispersion is violated (i.e., the variance values of the dependent variables are large). Our data fit these criteria.

4 Results

Our models explaining views (LR $\chi 2$ (9, N = 660) = 32.418, p < 0.01) and shares (LR $\chi 2$ (9, N = 660) = 20.508, p < 0.05) are significant as a whole. The results show that cover sound has no direct effect either on views (0.143, p > 0.05) and shares (0.324, p > 0.05). Additionally, we discover that cover sound has no interaction effects with any MGC in affecting views (emotional: −0.244, p > 0.05; informational: −0.234, p > 0.05; transactional: −0.164, p > 0.05) and shares (emotional: −0.207, p > 0.05; informational: −0.1, p > 0.05; transactional: −0.888, p > 0.05). Individually, emotional content has significant and positive effects on views (0.44, p < 0.05), while informational (0.317, p > 0.05) and transactional (0.527, p > 0.05) posts have no significant effects on views. Also, transactional social media posts have significant and positive effects on shares (0.898, p < 0.05), while informational (−0.18, p > 0.05) and emotional (0.203, p > 0.05) posts have no significant effects on shares.

5 Implications

Our explorative paper contributes to tourism and content marketing literature in three ways. First, we explore the role of sound in driving CE. We demonstrate that although cover sound is ubiquitous on TikTok, it has no direct and interaction effects on CE. This endeavour expands content marketing literature as existing studies only concentrated on the visual aspects of nonverbal information (e.g., photos and videos). Second, while extant tourism CE studies merely examined government-controlled or large tourism firms, we explicitly and particularly analyzed factors influencing CE in the context of tourism SMEs. Third, we enrich content marketing literature by discussing TikTok. This is substantial, considering social media is highly contextual [3], and prior studies [5, 7] primarily scrutinized Instagram or Facebook. Practically, our findings can guide tourism SMEs in optimising their content marketing strategies on TikTok. We suggest tourism SMEs to focus less on sound but more on MGC types. To increase views, tourism SMEs need to share more emotional content; and to improve shares, they need to distribute more transactional posts.

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Visual Social Media Communication of Italian Luxury Hotels and the Pandemic: An AI-Assisted Content Analysis

Katarzyna Minor[1]([⊠]) [iD], Jelena Mušanović[2] [iD], Jelena Dorčić[2] [iD], and Miha Bratec[3] [iD]

[1] Tourism, Hospitality and Event Department, Cardiff Metropolitan University, Cardiff, Wales, UK
kminor@cardiffmet.ac.uk

[2] Faculty of Tourism and Hospitality Management, University of Rijeka, Opatija, Croatia
{jelenak,jdorcic}@fthm.hr

[3] Faculty of Tourism Studies—Turistica, University of Primorska, Portorož, Slovenia
miha.bratec@fts.upr.si

Abstract. This study analyses the visual social media communication of Italian 5-star hotel brands to investigate whether it has changed over the course of COVID-19. An AI-based image content analysis approach was used to extract the most frequently ascribed labels from 2,439 collected photos of three consecutive year samples. The results of the performed content analysis show that the visual communication of the hotel brand is mainly focused on interior design and the natural environment, with the pandemic stimulating the use of the latter. The study contributes the literature by reinforcing the importance of relative consistency in luxury brand communication even in turbulent times.

Keywords: Visual communication · Photo content analysis · Social media · COVID-19

1 Introduction and Background

Social media (SM) has become an important communication channel for the tourism and hospitality industry and a source of managing brand awareness and equity [1, 2]. Hotel brands in particular use SM to personally engage with customers in two-way communication, advertise, improve service, research and disseminate their information [3] as a way to influence customers' purchasing decisions [4]. Extant studies show that luxury perceived by luxury hotel customers can be increased by hedonic rather than utilitarian or functional messages [5] and the customers are more interested in interior elements (e.g. rooms) of the hotel than the exterior (e.g. building, view, etc.) [6].

During COVID-19, hotel brands were forced to use SM wisely to communicate effectively with customers about unexpected crises [7]. Recently, several studies have examined crisis communication amidst the COVID-19 pandemic in the tourism and hospitality industry (e.g. [8, 9]). Most of these studies focused on text posts initiated by hotel brands to identify topics and effective communication strategies. Although hotel

brands mostly post photos and videos across SM [10] and such visual data can provide valuable insights into the tourism experience, current tourism research is still predominantly textocentric [11]. The limited number of photocentric studies mostly focused on destination images (e.g. [12]), use qualitative approaches and analyse photographs using content analysis, semiotic analysis or other visual methods [13]. Wang et al. [14] identified critical issues related to photo analysis methods in tourism and suggested that future studies should use machine learning and employ artificial intelligence (AI) to classify large amounts of visual data by minimising human inspection. Recently tourism studies started using machine learning and AI to analyse online photo data, but most of these studies conducted metadata analysis or textual data embedded in photos (e.g. title, description, hashtags) [15]; or focused on Instagram photos produced by tourists [16–18]. Yet, hotels are still predominantly using Facebook to engage with customers; to the best of the authors' knowledge, this study is the first attempt to apply AI tool and examine the content of photos posted by hotel brands during the pandemic.

To help to fill the methodological and content shortages in hotel photo analysis [19], this study follows the above-stated recommendations by Wang et al. [14] and seeks to apply AI in order to explore the photo-based communication of Italian 5-star hotels during the times of COVID-19 pandemic. Giglio et al. [6] state that luxury hotel brands should focus on interior elements to convey the class, refinement and overall sophistication of their interiors for the most efficient marketing of luxury. Further, Amatoulli et al. [20], suggest that luxury hotels are reluctant to include sustainability in their marketing communications; with communication about adapted services and health-related protocols certainly falling within the social sustainability and responsibility agenda. Thus, in this study, we seek to find out how COVID-19 affects the visual communication of Italian luxury hotels on Facebook (FB). Contrary to recent COVID-19 studies highlighting the changing nature of the communication and marketing strategies in tourism [21], communication consistency is the main factor found in hotel marketing to have a strong positive impact on all brand equity dimensions, especially on brand trust, brand image and perceived quality [21]. Thus, it is prudent to observe, whether luxury hotel brands reacted drastically, or focused on consistency in their visual communications during the pandemic when trying to convey the excellence, exclusivity and safety of their offering.

2 Methodology

Given that there are 601 five-star hotels in Italy and several steps of data collection were done manually, it was necessary to narrow down the sample. TripAdvisor has a standard sorting algorithm that ranks holiday accommodation listings based on travellers' overall rating of the property, the number of times the listing was viewed, etc. For this purpose, the hotel brands that appear on the first 10 pages of Italy's Tripadvisor listing (114 out of 601 brands or 19% in total) were considered and their official FB profiles were searched, reducing the sample to 64 distinctive hotel brands (56% in total). Further criteria used included the frequency of their communication (min. 3 times a month) and language of their communication (English), further reducing the final sample to 17 Italian 5-star hotel brands, i.e. 27% of the total sample.

The photo collection was conducted using Facepager and covers the period before and during the pandemic COVID-19 (1st January 2019 – 18th November 2021). The

sample size differs in all three years observed, with a total of 811 photos collected in 2019, 674 in 2020, and 954 in 2021. The researchers deployed image content analysis software, Google Vision AI, which extracted AI ascribed labels from the photos. This pre-trained software labels the characteristics of a photo within millions of predefined categories. For pragmatic reasons, the number of collected results was limited to the first 10 labels assigned per photo.

To enable further exploration of visual communication over the course of COVID-19, a content analysis was performed with the use of NVivo software, focusing on the frequency of occurrences of the collected phrases. A total of 1001 individual labels were identified as used to ascribe the photos. The findings that follow are limited to the presentation of the 30 most frequently occurring labels for each year.

3   Findings and Discussion

The analysed data shows that the selected Italian luxury hotel brands in all three samples (i.e., 2019, 2020, 2021) generally focus on the following themes: elements of the natural environment (i.e. plants, sky, wood, water), interior design (i.e. furniture, lighting, art), the exterior (i.e. building, property, architecture) and upscale cuisine (i.e. food, cuisine, drinkware, ingredients).
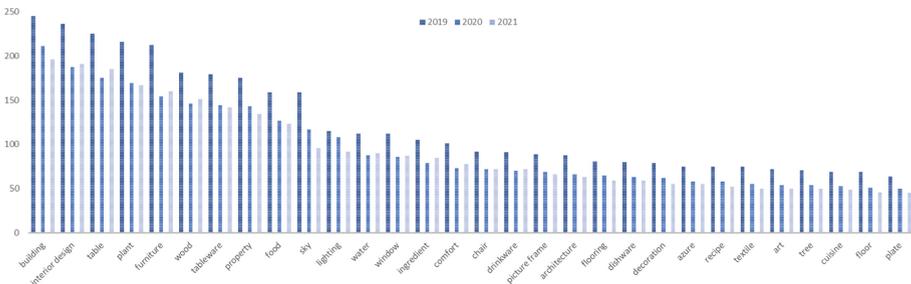

Fig. 1. Study results, top 30 AI-generated labels of Italian luxury hotel photos

A deeper analysis shows that hotel brands visually communicate most about interior across all samples (2019 = 42%, 2020 = 36% and 2021 = 40% of the 30 selected labels). With the outbreak of the pandemic, hotel brands placed more emphasis on the elements of natural themes (2019 = 22%, 2020 = 29% and 2021 = 27% of the 30 selected labels). Upscale cuisine was the second most important theme in 2019 (22%), while the same theme was communicated third most often in the years after (2020 = 22% and 19% of the 30 selected labels). The exterior theme was communicated the least in all samples (approx. 14% of the selected labels). Noticeably, labels related to health and safety measures and COVID-19 did not occur. The diversity of labels varied from year to year. In 2019, the average number of labels was 123.4 (SD = 57.43), in 2020 96.2 (SD = 46.95) and in 2021 94 (SD = 47.85).

The results thus suggest that hotel brands changed their visual communication during the pandemic, but this change seems to be very subtle enforcing the claim Šerić and

Mikulić's [21] about the importance of communication consistency for luxury hotel brands. The most notable change concerns the type of visual content used. The focus shifted from the interior design suggested by Giglio et al. [6] to more nature-based content, keeping in mind interior public spaces were considered a greater risk for the spread of the virus. This explanation could be further enhanced by a belief that this type of content would resonate well with a clientele that was restricted to their homes for most of the 2020 spring due to the lockdowns. In the pandemic context, the open-air spaces and natural themes in the luxury hotel brands' FB posts could better reflect the hedonic aspect of luxury hotels alluded to by Deb and Lomo David [5]. This emphasis on hedonic brand communication also explains the complete absence of health and hygiene-related visual themes so common during this pandemic. Yet, further, more in-depth research is needed to confirm this assumption and the reasoning behind it.

Finally, the variety of labels of images shown requires further investigation. Therefore, the authors will in the future, among others, investigate whether there is a positive correlation between FB likes and the increase in specific attributed content.

4   Conclusion

The study used an AI-based methodological approach to observe the changes in luxury hotel brand communication selecting Italy, as one of the first and most pandemic-hit countries. The results indicate the changes in visual content communication that are even subtler than anticipated; visual communication shifts towards attributing the natural themes within the hedonic framing of luxury, that hotel managers and academics might have earlier not been aware of. Therefore, this initial research suggests luxury and hedonism remain the most important elements of luxury hotel brand communication despite times of crisis. To explore this correlation the researchers will focus on the full dataset collected and will compare different hotel categories regarding their application of visual communication. Any future research will aim to utilise mixed methodologies, with a focus on multiple SM outlets and diverse marketing perspectives of various stakeholders to further expand on and overcome any limitations of this scoping study.

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What Makes People So Fond of Food Travel Vlogs? A Preliminary Study

Wenliang (Max) Li[✉] , Yoo Ri Kim , and Caroline Scarles

Centre for Digital Transformation in the Visitor Economy, School of Hospitality and Tourism Management, University of Surrey, Guildford, Surrey, UK
{wenliang.li,yoori.kim,c.scarles}@surrey.ac.uk

Abstract. The large consumption of food travel vlogs during the COVID-19 pandemic shows its potential for destination promotion. However, little research has been done on this video form. This study explores the difference in food travel vlogs, short videos, live videos, and DMO promotion videos (DPVs) and concludes four distinctive characteristics of food travel vlogs (storytelling, authenticity, intimacy, and presence) through 38 semi-structured interviews. A Stimulus-Organism-Response (SOR) model-based conceptual framework is proposed to help understand the mechanism underlying the influence of food travel vlogs on travellers. This study hopes to provide theoretical and practical implications for destination management and vlogging practices.

Keywords: Food travel vlog · Storytelling · Authenticity · Intimacy · Presence · Stimulus-Organism-Response model

1 Introduction

Gastronomy advertising has become a recent trend in destination marketing [4]. With the recovery of the travel industry, local food is being increasingly considered a destination's crucial competitive advantage; more DMOs tend to launch digital marketing campaigns like video promotions to advertise local food to entice travellers [4]. Traditionally, travellers have been influenced by DPVs while nowadays they are more easily affected by UGC travel videos thanks to the prevalence of social media. Especially during the COVID-19 pandemic, the consumption of UGC food travel videos has grown significantly [6]. Therefore, UGC food travel videos could be an alternative way to boost food tourism.

Food travel vlogs stand out for their popularity among mainstream UGC food travel video forms [2]. The top street food vlog channels on YouTube gained millions of followers and billions of views in 2020, showing great marketing potential [2]. Local DMOs should pay attention to this video form and leverage it for food tourism promotion [2]. So far, there is still a scarcity of studies on food travel vlogs and there is little knowledge about this emerging video form and its underlying mechanism of influencing traveller behaviours [9]. To address this gap, this paper explores the difference in travellers' perceptions toward vlogs, other mainstream UGC video forms (short videos and live videos)

and DPVs. The aim is to explore the distinctive characteristics of food travel vlogs which are attractive to travellers so as to explore the mechanism underlying the influence of food travel vlogs on travellers.

2   Literature Review

Travel vlog (video blog) refers to a casual, conversational video form featuring "a travel vlogger converses with an audience in front of the camera and narrates their experiences while showing viewers what they are engaging in, eating, feeling or hearing at a destination" [8, p. 605]. Currently, food travel is one of the hottest topics in travel vlogs. However, it has received little academic attention [9]. Yousaf [9] was identified as a pioneering attempt in this field. Drawing on the SOR model, he examined the vlogger-viewer relationship and confirmed the applicability of the SOR model to explore the food travel vlog phenomenon. The SOR model suggests that a stimulus induces an individual's cognitive and emotional state, which in turn leads to behavioural responses [5]. Li et al. [5] highlighted the SOR model's powerful flexibility and its suitability for exploratory studies. Since the key stimulus factors of food travel vlogs and viewers' psychological processes associated with food travel vlogs remain a mystery, the SOR model can still be applied to bridge this gap. In addition, despite emotions are seen as critical drivers of social media users' behaviours, little effort has been made to explore their role in the context of food travel vlog. As an emotion-oriented model, the SOR model can also be used to address this gap [5]. Taken together, this paper exploits the SOR model to explore the mechanism of food travel vlogs in influencing traveller behaviours.

3   Methodology

The researchers conducted an exploratory qualitative study using semi-structured interviews. Between May and August 2022, 38 interviews including 17 interviews with worldwide famous food travel vloggers and 21 interviews with the general audience who like watching food travel vlogs were carried out. Evidence shows that 9–17 is the ideal sample size for interviews to reach saturation, this study fully met this standard [3]. The gender ratio was nearly equal in each group. To hear from a wide perspective, this study adopted maximum variation (purposive) sampling. Vloggers with subscribers ranged from 100 to 2.35 million across all influencer levels were interviewed. As for the general audience who attended interviews, their age ranged between 20 and 72 years, and they came from diverse ethnic and education backgrounds. Guided by the SOR model, the key questions asked were: Q1. How do you see the difference in food travel vlogs, other UGC video forms (i.e., short videos and live videos), and DPVs? Q2. What emotions do you expect viewers to have when watching your vlogs/How would you describe your emotions when watching food travel vlogs? Q3. How did food travel vlogs influence viewers/you after watching (e.g., any behavioural intentions triggered)? NVivo 12 was used for thematic analysis after data collection.

4 Findings and Discussions

In general, most participants did not have a rich experience of watching live videos; they therefore talked more about the difference in the other three video forms. In a way, it may reflect that food travel live videos have not yet become that popular on social media right now and that food travellers are more influenced by short videos and vlogs. Though, all interviewees stated that they prefer food travel vlogs compared to other video forms. Overall, for food travel short videos, live videos, and DPVs, sensory stimulation, interaction, and advertising were identified as their most distinguishing features. As for food travel vlogs, their four competitive advantages are described below.

1. Storytelling. According to the participants, short videos (mostly less than 30 s) are "snippets" of life experiences with limited details, where most short videos only present what vloggers are eating and emphasise the attractiveness of food, without sharing their thoughts on food price, taste, and culture that participants care about more. Being consistent with a prior study [1], participants stressed that DPVs (usually within 1 min) are more like a commercial showcasing destination selling points and collage of beautiful visuals and also lacking in narrative. In contrast, vlogs are longer videos commonly 10 min long but make participants feel that they can fully tell stories and details of the food travel experience. Vlogs tend to always have a storyline and thus the audience can get rich information and insights and have a more intuitive and in-depth understanding of the destination food experience. In contrast, live videos are not as competitive as vlogs in terms of storytelling due to the longer duration of the video and viewers' short attention spans.

2. Authenticity. Under the context of travel video research, perceived authenticity can be understood as unedited, practical, and realistic information of tourism products [7]. Overall, participants reported that they perceive a lower level of authenticity from short videos and DPVs compared with vlogs and live videos due to two reasons. Firstly, participants believed that both video forms only showcase the positive or aesthetic side of the attractions to drive traffic. Secondly, due to the short duration, they tend to focus on the food and neglect the dining environment or full experience. In contrast, participants' experiences with live videos and vlogs are recognised as more authentic. Authenticity is a key feature of live videos as they are unpolished videos which allow broadcasters to engage and chat in real time with the audience. With respect to vlogs, they also have the strength in reflecting the genuineness of on-site experience. For example, they are shot by using common portable devices like smartphones and capture the raw and original scenery and experience. Additionally, vloggers' narrative tends to be believed as authentic as the vloggers are considered as individual travellers rather than marketers. Lastly, the longer video length enables vlogs to present the whole picture of food travel experience which can help the audience better understand what it would actually be like in reality.

3. Intimacy. The level of perceived intimacy varies by video forms. Different from short videos and DPVs where the videos tend to be created by professionals, the video creator tends to be more involved in live videos and vlogs. For live videos, there is a strong connection between streamers and viewers because of instant interactions. As for vlogs, a bond between vloggers and viewers tends to be created as viewers perceive intimacy with the vlogger. As reported by participants, if they like vloggers' identities,

personalities, opinions, and the ways they express themselves, they would have a feeling of closeness to vloggers and thus influencing their behavioural intention towards travel, for example. In the existing vlog literature, scholars have used the concept of parasocial interaction to describe such sense of intimacy [10].

4. Presence. Participants emphasised that they perceive a high level of presence from vlogs and a low level of presence from DPVs. From a videography standpoint, DPVs are normally third-person perspective videos whereas vlogs are largely recorded from a first-person perspective, which makes people feel like they are actually on a trip led by vloggers. From a narrative perspective, as narrative is rarely used, DPVs can show the audience what they can see at the site but cannot really show the audience what they can feel at the site. Besides, their narrative way is usually formal and commercial. Contrastingly, vloggers normally describe their in-the-moment feelings in detail and in a casual way like a friend thus is more approachable. In terms of content, DPVs are keen on showcasing destination resources at a macro level while vlogs show engaging micro stories which are close to life. For instance, stories with more interactions and connections between vloggers and local people and places. Participants also pointed out the weaknesses of creating the sense of presence in short and live videos. Short videos are good at providing sensory stimulation; however, it is hard to be fully immersed in a short time; poor internet connection is a constraint for live videos. Findings showed that a mega-vlogger strongly believed that vlogs could be the best way to make the audience feel immersed and feel like they are really there compared to other forms.

Guided by the SOR model, storytelling could be seen as the key stimulus factor of food travel vlogs (S). In the context of vlog, storytelling represents a holistic impact because vlogger's performance and videography (audio-visual elements) are also parts of storytelling as they are used to cooperate with narration [8]. Authenticity perception, intimacy perception, and presence could be seen as viewers' cognitive evaluations of storytelling cues, which could be used in the organism construct (O). The answers to Q2 revealed participants' emotions when watching food travel vlogs. In general, participants experience positive emotions whilst watching the video, and happiness/joy and excitement have been mentioned most. Thus, these emotions could be used as organism factors as well (O). Regarding behavioural outcomes (R), according to the answers to Q3, food travel vlogs could trigger viewers' travel desires. Participants said that if they are attracted by a food travel vlog, then they are likely to have a positive destination image and visit intention, adding the video to their favourite list and using it for future travel plans and sharing it with families and friends who are potential travelling companions. More importantly, food travel vlogs can induce actual travel. Evidence shows that some participants did travel to certain destinations inspired by food travel vlogs.

5   Conclusion

Food travel vlog is an emerging UGC travel video form about which we know little. As a preliminary study, this paper contributes to the extant literature in two ways. Firstly, it proposes that storytelling, authenticity, intimacy, and presence are the distinctive characteristics of food travel vlogs as well as the keys to understand why food travellers are so fond of vlogs rather than other mainstream UGC video forms and DPVs. So far,

the roles of these four factors especially storytelling in facilitating travel behaviours have been less examined in travel vlog research, which needs more attention. Secondly, this paper suggests a SOR-based conceptual framework which is hoped to explain the mechanism underlying the influence of food travel vlogs on travellers. This paper also provides practical implications: DMOs are recommended to incorporate food travel vlogs into marketing campaigns as this paper demonstrates the competitiveness of food travel vlogs. Strategies such as shooting own vlog style videos, forwarding outstanding vlogs on own platforms, and encouraging vlog creations could be considered. For vloggers, this paper helps them better understand the audience's needs, which is favourable for their vlogging practices.

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Smart and Sustainable Destination Experiences: A Content Analysis on Finnish Tourism Experts' Perspectives

Minni Haanpää[✉] and Päivi Hanni-Vaara

University of Lapland, Rovaniemi, Finland
{minni.haanpaa,paivi.hanni-vaara}@ulapland.fi

Abstract. This paper discusses how Finnish tourism experts such as tourism entrepreneurs, destination management organizations (DMOs), development project personnel, and third-party organizations explain and shape the smartness of tourism destinations in Finland. We especially explore how the experts view the nexus of smartness and the experiences of tourists. The method used in this research is qualitative inductive content analysis. The preliminary findings show that the destinations aim to provide sustainable experiences with a balance between physical and digital services. However, the conditions such as scant mobility services and sometimes harsh nature conditions set challenges to developing smart tourism experiences. Smartness is still seen as a way to improve different aspects of social, cultural, and ecological sustainability.

Keywords: Smart tourism · Tourism experience · Sustainable destination

1 Introduction

The aim of this paper is to discuss how smart destination development is understood and perceived in relation to tourist experiences by tourism experts in Finland. Before COVID-19, Finnish tourism exports were growing rapidly, which is largely explained by the increase in the number of foreign individual tourists. Finland's major tourism attractions for international travelers are remote destinations, nature, and nature-based experiences. These are oftentimes located in sparsely populated areas with variations from snowy to snowless seasons. Currently, digital solutions for individual foreign tourists are underdeveloped. For example, relevant information on travel modes, timetables, and services at the destinations is fragmented across several different websites, applications, and services. Therefore, accessing nature attractions and finding relevant services could be facilitated with novel digital solutions.

However, this development has implications for the experiences of tourists. In this paper, based on the interviews of Finnish tourism experts, we discuss the development of physical and digital environments in tourism destinations and how the experts view them affecting these experiences. As digital transformation globally reshapes the roles of different tourism actors from company-oriented to co-creative value-based business [1–3],

how do the experts see the possibilities in developing service concepts which acknowledge not only the traveler but value their information and collaborate with the traveler throughout their journey enriching the experience in the different touchpoints [4]? The concept of smart destinations and the experiences they create has been extensively studied in urban contexts. In this study we investigate smart destination development and its possibilities and consequences in peripheral, sparsely populated contexts which has been a less studied phenomenon. We thus ask: how can smartness enhance accessibility and service levels of rural, sparsely populated, peripheral travel destinations? Besides enriching the experiences of travelers, we are interested in how the experts see the possibility of smart solutions to promote sustainable choices for travelers as part of these experiences. For example, finding alternative modes of transport to a private car or travel chains connecting different modes of transport can be impossible in the current situation.

2   Theoretical Background

The theoretical framework of this study combines theories discussing smart tourism, smart destinations, and the blending of physical and digital experiences, as phygital experiences [5] in order to analyze the development of smart destination experiences in peripheral destinations.

Smartness is often reflected in technology, as an independent agent, having the capability, intelligence, and ability to connect with the help of devices like smartphones [5, 6]. However, it is crucial to also consider the elements besides technology enriching the total experience of the traveler. Thus, smart tourism can be categorized being a combination of technology and human [7]. We understand smart tourism in smart destinations as "improving tourism services and experiences through innovative digital solutions" [8] where the services are provided by multiple human and non-human agents, such as social robots informally called chatbots [2].

Thus, smart destinations are bridging the physical and digital experiences as a joint entirety and, forming an interplay between the systems of insights and systems of engagement [7, 9]. The systems of insights represent data; collecting, exploiting analysis, and harnessing the insights into practices [9]. Moreover, the systems of engagement refer to the technology-driven architectures that are interconnected with the travelers' touchpoints by personalizing and enriching them through augmenting, gamifying and targeting the experience [9]. Hence, travelers' experiences become phygital, being allocated in several places and spaces simultaneously, not only inside the smart destination. For example, standing physically in a tourism destination while simultaneously checking digitally work-related emails [5].

Accordingly, Debnath et al. [10] emphasize sensing as a relevant element when interacting and living with the traveler throughout each touchpoint of the tourism journey. The destination creates inclusiveness, well-being, and sustainability for the whole tourism society when it prioritizes the systems of insight and engagement in the center of the phygital service touchpoints [5, 9]. Gretzel et al. [6] describe that the functionalities like adapting, adjusting, and fitting the technology to the destination culture, characteristics, and environment create value for the whole tourism ecosystem. When the tourism society and ecosystem are involved in an ongoing process and controlling the information,

engaging and communicating with the travelers, it has better possibilities in healing and predicting forthcoming, and even preventing disruption [6, 9, 10].

In practice, mobile-supported, digitally enriched travelers' journeys utilize, for example, artificial intelligence (AI) and big data where geographical information of the destination is informed. For example, augmented reality (AR) offers possibilities in immersive multisensory digitally mediated stories and gamified services that enrich the travelers' experience throughout the touchpoints whether they occur pre-, onsite, or post-experience [4, 7, 11, 12]. AI is found to inspire and intensify the travelers' experience with the destination culture, like local heritage, traditions, and stories of the destination.

3   Methodology

The data of this study has been collected as a part of a research project focusing on the digitalization of tourism mobility and services. The data consists of 17 semi-structured interviews. Their duration ranges from half an hour to 1,5 h. The informants were chosen according to the project's focus: they actively contribute to destination development either on the national level or in one of the two pilot areas of the project. They were representatives of destination management organizations (DMOs), development project personnel, and third-party organizations that are supervising the interests of tourism experts, and tourism entrepreneurs. The interviews had three major themes: the informants were asked to explain their viewpoints on the future traveler and the operating environment of tourism. Moreover, they were asked to anticipate the near future development of the destinations (this being either Finland or the destination they operate in, depending on their position).

The method of analysis used is qualitative inductive content analysis. The analysis included interplay with theory, data, and the researcher's interpretation in observing the visible, and the latent contents of the data provided by the informants [13].

4   Preliminary Findings

"Well yes, it has been under construction for a long time, or we have discussed at least for 5 years, about the digitalization of accessibility and that place related information, and you could follow where your bus stop is and where it [the bus] is coming…" The preliminary findings show that the informants view smart destination development as the future for peripheral destinations. However, there are differences in how destinations and organizations perceive and implement smartness and sustainability elements in the smart destination context.

Experiencing smartness is connected to local conditions. For example, the annual cycle of weather conditions in Finnish Lapland imposes different challenges for digitalized services compared to a snowless season. As a result, it is important to ponder how and when travelers can safely use, for example, only their smartphones to navigate when hiking in nature. Namely, when the weather is snowy, and the temperature is about -20 degrees below zero, the battery of the smartphone gets down quickly. By compensating the services with a variety of physical and digital elements, like providing physical

maps alongside the use of smartphones, the destinations create practices that support sustainability and trust for the whole destination ecosystem.

"And maybe because our destinations are a bit uncharted, then that's the reason why the last confirmation is wanted from the reception anyway. To ask from the local person. And surely, the information is available better and more easily from the web and you can make bookings and other stuff there, be it mobile device or whatever. And you get the info of all the confirmations. But somehow still, the foreigner wants the personal confirmation." The local conditions also relate to the issue of trust. According to the interviewees, travelers oftentimes trust the information and knowledge provided by the locals after arriving at the destination. How can the experience of smartness inside the destination be created as an interplay between physical and digital elements? And again, are there ways to present local knowledge and create insights digitally – even pre-travel?

Generally, the preliminary findings show that the objectives of development are set in balance with the destinations' ecological, cultural and social traditions as well as physical conditions. Smartness is seen as a possible way to improve sustainability in destinations by the informants. It is seen that digitalized services, even tiny concepts, can steer the behavior of the traveler to understand and value local habits and the way of living. Moreover, digitalized and immersive services are seen as a resource as they are releasing entrepreneurs' hours from daily operations in the long run. Further, these resources are found to support the well-being of entrepreneurs.

Finally, the preliminary findings show that the systems of insights and systems of engagement [9] involve travelers, tourism destinations and tourism intermediaries. Namely, COVID-19 introduced travelers and tourism destinations to the fact that trust in gaining correct and updated information on travel-related elements creates well-being, especially in constantly changing situations. The data shows that intermediaries are taking back their seats in tourism supply and value chains as the correct information is crucial and creates social sustainability for the whole ecosystem.

5   Conclusion

Our study contributes to the discussions of designing smart tourism experiences. Theoretically, it highlights the need for situated theorization inside the smart tourism discussion: the prerequisites and conditions in sparsely populated areas differ greatly from their urban equivalents. Our empirical findings reveal how local conditions, be they natural, cultural, or social, affect the way of experiencing, and thus designing, smartness in destinations. Further, our empirical data brings insights into experiencing and designing smart tourism in sparsely populated areas. And finally, we provide insights into how tourism experts perceive the nexus of smartness and sustainability when developing and managing destination experiences. However, this study is not without limitations: as this study is qualitative and looks at one national context, more research is needed from other destination contexts in order to compare and generalize the results. The future studies could explore other country contexts but also ask directly from the travelers about their experiences on peripheral smartness.

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Where You Sleep Tells What You Care About

Estela Marine-Roig[(✉)], Natalia Daries, Eva Martin-Fuentes, and Berta Ferrer-Rosell

University of Lleida, Lleida, Spain

{estela.marine,natalia.daries,eva.martin,berta.ferrer}@udl.cat

Abstract. Online reviews are valuable sources of information that can help other tourists gain an idea of the destination they seek. The aim of this research is to examine what types of content is reviewed by hotel guests and Airbnb guests in two of the main urban tourist cities in Spain (Barcelona and Madrid) to distinguish content between the destination where the accommodation is located and to observe variations on users of these platforms when they write reviews. Comparing more than one million reviews posted on TripAdvisor and Airbnb through compositional data analysis (CoDa), results show that there are different patterns between Barcelona and Madrid and between their accommodation mode according to the reviews. This study can help researchers and managers know what useful information can be extracted from online travel reviews.

Keywords: Peer-to-peer accommodation · User-generated content · Online travel reviews · Compositional data analysis · Spain

1 Introduction

Online travel reviews represent a prolific source of valuable information about consumers' preferences [1]. Their needs, wants, and demands and can guide businesses' proactive responses to cater to those preferences, especially by supplying satisfactory services and pre-purchase information [2]. In that way, reviews allow managers to analyze the virtues and defects of their businesses, motivate them to fix mistakes and solve problems, and, more broadly, help them to incrementally improve their companies [3]. By extension, by sharing their experiences in reviews that can shape the future of businesses, customers serve as co-creators of businesses, and their opinions and preferences can be used to generate more accurate user profiles and fine-tune customized recommendations. In parallel, competition between traditional and disruptive accommodations has spiked in the era of the collaborative economy, in which the success of business platforms depends on high levels of user engagement [4].

It is therefore valuable to know whether online reviews are different or perhaps even less valid for hotels versus P2P accommodations, which cannot be measured with star systems and have no established certificates of quality. In that case, readers can rely only on online reviews to form opinions about given services, which underscores the value of reviews as feedback that can be used to benefit consumers as well as the owners and managers of establishments [5].

This study aims to identify differential patterns in tourists' reviews according to the type of online travel platform used, focusing on content related to the destination's attraction factors: TripAdvisor (hotels) versus Airbnb (P2P accommodation) in the two most relevant tourism destination cities in Spain. Both TripAdvisor and Airbnb are useful to unveil users' destination image and preferences [6]. However, in addition to the different types of accommodation these platforms represent, some studies affirm that Airbnb reviews are overtly positive [7] and that the information they contain is shallow or presented in a specific way not really useful for customers. Besides, although TripAdvisor review content may be more extensive, the continuance in use of the platform is related to the credibility and usefulness of the review content [8]. Hence the importance of unveiling their potentially different patterns.

2   Literature Review

Perhaps the most notable provider of P2P products and services is Airbnb, whose outstanding marketing efforts have focused on the experiential side of its service—that is, offering opportunities to interact with hosts and local venues or to have authentic experiences at destinations [9]. Guests who choose Airbnb are frequent travellers who prefer the platform's accommodations that allow sharing experiences with friends, not families, and who have had good past experiences with and trust the brand [10]. Contrarily, guests who prefer hotels typically rate experiences with hotel websites highly, prioritise the comfort of dining in hotel restaurants, have been influenced by advertising, travel with their families, seek services offered by the establishment's infrastructure, and book accommodations via travel agencies, thus increasing their confidence in receiving refunds when necessary [11].

Few studies have focused on determining whether the same segment of consumers makes reservations in commercial hotels as in peer-to-peer accommodations such as Airbnb [12]. Some authors have argued that various micro-segments, including smokers, pet owners, long-term guests, groups of friends, and travellers who seek to share experiences with hosts, prefer to use P2P accommodations, whereas travellers looking for a more complete, professional, intimate service prefer conventional hotels [9, 13]. However, other researchers have affirmed that peer-to-peer accommodations and hotels share the same market in specific places and at specific times, particularly in countries or cities (e.g. Paris, London, and New York) where the available supply of accommodations is low, hotel beds are scarce, and the price of hotel rooms are excessive [12]. In those markets, P2P accommodations become competitive, especially when demand exceeds supply, during specific seasons or surrounding certain events (e.g., sporting events, concerts, and trade fairs), and where P2P accommodations make less use of dynamic pricing.

3   Methodology

3.1   Data Collection

In March 2020, more than one million reviews written from 2010 to 2019 were downloaded from Inside Airbnb (www.insideairbnb.com) and TripAdvisor.com, which corresponded to accommodations of the two most populated Spanish urban tourist destination

cities: Madrid and Barcelona. For this research, only English reviews (442,701 for Airbnb and 895,285 for TripAdvisor) were analyzed. The English reviews from InsideAirbnb were selected automatically from the dataset using OpenRefine, an open source application for handling big data. The filtering was done using Google Language detection tools with a Python scriplet from OpenRefine. After adding a blacklist of non-significant words, and a list of composite terms of interest, we proceeded to content analyze reviews through key-term counts (counting the number of times a certain key-term appears in reviews) with the KHCoder software. In the case of Airbnb reviews, this resulted in a total analysis of 31,543,003 words/terms for Barcelona, of which 81,504 were unique; and of 22,872,293 words in the case of Madrid, of which 62,823 were unique. In the case of TripAdvisor reviews, the process resulted in an analysis of 41,329,101 total words, of which 102,326 were unique; and of a total of 22,915,536 words in the case of Madrid, of which 74,474 were unique. Then, these keywords were classified through intercoder reliability technique into eight predetermined content categories on destination attraction factors [6], gaining percentages of classified words in each category. CoDa was used to deal with those percentages.

3.2   Data Analysis

When analyzing percentages, it is necessary to bear in mind their proportionality, otherwise results may be misinterpreted [14, 15]. In other words, Euclidean Distance consider that the pairs of percentages 1% to 2% and 11% to 12% are mutually distant (1% of difference), but in the first pair the proportional increase is of 100%, while in the second pair, it is of less than 10%. Consequences of not considering the characteristics of data carrying relative information can be found in Pawlowsky-Glahn et al. [16].

The most common approach to deal with data carrying relative information is to transform the data into logarithms of ratios [14]. They constitute a natural way of distilling the information about the relative size and tend to meet the distributional assumptions of classical statistical models. The so-called centered log-ratio (clr) transformation computes the log-ratios of each component (in this study, the content categories) over the geometric mean of all of the components (content categories), including its own. Once we have the clrs computed, compositional squared distance between two compositions x and y (platform per city x and platform per city y) assumes log-ratios carry all of the needed information about relative differences [17] and see the differences between cities and platforms for each clr summing the squares. Computations of compositional distance reveal which of the content categories contributes the most and the least to differentiating the platforms per cities. Thus, it is possible to measure which content categories contribute mainly to differentiate the pairs of cities and platforms.

4   Results

Barcelona, in relative terms has double the number of words referring to Sports than Madrid, as well as words referring to Sun, Sea, and Sand. Reviews from Madrid, however, contain more words referring to Food and Wine. It seems that there are differences between both cities, but proportionality of the content's appearance is respected in reviews of both platforms (Table 1).

Regarding compositional distance, Madrid presents the greater gap between platforms (0.822). The content categories contributing the most to differentiating platforms in Madrid are Sports (0.293) and Urban environment (0.2886).

Table 1. % of content categories per city and per platform, considering the keywords classified into the categories (first 4 columns) and Compositional distances and contributions to compositional distances between platforms (per cities) within content categories (last 2 columns).

Content Categories	Bcn TA	Bcn AB	Mad TA	Mad AB	Bcn TA-AB	Mad TA-AB
Food and Wine	26.98	20.94	29.59	22.22	0.025	0.012
Intangible Heritage	0.34	0.25	0.49	0.35	0.051	0.030
Leisure & recreational activities	16.15	11.48	16.30	12.61	0.060	0.006
Nature & active tourism	1.48	1.66	1.72	1.61	0.045	0.012
Sports	1.49	1.01	1.03	0.50	0.085	0.293
Sun, Sea, Sand	7.22	7.72	3.92	3.88	0.026	0.028
Tangible Heritage	13.69	15.19	15.83	14.43	0.040	0.007
Urban Environment	32.65	41.76	31.10	44.40	0.117	0.286
Compositional distance					0.671	0.822

5 Conclusions

The initial work concludes that reviews describe the characteristics that define the cities: Barcelona, as the Olympic host city and located on the coast; and Madrid, the imperial city with a wide gastronomy. TripAdvisor users comment very similar things (specific pattern), and Airbnb users also talk about very similar things among them (specific pattern) regardless of the city. This study seeks to provide researchers and tourism destinations with a straightforward method to compare user reviews from different platforms, as well as to obtain relevant information on user profiles and preferences, to improve communication strategies and contributes to understand the new consumer dynamics in the accommodation sector. Destination managers should consider differences in tourist preferences to develop new services, activities and experiences that meet the needs of all visitors.

In the future work of this study, we aim to analyse other urban destinations and to include the valence analysis (positive or negative) of reviews, to confirm the results and strengthen the theoretical contribution, as well as to focus on patterns about the accommodation features in more detail.

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Social Media-Based Tourist Flow Weighting

Christian Weismayer[1]([✉]) [ID], Ilona Pezenka[2] [ID], and Katharina Ladurner[1]

[1] Department of Sustainability, Governance, and Methods, Modul University Vienna,
Am Kahlenberg 1, 1190 Vienna, Austria
`christian.weismayer@modul.ac.at`
[2] Department of Communication, FH Wien der WKW University of Applied
Sciences for Management & Communication, Währinger Gürtel 97, 1180 Vienna, Austria
`ilona.pezenka@fh-wien.ac.at`

Abstract. The identification of tourism flows is of great importance for the tourism industry to design memorable experiences. Since Millions of smartphone users are sharing their routes on online social networks (OSNs), social media analytics (SMA) based on location-based social networks (LBSNs) became a powerful tool to analyze tourism flows. Thus, this paper proposes a novel analytical approach to investigate tourism flows based on geotagged social media data through the weighted inclusion of comments and likes.

Keywords: Tourist flow · Travel path · Spatial representation · Social media

1 Introduction

Tourism is a significant economic factor for many regions and accounts for a considerable amount of movement within and between regions. Therefore, tourist flow, which refers to the projection of the trajectory of tourists and their activities in geographical space [1], is of great importance for the tourism industry and has become a highly researched area. The development of location-acquisition technologies and the rising popularity of Online Social Networks (OSN) led to the availability of a huge amount of data that provide very useful information on spatiotemporal behaviors of individuals as well as corresponding interactions between users. When travelling, tourists nowadays typically use their smartphones to upload photos and videos with text information to numerous social media channels, documenting their trip in real-time. The use of location-based social network (LBSN) data can help us to recognize potential cases of overcrowding and other problematic trends at an early stage to avoid conflicts that could stem from the tourist flows before the problem areas fully manifest. However, prior research of digital footprints has not included social network interactions and therefore ignored awareness and popularity of posts. This paper assumes that these interactions are proxys of interest in a region and therefore might be an indicator of the intensity of tourism flows.

2 Literature Review

Today, the majority of tourism processes and transactions are digital. Most travelers use online tools and social media to plan their stay, to acquire information before and during

the trip, to book a hotel or transportation, and finally to share their experiences with others. Therefore, the importance of OSNs has increased significantly in the last decade [2] and became one of the main sources used by tourists for compiling and sharing information. Furthermore, the rapid growth of mobile devices such as smartphones and tablets and the increasing availability of location-acquisition technologies including GPS, Wi-Fi and 5G, allow users to publish media content along with their position as location-tagged media content. In this way, social networks become Geosocial or LBSNs [3] enabling researchers and marketers to obtain location-based user information. LBSNs include Facebook, Flickr, Foursquare, Google+, Instagram, and Twitter. The identification of the spatiotemporal distribution of tourism flows and the recognition of popular touristic sites from LBSN data is one of the most researched topics in tourism. For instance, Peng and Huang [4], Su et al. [5], and Zhou et al. [6] proposed methods to find tourist hotspots while Mou et al. [7], Vu et al. [8], and Wu et al. [9] showed how tourism flows could be extracted from geo-tagged Flickr photos.

Another stream of research combines spatial and semantic data to analyze tourists' preferences. Brandt et al. [10] demonstrated that SMA captures spatial patterns within the city that reveals environmental and topical engagement. Miah et al. [11] combined four techniques (text processing, geographical data clustering, visual content processing, and time series modeling) on Flickr data to analyze tourist interests, trends, and seasonal patterns. Shi et al. [12] exploited tourism crowding from crowdsourcing geospatial data, and Jiang et al. [13] investigated the tourist sentiment changes between different attractions based on geotagged social media data derived from Sina Weibo.

However, among the many studies analyzing LBSN data, there are only a few linking geotag metadata with other information. To achieve a more complete picture of travel patterns and location attractiveness, this paper proposes a new methodology linking geotagged pictures with online reactions from users. First, geotagged pictures of single users provide insight into their travel behavior. Second, the resulting travel paths are enriched with comments and likes to act as a proxy for the users' awareness of joint locations emanating from a LBSN platform like Instagram.

3   Case Study Background and Data Collection

The most western province of Austria, Vorarlberg, includes six defined destinations, of which Montafon valley is one of the top three in terms of arrivals. The DMO is promoting their hashtag #MeinMontafon (45.8K posts) on their own Instagram account, which has 20.8K followers as of July 2022. 18,504 public Instagram posts containing the hashtag #Montafon were acquired from Picodash (https://www.picodash.com) in April 2022 (2022: 5,428; 2021: 13,041). The following variables were processed: userID, geotag information, and # of comments/likes.

4   Methodology

In a first step, 7,521 geotagged posts assigned to a location within the case study border were kept (see https://touren.montafon.at/en/tours/). As users could assign multiple posts to the same location, the number of comments/likes collected by each user (userID) for

each specific location were aggregated, 4,295 location-userID combinations. Instagram users who only linked posts with one single location were deleted, 2,460 posts.

In the second step, two different weighting procedures were applied to the remaining posts. The first one, called *path dominance*, is based on pairs of locations with posts by the same user. Occurrence frequencies for each pair were determined through all users. The second/third weighting, *social media presence*, is determined by the sum of comments/likes collected through all users attributed to each location pair determined before.

5 Results

Following visualizations, using the R package ggmap [14], illustrate the 14 pairs with the highest number of occurrences and comments/likes respectively. Path thicknesses of Fig. 1 come with a minimum occurrence of 20 or higher (grey coloured in Table 1). One path showed up 30 times, two paths 26 times, etc.

Table 1. Path occurrence–Montafon.

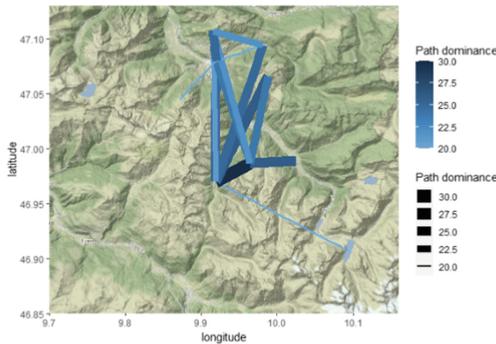| Paths	1	2	3	4	5	6	7	8	9	10	11	12	13
Occurrence	2,581	388	127	50	33	24	16	11	9	9	5	7	4
Paths	14	15	17	18	19	20	21	22	24	25	26	30	
Occurrence	4	4	3	3	2	3	1	2	2	3	2	1	

Fig. 1. Path dominance–Montafon.

Figure 2 displays each pair's attention attracted on Instagram. The maximum number of comments/likes for a path was 1,915/38,718. Path thicknesses of Fig. 2 come with a minimum of 597/17,215 comments/likes for each location pair.
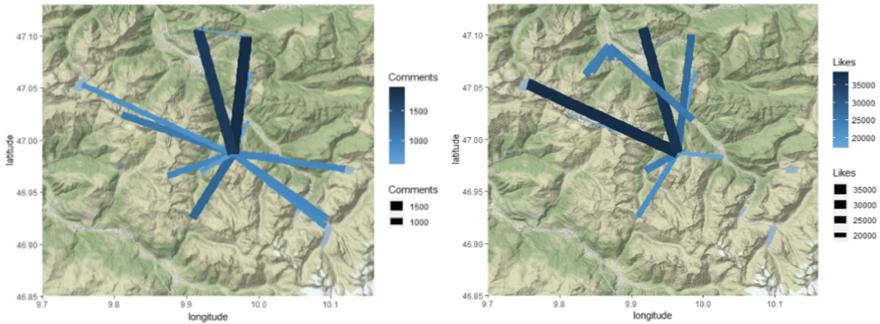
Fig. 2. Social media presence based on comments (left) and likes (right)

6 Discussion

LBSN posts reveal insight into travel paths of tourists. Depending on the means of investigation, either raw path trajectories, or measures including social media attention (comments and likes) can be observed. Concordance between a DMO's marketing strategy and the representation of a destination's locations on social media platforms is a must to pool both advertisement mediums.

The DMO of the case study region Montafon has formulated their brand slogan as "Real mountains. Real experiences". In terms of local attractions motivating tourists to visit the destination, the DMO has, in line with their slogan, put a specific emphasis on the mountains surrounding the valley and its villages [15]. Consistent with this, the most common path (Figs. 1 and 2) includes the mountain range dividing the two villages with the highest altitude Gargellen and Gaschurn. Observing Fig. 1 by post frequency, the path lies between the two mentioned villages. The strongest path in correspondence to comment engagement (Fig. 2) connects afore mentioned mountain range and the mountain Kristberg/Innerberg in the village Silbertal. The second most frequent path is again the mountain range between Gargellen and Gaschurn with its village Bartholomäberg. The latter path is simultaneously the most common path by likes, together with a path to the high mountain lake Lünersee in the village Vandans. In general, the distribution of paths varies between frequency, comments and likes. However, it can be deduced that travel paths determined from the LBSN Instagram are in line with the DMOs' advertising messages.

Summarized, different path determination strategies offer a more comprehensive picture of customer perceptions communicated on social media channels. Comparison of this new approach with traditional tourism flow analyses will be necessary to assess the relevance of the inclusion of social network interactions.

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Destinations

Contribution of Network Approach to Tourism Destination Governance

Tomáš Gajdošík[(✉)] [ID]

Faculty of Economics, Matej Bel University in Banská Bystrica, Banská Bystrica, Slovakia
`tomas.gajdosik@umb.sk`

Abstract. A tourism destination is a prototypical complex phenomenon and an ideal object of study of network science. Thanks to recent advances in computer science, this approach is capable of providing the baseline needed to design and govern tourism destinations in a dynamic environment. Although there have been some major contributions to this phenomenon, their scarcity has brought a rather fragmented contribution to tourism destination governance. Therefore, the aim of this paper is to conceptualise the contribution of network approach to tourism destination governance. Based on 10 real and virtual networks of mature tourism destinations in a Central Europe, the article provides areas where the network approach can help the tourism destination governance. Furthermore, it suggests managerial implications from the application of the network approach in the practice of governing a tourism destination.

Keywords: Network science · Tourism destination governance · Smart data

1 Introduction

A tourism destination is considered an essential unit of analysis for understanding the whole tourism system [1, 2]. Tourism destinations are focal points of tourism activity and an important subject of tourism research [3]. Although there are several ways how to define a tourism destination, the current research streams [4–6] highlight mainly the fact, that the tourism destination consists of a number of different components. From the supply-side perspective, there are stakeholders of different sizes and structures, while tourists represent the demand side. There are dynamic connections among these components that are many times nonlinear. Furthermore, due to the impact of the external environment, these relations are open and unpredictable [7]. From this point of view, tourism destinations are viewed as complex systems [8, 9].

The complexity and limited power to influence the number of stakeholders resulted in a network approach to the tourism destination and its governance [5, 6]. Destination governance focuses on the role of influential actors, their interests, affiliations, and the roles they play in destination development [10]. In the sense of network governance, destination is seen as a cluster of interrelated stakeholders embedded in a social network [12].

2 An Overview of Network Approach Focusing on Tourism Destination Governance

Based on the idea that the most relevant characteristics of the system are its components and the relationships between them, the network approach started to be applied to study the complex systems as tourism destinations. In the tourism research, the network approach has been neglected for a long time [13]. In the beginning of the 21st century, some scholars elaborated on the idea of network approach, although mainly from the qualitative perspective dealing with aggregated or dyadic relationships. Firstly, inter-organisational relationships in tourism were analysed through the lenses of sociology and management [14]. Then, the building of networks by public and private tourism sector organisations was examined [15].

More quantitative examination of destination networks started in the mid-2000s, focusing mainly on the supply-side networks. The aim was to examine the topological characteristics of destination networks and their peculiarities [12, 16]. One of the major contributions in this domain was the review of the methods of networks science with the application to the field of tourism studies [17]. Further, the applicability of the network approach to identify the most relevant actors in tourism was proven [18–20]. Some significant contributions in this domain were made by analysing the innovation potential and knowledge transfer in tourism destinations [21–23].

Advances in computer science and the use of information and communication technologies allowed to analyse real and virtual components in the digital ecosystems of destinations [24–26]. Until recently, tourist mobility has been examined using the network perspective [27, 28].

Although a conjecture of a universal model of the network structure of a tourism destination that can help in design, planning and governance activities was made [30], there is still a lack of research to prove the contribution of a network approach to tourism destination governance. Moreover, a lager sample of rigorous research is needed to better confirm the results [31].

3 Methodology

The aim of this study is to conceptualise the contribution of the network approach to tourism destination governance. To meet this aim and fill the research gap, two research questions were developed.

RQ1: In which areas can the network approach help tourism destination governance?

RQ2: What are the managerial implications of the application of network approach in tourism destination governance?

The study uses ten networks of mature tourism destinations in Central Europe, Slovakia. In order to meet the aim of the study, different types of networks were chosen:

- three networks based on the cooperation of destination stakeholders in the High Tatras, Liptov and Central Slovakia [32];
- four leadership networks based on financial ownership of resources in the High Tatras and Liptov [19];

- one virtual network based on knowledge transfer in the High Tatras [26];
- one network based on strategic visitor flows in the High Tatras [33];
- time series of visitor arrivals mapped into a network [34].

Besides the graphical interpretation of the networks, several quantitative characteristics of a network analysis are used. The global metrics include density, clustering coefficient and modularity. From the local metrics centrality measures are used (degree, closeness, betweenness and eigenvector) as well as the measure of connected components. The analysis was carried out using UCINET 6.720 and Gephi 0.9.3 software.

4 Application of Network Approach in Tourism Destination Governance Research

4.1 Supply-Side Networks

Concerning supply-side networks in tourism, the most common way of exchange (or links) among stakeholders is cooperation. Networks created based on the cooperation of destination stakeholders in product development and marketing communication in three destinations are presented (Fig. 1). The cooperation is concentrated in tourism associations and DMOs (red circles), while the cooperation among individual stakeholders of the same type is not evident.
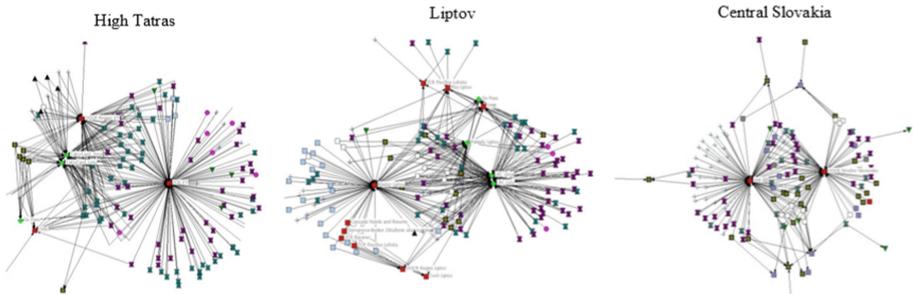
Fig. 1. Graphs of networks based on cooperation (Source: Gajdošík T (2015) Network analysis of cooperation in tourism destinations. Czech J Tour 4:26–44)

The graphical interpretation is supported by the examination of the quantitative characteristics. When calculating the quantitative characteristics, there is no reference value that indicates what is good or bad. Rather, it is recommended to compare the values among similar destinations in the same stage of destination life cycle or to compare the values with the random network. The random network has the same number of links and density as the original network, but the links are randomly distributed by the computer program using the Erdos Renyi model (Table 1).

Table 1. Quantitative characteristics of network based on cooperation

	Density	Clustering coefficient	Clustering coefficient (random)
High Tatras	0.018	0.037	0.020
Liptov	0.017	0.035	0.018
Central Slovakia	0.010	0.018	0.018

The situation in the analysed destinations revealed that there is a very low density and the clustering of nodes is comparable with the randomly distributed networks. This indicates that stakeholders do not create tight groups with a high intensity of cooperation. In order to find the reasons for a low level of cooperation, the quantitative analysis of networks properties should be enriched with in-depth qualitative knowledge of the destination system. This analysis provides several implications. Firstly, the network approach is capable of identifying the weak connections and thus highlighting the problems in cooperation in the tourism destination that should be further qualitatively analysed. Further, based on the quantitative characteristics, it is possible to benchmark destinations and thus to find the competitive position and to define improvement goals.

Supply-side networks can also be created on the basis of leadership. Leadership can be identified as a key factor of tourism destination development, where leaders provide strategic directions to destinations; however, they need resources and power. Therefore, power and ownership of resources can be taken into account to create the network.

This kind of network was created in two Slovak destinations and the change between two time periods (1995 and 2015 = 20 years) was analysed. In 1995 the major structural changes in the offer of destinations occurred. These changes were present because of the new legislative and institutional framework, as well as because of creating more support for entrepreneurial activities within the business environment. In 2015 the situation was influenced by the existence of the Tourism Support Act that initiated top-down development of DMOs in Slovakia. The situation in 1995 in both destinations indicates that the relationships are centralised to local tourism associations (Tourism Association of the High Tatras, Tourism Association of Liptov–LTA) and municipalities. However, the situation in 2015 presents a significant change towards the corporate-based model as a private stakeholder (Tatry Mountain Resort, Inc. –TMR) is gaining more powerful position (Fig. 2).

The graphical interpretation is supported by discovering the leaders in the networks using centrality measures. These measures are important indicators to point to the privileged positions of some stakeholders compared to other members of the network (Table 2).

Based on these measures, it can be concluded that in the examined destinations, one private stakeholder (TMR) is gaining more power and changes the community-based structure of destinations. The analysis has several implications. The network approach is suitable for the identification of leaders in a destination and provides the baseline for destination leadership research. Moreover, the network approach is appropriate to determine the change in a destination structure and can be applied to measure the reengineering processes in traditional tourism destinations.
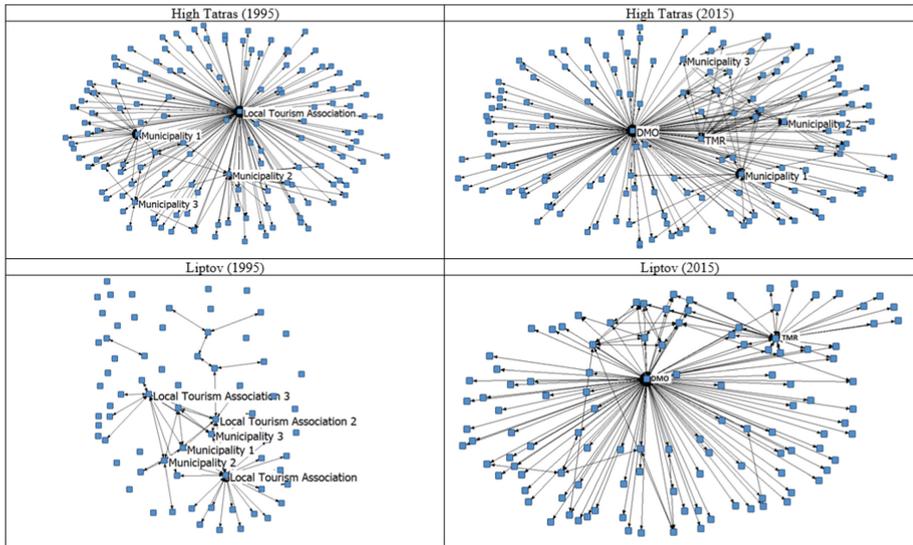
Fig. 2. Graphs of networks based on leadership (Source: Gajdošík T, Gajdošíková Z, Maráková V, Flagestad A (2017) Destination structure revisited in view of the community and corporate model. Tour Manag Perspect 24:54–63)

Table 2. Quantitative characteristics of networks based on based on leadership

HIGH TATRAS	1995			2015		
	LTA	Muni1	Muni 2	DMO	TMR	Muni 1
Degree centrality	74.731	12.366	9.140	75.000	19.681	13.298
Closeness centrality	2.173	2.144	2.140	2.379	2.348	2.345
Betweenness centrality	55.877	1.423	0.852	56.638	5.091	1.747
Network centralisation index	0,621			0,745		
LIPTOV	1995			2015		
	LTA	Muni 1	Muni 2	DMO	TMR	LTA
Degree centrality	10.194	4.854	4.369	50.962	12.981	10.577
Closeness centrality	0.588	0.587	0.588	1.203	2.197	1.197
Betweenness centrality	2.099	0.724	1.189	33.102	5.572	4.624
Network centralisation index	0,100			0,506		

The third examined type of supply-side network is a network based on knowledge transfer. Successful destinations in a globalised, knowledge-based economy are those, where stakeholders, embedded in collaborative network, are engaged in knowledge sharing processes [35]. To identify the knowledge transfer, the technological virtual network was used as virtual networks can potentially mirror and represent the real networks are

less costly to study [23]. The network based on website citations was created in the destination High Tatras using the Webometric Analyst application [36]. Due to the limits of search engine Google, where weighted direct link networks of up to 22 websites can be calculated for free, only the most important stakeholders were selected (Fig. 3).
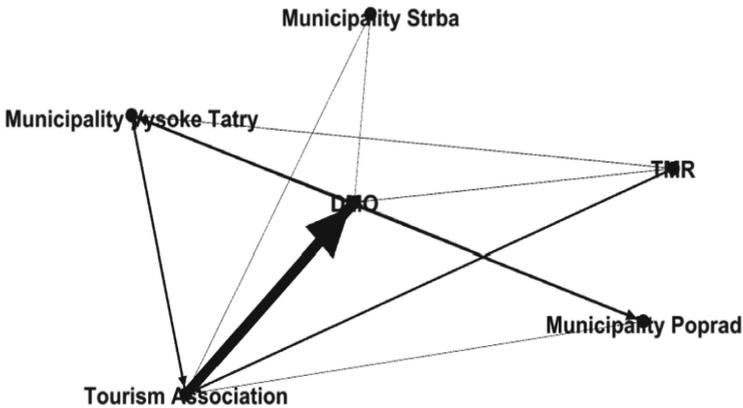

Fig. 3. Graph of network based on knowledge transfer (Source: Gajdošík T (2022) Smart Tourism Destination Governance: Technology and Design-Based Approach. Routledge, London)

Following the graphical interpretation, the most important link is between the Tourism Association and the DMO. Knowledge transfer among other stakeholders is significantly lower. As the network is directed in this case, the centrality measures were slightly modified (Table 3).

For directed weighted networks, the previously used centrality measures have to be modified. To calculate the 'prestige' of a node, in-degree centrality counting the number of incoming ties is used. Closeness centrality is not well suited to directed data in fragmented networks. However, the network based on knowledge transfer in the High Tatras is not fragmented, therefore the use of closeness centrality is appropriate. Betweeness centrality can be applied to directed data without any modification.

The eigenvector is similar to degree centrality, where the eigenvector centrality can be split to two concepts: the right eigenvector corresponding to out-degree and the left eigenvector corresponding to in-degree. In this case, the use of the left eigenvector is used to indicate the amount of direct and indirect potential influence of the node [37]. Based on the geometric mean of these centrality measures, the importance index was calculated, indicating that the DMO is a hub in a knowledge transfer.

There are implications from this analysis. The network approach to knowledge transfer is capable of identifying knowledge hubs. Knowledge hubs manage the flow of ideas, information and innovations. By finding this role, knowledge transfer in a destination can be supported as cooperation with hubs that have a link to external organisations can produce new knowledge [22].

Table 3. Quantitative characteristics of network based on knowledge transfer

Organisation	In-degree	Closeness	Betweeness	Left -eigenvector	Importance index
DMO	1976	0.571	0.708	0.847	5.101
Tourism Association	887	0.667	0.750	1.000	4.590
Municipality Vysoké Tatry	647	0.800	0.875	0.590	4.043
Municipality Poprad	436	0.800	0.875	0.280	3.040
Municipality Strba	13	0.500	0.853	0.400	1.220

4.2   Demand-Side Networks

The governance of tourism destinations is nowadays challenged by incorporating more demand-related issues related to visitor flows [38]. The following network is created based on passive mobile positioning data (Fig. 4). Together with the analysis of tourism supply, it is a starting point for finding the intersection of demand and supply, as the success of a destination depends on the action of stakeholders and their ability to attract visitor flows and create synergies for these flows.
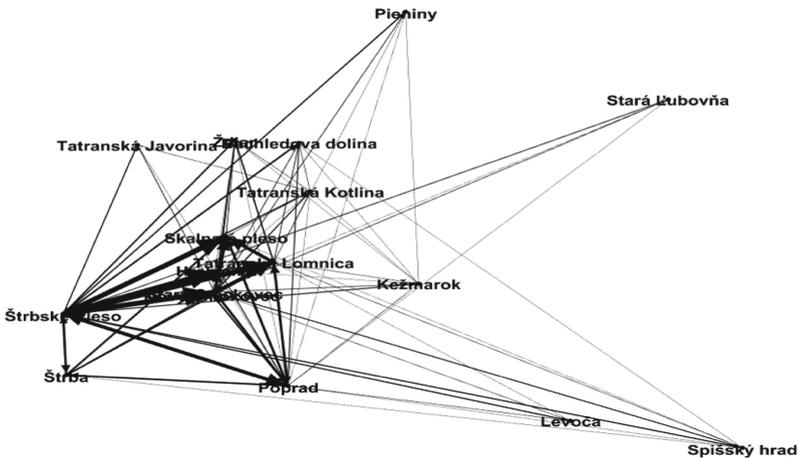
Fig. 4. Graph of network based on visitor flows (Source: Gajdošík T, Gajdošíková Z (2021) DMOs as Data Mining Organizations? Reflection over the Role of DMOs in Smart Tourism Destinations. Lect Notes Networks Syst 228:290–299)

To explore the structural properties of the network of identified visitor flows in the destination High Tatras, the most relevant metrics of centrality (in-degree, out-degree and betweeness) were used (Table 4).

Table 4. Quantitative characteristics of network based on visitor flows

Place	In-degree	Out-degree	Betweenness	Strongly connected component (ID)
Štrbské Pleso	10.0000	16.0000	0.1048	6
Starý Smokovec	9.0000	16.0000	0.0906	6
Nový Smokovec	6.0000	4.0000	0.0008	6
Hrebienok	8.0000	2.0000	0.0000	6
Tatranská Lomnica	9.0000	14.0000	0.0607	6
Skalnaté pleso	8.0000	0.0000	0.0000	6
Tatranská Kotlina	4.0000	11.0000	0.0017	6
Ždiar	5.0000	8.0000	0.0007	6
Tatranská Javorina	4.0000	0.0000	0.0000	5
Poprad	6.0000	16.0000	0.0315	6
Štrba	5.0000	6.0000	0.0031	6
Kežmarok	6.0000	6.0000	0.0019	6
Levoča	4.0000	0.0000	0.0000	3
Spišský hrad	4.0000	6.0000	0.0000	4
Bachledova dolina	8.0000	0.0000	0.0000	2
Pieniny	5.0000	0.0000	0.0000	1
Stará Ľubovňa	4.0000	0.0000	0.0000	0

The in-degree centrality counts the number of incoming flows to a place, therefore, it can be interpreted as a measure of attractiveness or popularity (places - Štrbské Pleso, Starý Smokovec, Tatranská Lomnica). Out-degree centrality counts the number of outgoing flows. The places having the highest outdegree centrality can be considered as departing points (places Štrbské Pleso, Starý Smokovec, Poprad). Betweeness centrality is calculated as a proportion of all the shortest paths from one place to the other through the focal one. In this context, it indicates the place that has the highest influence (places - Štrbské Pleso, Starý Smokovec, Tatranská Lomnica). The quantitative characteristic of strongly connected components indicated those nodes that are easily reachable, thus indicating the boundaries of a destination. Moreover, based on new boundaries, new destination stakeholders who are able to attract the visitor flows can be found using online geographic information systems (e.g., Google maps).

To provide implications from this analysis, it can be stated that the network approach is able to identify the roles played by places, which has a significant contribution to flow-based destination management. Moreover, it allows one to determine the boundaries of a destination and find new stakeholders, thus focusing more on the intersection between tourism demand and supply. This creates opportunities to engage new destination stakeholders and better serve the tourist needs.

To understand the complexity features of a tourism destination from the demand side, the network approach can also be used for time series analysis. In order to transform time series into networks, the horizontal visibility graph algorithm is a useful approach. It considers each point in the time series as a node connected with another node under the condition that it is possible to trace a horizontal line not intersecting another intermediate node. In this way, the time series of tourist arrivals to a destination in the High Tatras was mapped into a network (Fig. 5).
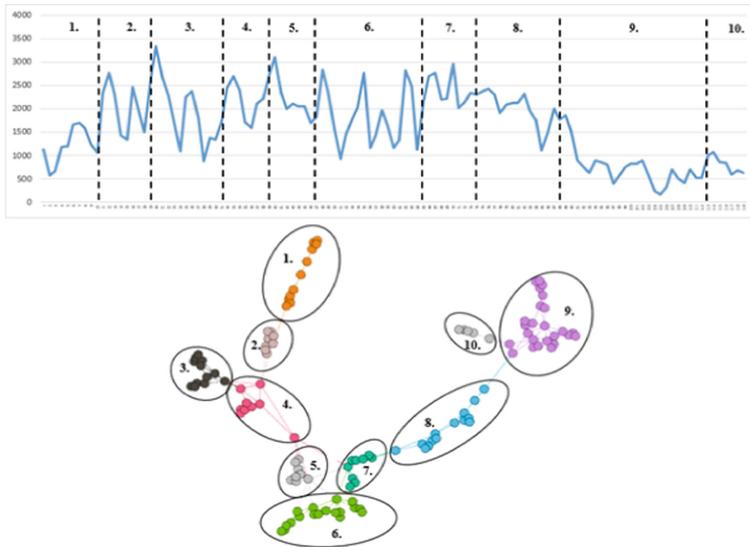

Fig. 5. Mapping time series into a network (Source: Gajdošík T, Valeri M (2022) Complexity of Tourism Destination Governance. In: Valeri M (ed) New Governance and Management in Touristic Destinations. IGI Global, Hershey, pp 119–132)

The analysed time series represent the daily visitation of the destination High Tatras from 24th December till 12th April 2020. The modularity index of the network Q = 0.781 indicates a good separation between different nodes. The analysis divided the time series into 10 different dynamic phases. These modules thus correspond to periods with similar dynamics or the same business cycle [39]. In this case, it is the same dynamics in tourist behaviour. The most interesting implications are revealed in the seventh and eighth cycles. The seventh phase corresponds to the spring holidays in the western Slovakia region. The eighth cycle grouped together the spring holidays of the eastern Slovakia region with the central Slovakia region. The visitor flows were divided according to geographical location. Based on geographic segmentation, visitors from western Slovakia form one flow, while visitors from central and eastern Slovakia form another flow. The network approach can identify turning points in the time series and is capable of better characterising the visitor flows.

5 Conclusion

It can be concluded that the network approach has valuable research implications to tourism destination governance. It can help to measure the strength of connections, thus determining the problems in cooperation; it is capable to find the leaders in a destination, thus supporting the theory of destination leadership, it is able to detect the knowledge hubs supporting innovations, it classifies places according to their roles and it is able to find out the turning points in visitor behaviour. These findings extend the previous knowledge on destination governance.

Thanks to the network approach, tourism destination managers can more easily benchmark their destination as quantitative characteristics can be compared with similar destinations. Changes in the structure of a destination can signal the need for a reengineering of the structures and processes in a destination. Finding the knowledge hubs helps to better diffuse the innovation and thus support the competitiveness of a destination. Moreover, as tourism destinations have blurred boundaries, the network approach can help to define them more precisely. The ability to analyse visitor behaviour helps to better understand the strategic visitor flows (Fig. 6).
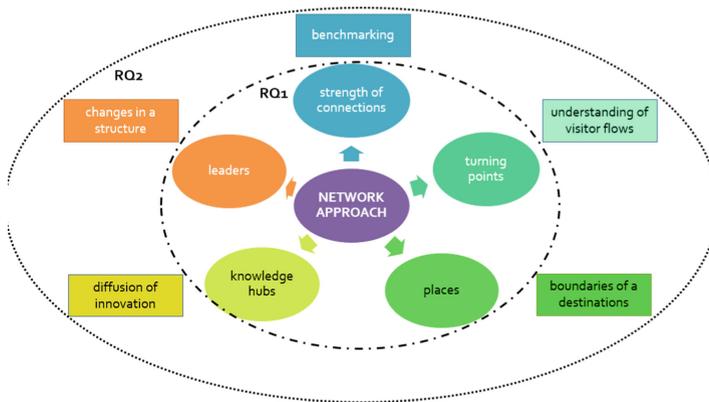

Fig. 6. Contribution of network approach to tourism destination governance

However, this approach also has several limitations. One of the main problems of the use of the network approach in the context of a tourism destination is the data collection. Traditional methods of collecting data (e.g. surveys, archival records) provide past static data and their collection is many times time-consuming and misleading (e.g. high nonresponse rate in network surveys). Moreover, some big data collection methods, e.g. data from mobile operators or sensors in a destination, are too costly. Another limitation is the difficulty of data analysis and interpretation. Knowledge is needed to correctly interpret the quantitative characteristics of network analysis; however, without a further in-depth knowledge of a destination and its characteristics it is not recommended to draw definitive conclusions [6]. Therefore, to analyse and interpret the data correctly, the researcher should cooperate with the destination manager.

Following the results of the presented research, several implications arise for further research. First, there is a challenge of shifting attention from small and big data to "smart" data, thus creating the opportunities to examine the real-time networks. In addition to static analysis, simulations and modelling of a destination system can shed more light on destination resilience.

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Boundaries of Visitors' Willingness to Disclose Personal Information to Tourism Destinations

Hubert Stocker, Aleksander Groth(✉) , and Peter Mirski

Department Management, Communication and IT (MCiT), MCI – The Entrepreneurial
University, Innsbruck, Austria
{aleksander.groth,peter.mirski}@mci.edu

Abstract. With the rising demand for personal information, touristic websites and service providers collect and increasingly depend on the willingness of tourists' private data disclosure. While legislation slowly provides directions for data collection practices, tourists remain wary on which and how much data they should or have to provide to organize their visit in a tourism destination. Our qualitative study explores this domain holistically and lays out four boundary evaluations: blurred, but clear view, positive incentives, subjective well-being, and restraining factors on how tourists evaluate their willingness to disclose personal information to a destination. By drawing upon and substantiating theory of information privacy behavior, we contribute to the field of personal information sharing in the tourism domain by expanding and coloring the complexities of tourists' expectations, intentions, and boundaries.

Keywords: Information privacy · Disclosure intentions · Privacy concerns · Destination management organizations

1 Introduction

The implementation and utilization of digital technologies within tourist destinations is essential to stay competitive. Especially, the role of DMOs is of increasing relevance, as tourism marketing and product improvements rely on a steady input of correct and truthful self-reported data, in order to provide recommendations and information in real time to enrich a tourist's experience [1]. To achieve this, modern tourism destinations utilize customer data to arrange suggestions based on their interests, needs, and constraints [2]. This, often self-reported, customer information is obtained from websites and supplemented by a range of other channels to reach the visitor [1].

Acknowledging this dependency, researchers have investigated along an individuals' personal information disclosure behavior in relation to websites in e-commerce [3–5], mobile apps [6, 7], and social networking sites [8, 9]. The available literature offers a rich discussion of information privacy concerns and personal disclosure intentions [10], but it also suggested that tourists' decision making and related issues about privacy of information require further research [11]; especially in the context of an adapting legal environment, like the release of the GDPR in 2018 by the European Union, and an

increased public and media awareness towards data privacy policies (and their violations) of businesses, organizations, and institutions.

Interactions between tourists and their destination of choice occur before, during, and after their stay in the destination via a constant exchange of relevant information, mediated through digital interfaces [12]. A balance of personal information demands and needs is vital as a too heavy-handed pursuit by DMOs may disgruntle consumers, which makes it necessary to further explore the underlying individual concerns, interactions, and interests of visitors [13]. Recognizing the need for DMOs to identify and evaluate tourists' attitudes towards information disclosure interests can therefor help persuade visitors to disclose personal information more willingly. Hence, we aim to answer the following research question: How do tourists evaluate the boundaries of their own willingness to disclose personal information to tourism destinations?

This qualitative study exploratively identifies, how visitors' perceived benefits within tourism offers can be determined, their concerns about information privacy, and the assessment of their personal data once it has been provided to the destination. This study theoretically complements and extends existing research, going beyond the limitations of previous investigations, where the overly specific focus has been upon a single class or genre of tourism providers, such as hotels [6].

2   Related Work

Recent literature concerning privacy focused on the concept of information privacy, whereas information privacy definitions center upon the resulting ability to control personal data on an individual level [13, 14]. Hence, individual concerns about entering information onto a website is related to the "control over secondary use of information", as the further usage of such data is beyond their individual control [13].

2.1   Information Demand of DMO Websites and Services

Naturally, online tourism information sources are utilized by travelers to gather specific details for their trip, which include DMO or hotel websites, online travel agencies (OTA), or other digital sources like travel blogs and social media sites [15]. Regarding the relevancy of DMO websites, research lately argues towards an decreasing importance, as travelers utilize other channels like online travel agencies or social media for information [16]. On the other hand, the relevancy of DMO websites as they remain the primary platform for interaction with their visitors [17]. Additionally, these websites enable travelers to access and evaluate specific local offerings within a destination [18] and provide benefits by e.g., receiving information and recommendations or navigation assistance [19].

With the rise of mobile devices, tourists plan their trips more spontaneously or even after they have started their journey [17], therefore, the delivery of customized and/or personalized information is a growing challenge for DMOs [20], even further increasing the need for personalized information, e.g., via tailored location-based services [21].

This personalization implies the understanding of unique needs and preferences of tourists. Consequently, to build such a personalization process and to adjust directed

marketing activities, data from web traffic, rating platforms or social media sites is used to congregate digital footprints, left by users voluntarily or involuntarily, to better understand behavioral actions of tourists [22]. Furthermore, personal information is collected by directly asking tourists to share their needs, priorities, and interests [2]. Touristic destinations are therefore increasingly considering the implementation of incentives for their customer to use and generate personalized content [23].

A successful data collection approach for DMOs acknowledges the integration of the tourist's personal data with clear protection measures and incorporates both into the destination's communication strategy to build and maintain a trustworthy relationship between visitors and DMOs [24]. However, before this data can be collected it is important to know the premises of tourists' intention and willingness to disclose their personal information via a destination's digital interface.

2.2   Intention and Willingness Towards Sharing Information Online

In relation to the increased demand of DMOs for their tourists' personal information, an individual's privacy concerns have been shown to increase [24]. Literature provides various instruments to quantitatively measure the intention of users to share personal information, however, such research lacks the usage of a multilevel framework for information privacy concerns [13]; and at the same time recognizes, that people's intention to disclose information on the internet is a complex procedure [25]. Still, in our explorative understanding of these intentions we draw upon two conceptual models, the Privacy Calculus and the Antecedents-Privacy-Concerns-Outcome model (APCO) and later contextualize these abstracted behavioral intentions in respect to tourists' willingness to disclose personal information.

Privacy Calculus. A fundamental concept for information disclosure behavior, the model is utilized in the context of online information disclosure [9], as well as in a variety of connected settings, such as e-commerce [25], mobile devices [26, 27], social networking sites, Internet-of-Things [28], and hotel applications [6]. The willingness to disclose personal information is dependent on an individuals' perceived internet privacy risk, internet privacy concerns, internet trust, and personal internet interest, which are in themselves grounded in individual perceived risks (e.g., unauthorized selling, sharing, or access to personal information) and perceived benefits (e.g., extrinsic benefits like monetary savings or intrinsic benefits like altruism and pleasure). The combined outcome of this calculation is noted as a perceived value to information disclosure, described as "the individual's overall assessment of the utility of information disclosure based on perceptions of privacy risks incurred and benefits receive [29].

Antecedents-Privacy-Concerns-Outcome Model (APCO). The APCO model conceptualizes privacy concerns along five antecedents (Privacy experiences, Privacy awareness, Personality differences, Demographic experiences, and Culture/Climate) and how they influence privacy outcomes [14]. However, a paradoxical situation may occur, when users state privacy concerns when it comes to disclosing information, but then their actual behavior is diverging; a conflict between intentions and actual behavior described as the privacy paradox [30]. In order to better cater for this paradox besides economic and

social theory-based explanations, research included cognitive and psychological aspects to deepen explanations of such user behavior [31, 32] and integrated privacy concerns (e.g., beliefs, attitudes, perceptions) as a core construct within APCO. The 'outcomes' of privacy concerns are an individuals' regulation, behavioral reactions (including disclosure), trust, and the calculus of risks/costs, and benefits. The resulting behavioral reaction is the dependent variable since it represents the willingness to reveal personal information.

Concludingly, DMOs should be aware of the complex construct that is the concern for one's private information, as it influences the intention to share information either online on their website or within a destination. Still, research explores this construct predominantly from a quantitative perspective, and in by doing so abstracting the phenomenon of sharing personal information into multi-dimensional dependency models, supposedly beyond any reasonable practical relevance for the DMO itself. Hence, our study aims to (1) explore tourists' information disclosure behavior within a destination and (2) complement these quantitative studies via an inductive qualitative approach via a holistic understanding of tourists' boundaries when they evaluate to disclose their personal information to the visited tourist destination. Notably, research on data privacy concerns does recommend broadening the scope for more diverse samples and contexts, as studies in this field predominately rely on student-based data [13] and is situated in constantly changing legal and technical environment.

3 Methodology

Qualitative semi-structed in-depth interviews were conducted during the winter season 2021 in an alpine touristic destination in Styria/Austria. As the character of the study is explorative, potential interview partners, who did not have their primary residence within the region, were approached at three different locations before or after their skiing endeavors into the region. Over the course of three weeks twelve participants, four female and eight males, agreed to be interviewed face-to-face until data saturation was reached; interviews lasted up to 30 min.

The construction of question for the semi-structured interview guideline was rooted in literature on sharing personal information (Privacy calculus, APCO) and specifically focused on sharing such information within the touristic domain. All questions were open and aimed to encourage the interviewees to explain their feelings and thoughts freely and openly. Thematically, interviews approached the topic from general touristic information search behavior when looking for a touristic trip, to disclosing personal information when registering at booking/destination websites and/or personalized offerings, as well as their trust and expected benefits within the destination in exchange for their personal data.

The analysis followed an approach of circular deconstruction[1], which is described as an abridged version of Grounded Theory and allows researchers to integrate and organize subjective ideas in the process of interpretation and understanding [33]. This method is shaped by a constant rotation of an intuitive evaluation and consideration of the text, which is circulating and throughout guided by intuition and theory. Through

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[1] Orig.: Zirkuläres Dekonstruieren.

this deconstruction and composition of the text, implicit meanings achieve visibility. Hence, this approach lends itself well for a constant change of the perspective lens, where relevant parts of theory are identified to circle and understand phenomena from a holistic perspective; as a result, new findings can be discovered, and creativity and productivity are proactively implemented in the analysis.

4   Results

Our data analysis manifested four themes with several sub-categories, which constitute the boundaries of tourists' willingness to disclose personal information in tourism destinations: (1) Blurred, but clear view, (2) positive incentives, (3) subjective well-being, and (4) restraining aspects (Fig. 1).

Individual willingness to disclose personal information			
Blurred, but clear view	**Positive incentives**	**Subjective well-being**	**Restraining aspects**
Uncertainty of data usage	Local insider information	Past experiences establish credibility	Clear and charming privacy notices
Privacy paradox in sharing behavior	Incentives and discounts on touristic services	Brand and reputation link to trust	Retaining anonymity while searching for destination information
Anxiety of privacy invasion	Personalization of information and service offers	Personal contact with destination or service provider (e.g., hotel)	Strong sensitivity towards location-based data
			Accountability of service providers

(Left vertical label: **Boundary evaluation**)

Individual willingness to disclose personal information

Fig. 1. Boundary evaluations of tourists' willingness to disclose personal information

4.1   Blurred, But Clear View

The first theme contains three categories, which subsume visitors' assumptions and concerns when disclosing personal information on tourism related websites. Many visitors stated that they have no clear understanding of how the information will be used by organizations. This blurred view of their data usage is considered a worrying situation. Visitors are unsure, if their personal information is sold to a third party or to how many third parties it is sold. This unclear comprehension of participants confirms that internet users may not understand, how their data is processed or where their data is transferred to [34]. In literature, the uncertainty of data usage is assigned to the perceived risk factor in the privacy calculus [25]; consequently, this factor has a negative impact on the visitor's willingness to share personal information. The phenomenon is noticeably two-headed,

as respondents state on the one hand that they are very cautions when it comes to information disclosure but "*on the other hand you agree with every app that you pass on all possible data (P3)*", which points towards the so-called privacy paradox [30]. Also, the fear of receiving unwanted e-mails when disclosing personal information is highlighted, which triggers negative reactions that amount to concerns about the invasion of privacy. This equates to the concept of privacy experiences in the APCO model [14], which may cause privacy concerns and counter reactions (e.g., activating spam filters), but may in turn again reduce privacy concerns [35] due to the subjective feeling of 'being in control' (e.g., via the ability to unsubscribe newsletters).

4.2 Positive Incentives

Participants see benefits from tourism destinations to be most useful when they can be experienced directly in the destination or if they facilitate their travel planning. In other words, offering discounts on services in the tourism destination or offering insider tips are ways to increase the willingness to reveal personal information. Participants claimed that discounts were acceptable as a compensation for sharing their personal information (e.g., lower cost of accommodation or the availability of activities in the tourism destination) and emphasized interest in benefits for activities during their stay (e.g., discounts on bike rentals or free access to cable cars). This confirms the relevance of monetary incentives in exchange for personal information connected to the pleasure associated with intrinsic benefits, which as a result contributes to an enjoyable touristic experience [36]. In addition, exclusive offers are stated by participants as incentives to submit personal information more willingly, for example, if they receive services that *"… Others do not get (P4)"*. Participants refer to their information sharing behavior as cautious when an online platform is unknown, but at a certain level of discount on a vacation they would change their mind (20–50% discounts). If a website has been previously used and requests more personal information, then a 20% discount was stated to increase their intention to accept. Access to advantageous information or convenience are viewed as beneficial in the search for tourism information, as well as free access to information, or assistance in the booking procedure to save time, which confirms literature [36] through the factor of personal internet interest (Privacy calculus).

Overall, participants responded positively to personalization offers that assist their information search process, substantiating literature that such information does not increase individual privacy concerns [37]. However, this type of personalization is perceived negatively in the tourism domain, as tourists' motives for travelling vary, depending on the partners with whom the holiday is spent. The importance of the right choice and depth of positive incentives is highlighted in this theme. Incentives, which are experienced at the destination or benefits which facilitate the travel planning are relevant for visitors, who in turn tend to show more willingness to disclose personal information to tourist organizations.

4.3 Subjective Well-Being

With the feeling that personal data is secure, trust is increased. In literature, such principles for fair information practices reduce users' privacy concerns [38]. Hence, participants stated to have more trust when they perceive that their tourism provider is taking active steps to secure the customers' data. Previous experiences with the tourism provider and regular interactions with a website positively link to their trust perception. If the service and transaction fulfilled the visitor's expectations, trust in the tourism provider is increased. This linkage, according to which past experiences help the user to assess "the other party's credibility" [39] connects with the time spent in the tourism destination, which in turn affects the visitor's evaluation of trust. One night in the destination or only driving through is not seen as a 'contact' with the tourism provider. Instead, regular visits to destinations are positively emphasized as maintaining contact and hence visitors' interest in information disclosure increases. As the literature indicates, relationships grow as interaction occur and therefor result in increased perceived trust [39], which impacts behavioral reactions as described through APCO. Hence, visitors are more likely to share personal information with the tourism provider.

In general, interviewees state that they feel more comfortable when searching and booking on well-known websites or with familiar organizations. This is in line with literature, that famous or well-known organizations reduces some of the customers' uncertainties in an online environment [40]. In contrast, the preference of websites from smaller tourism providers was also mentioned, leaving a blurred impression.

An important aspect stated is maintaining a certain direct personal contact with the tourism provider or host as vital for visitors and relevant for visitors' intentions to interact with tourism websites. When no direct contact exists, uncertainties arise when personal information is requested. They describe the lack of personal contact as *"having no face (P5)"* or the contact person as *"not touchable (P7)"*. This vocalized absence or lack of personal contact is described in literature, since it increases some of the uncertainties in the online environment [40]. As tourism is strongly connected to individual experiences and well-being, personal contact and trust are consistently stated as important aspects in this domain.

4.4 Restraining Aspects

A common aspect noted by interviewees is that privacy notices are actively utilized to gain more knowledge about the consequences for revealing personal data. The significance of knowing what the privacy notices contain and what consequences the disclosure of personal information entails is emphasized, highlighting that the exchange process needs to be fair. Therefore, some of the visitors read the privacy statements very carefully or restrain their behavior. As literature shows, privacy notices in themselves reduce people's concerns [37]; users' knowledge and understanding of privacy statements to reduce privacy concerns is identified as the conceptual dimension of awareness [41]. Interestingly, participants are perceiving a lack of 'charm' in the display and content of privacy notices or in the various ways that are utilized to personalize offerings. This suggests that tourism organizations need to adopt more engaging approaches to positively influence tourists' interest to reveal personal information.

Additionally, the need for retaining anonymity while searching for touristic information online is salient, which is in line with previous research illustrating that users seek anonymity while conducting searches on the internet [42]. This suggests that tourism organizations should clearly provide adequate and truthful privacy statements in their online environment when requesting personal information from their visitors.

Participants also indicate a moderate concern about their personal contact information. As the perceived risk increases, so is the sensitivity towards sharing personal information [43]. Hence, the disclosure of personal location information corresponds to a form of external restriction upon visitors' freedom. For example, participants do not want to be tracked while spending time in the tourism destination, e.g., they *"do not wish others to know which hiking tracks they chose to walk on (P8)"*. Disclosing such location-based data gives rise to concerns of identification [44]. Although these concerns are salient, they are not solid. Participants are in turn willing to share their location information, if the service assists them in their individual orientation and navigation within the destination. If the latter is functional and useful when undertaking an activity, these concerns are reduced and *"then it does not bother me (P7)"*.

When on an information search for touristic offers, a wide mix of various websites and platforms was mentioned by participants, like destination websites, hotel websites, blogs, social media sites, and online agencies – often intermixing offline and online sources. The perceived importance of a destination's website was stated twofold. Either described as a relevant utility for organizing their holiday and a primary source to gain information about local activities in the destination; in line with literature, as a source for potential visitors to evaluate offerings in a tourism destination [18]. Nevertheless, visitors argued that the importance of destination websites is overall decreasing and *"… no longer one of the most important (P6)"*, which is also echoed in literature [16] and left us mildly confused, but on a higher level.

5   Conclusion

The aim of this explorative study was to identify boundaries of tourists' willingness to disclose personal information to tourism destination websites and applications. While many aspects substantiate literature, we draw attention to possible approaches that would potentially increase the tourists' willingness to disclose personal information to DMOs. Importantly, drawing assumptions on the disclosure behavior of tourists across the vocalization of their intentions does not automatically reflect the actual behavior of tourists. However, our results do colorize and offer new insights into the willingness of visitors to share personal information with a tourism destination.

5.1   Theoretical Implications

As an exploratory study, our results substantiate and extend current understandings of privacy and sharing intentions of personal information. Participants hinted to increase their interest to disclose more personal data when certain factors are established: (1) trust in the tourism provider is gained when personal contact exist, (2) subjective positive incentives or benefits that can be experienced at the tourism destination enhance

tourists' engagement when personal information is inquired by a DMO, and (3) privacy practices presented in a clear, understandable, and pleasant manner help reduce privacy concerns. Furthermore, previous studies in the domain of personal information sharing have largely focused on quantitative approaches (Privacy calculus, APCO). Our study utilized a qualitative approach to gain a holistic understanding of visitors' willingness to disclose personal information when they approach tourist destinations over the internet and echoes findings from literature, also in the domain of tourism information search. Carrying out in-depth interviews with visitors within a specific tourism destination, contrary to more artificial settings outside a destination, proved helpful in complementing and extending previous research in this field, that placed a heavy reliance on student-based and US-centric approaches, which lack the exposure and awareness of respondents towards recent changes in regulations of data privacy (e.g., GDPR).

5.2   Practical Implications

Our findings suggest several vantage points for DMOs and tourism providers. When requesting personal data from visitors, privacy notices in an appropriate length and clarity, bundled in a polite and winning approach should be presented to increase visitors' trust in the intentions of the organization and increase transparency. Also, tourist destinations should consider offering 'compensation' to visitors in the form of experiences and activities, for the exchange of personal information, as visitors indicate a willingness to share more personal - and truthful - information in exchange for benefits they receive from tourism providers under the prospect of increased pleasure that tourists can obtain. Such compensation could be compensatory discounts or free access to activities or public transportation facilities. Additionally, visitors show an increased interest in disclosing their personal information when personal contact, and consequently trust, can be established with the tourism provider. This could be stimulated by combining DMOs mobile/web applications or functional systems with those of local tourism providers. Especially accommodations and tourist attractions have great potential to increase the visitor's willingness to disclose personal information, as they have direct personal contact with them. Finally, DMOs who utilize mobile applications to support the customers' use of location devices should be aware of the sensitivity of the collected data and tourists' awareness of the power of such an exchange. Although visitors are willing to share personal information with tourism providers to some extent, the performance, usefulness, and utility of such touristic products and services is an essential factor that influences the visitors' willingness to disclose information – it is part of a deal. Hence, tourism service providers should constantly evaluate their performance and service quality to guarantee that it fulfills visitors' expectations.

5.3   Limitations and Further Research

Naturally, this qualitative study comes with several limitations and recommendations for further research. First, we highlight the limited transferability of results linked to the locus of study and sample size. Still, although reaching data saturation in interview responses and in combination with the explorative semi-structured approach, the manifested thematic boundary evaluations can complement and do thematically substantiate

existing research in the domain of tourism and personal information disclosure. Second, this study only examined intentions in relation to self-reflected privacy disclosure behavior. Previous research highlights that actual behavior might not be the same as expressed intentions [13]. Therefore, further research should investigate both the declared willingness of visitors to disclose personal data and their subsequent actual behavior, along the lines of the privacy paradox, which did inherently manifest within the first theme of our findings but was also revealing itself between the lines of positive incentives and restraining aspects. Third, our study was conducted in a specific tourism destination in Austria, which implicates a closed sphere of cultural norms that may form or influence these boundary evaluations. Finally, inquiring on the visitor's privacy disclosure behavior is a socially sensitive topic. It is possible that what is known as social desirability bias affected participants' answers, as this could influence respondents' truthfulness in our interviews. Participants may hide their true feelings and provide responses that they subjectively perceive as fitting, but may stand in contrast to their own attitudes, ideals, intentions, or decisions in specific situations [45].

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How Do Destinations Relate to One Another?
A Study of Destination Visual Branding
on Instagram

Lyndon Nixon(✉)

School of Applied Data Science, MODUL University Vienna, Am Kahlenberg 1, 1190 Vienna,
Austria
`lyndon.nixon@modul.ac.at`

Abstract. Destination marketers are aware that online communication about their
destination is increasingly dependent on visual media rather than text, due to the
growing popularity of social networks such as Instagram. An accurate understand-
ing of how the destination is being presented to users in this medium is critical for
digital marketing activities, e.g. to know if the desired destination brand is present
or if visitors focus on other aspects of the destination than those being promoted
in marketing. Unlike text mining, which has well established techniques to extract
keywords and associations from text corpora, a consistent approach to under-
standing the content of images and expressing the resulting destination brand is
lacking. This paper presents a visual classifier trained and fine-tuned specifically
for destination brand measurement from images using 18 visual classes. It presents
an exploratory study of how different destinations are being presented visually on
Instagram and discusses how these insights could be used by destination marketers
to adapt and improve their digital marketing.

Keywords: Destination marketing · DMOs · Visual classification · Instagram

1 Introduction

The shift in digital consumer behaviour, particularly among Generation Z and millenni-
als, towards visual content on the Web for destination discovery and inspiration raises
a new challenge for tourism stakeholders. Insights into how destinations are being per-
ceived by online consumers, which are necessary for optimal decision making by man-
agers about how to manage the brand of the destination online, will only be meaningful
if the whole story is being considered, i.e. that the online digital photography of the
destination is included in the marketing data analytics alongside textual content and sta-
tistical analytics. Advances in computational media under-standing (computer vision) -
particularly through the application of neural networks and deep learning - have enabled
significant progress in computer systems that can accurately classify visual content
(photos) into predetermined categories. Such visual classification capabilities are now
available publicly as pre-trained models, meaning that functionality that has long been
only accessible to very few based on highly complex and expensive computer systems is

now a possibility for any business who identifies a business need for it. However, these off-the-shelf solutions demonstrate certain limitations: the available models are trained on highly generic visual data (not specifically touristic imagery) for a very broad set of fine-grained labels (not specifically destination related). As a result, users still need to train these systems to work for specific use cases, both determining the appropriate set of (visual) classes to be supported and ensuring sufficient training data for those classes so that the system can learn to distinguish between them in previously unseen content. In this paper, after motivating the need for a new approach to extracting destination brand from imagery (Sect. 2), we present our visual classifier which was trained and fine-tuned specifically on tourist photography of destinations to classify into classes which are aligned to those accepted in past e-tourism research as capturing the various attributes of a destination's brand (Sect. 3). This offers the opportunity for a shared, consistent approach to destination brand measurement from visual media. This is demonstrated in an explanatory study extracting the brands of nine different destinations from user generated content on Instagram and comparing them (Sect. 4). The results of this study offer an opportunity for discussing how destination visual branding could be used by destination marketers to adapt and improve their destination marketing (Sect. 5). We close with a conclusion of the contributions of this work to research in applying computer vision approaches in the e-tourism do-main and ideas for future studies making use of visual destination branding (Sect. 6).

2   Background

Destination management includes the management of the mental image of the consumer when they think of the destination, promoting desirable attributes that achieve an intention to visit and differentiating the destination from others, which then becomes the destination brand. The success of this will increase the destination's attractiveness to potential tourists [1] and boost the economic profitability of a destination [2]. Destination marketers have always wanted to understand the image that their target audience has of their destination (perceived image) and how to influence that image to be closer to the intended brand through their own marketing activities (projected image). With the rise of the Web, social networks, mobile and digital photography, a destination's image is being less and less determined by the destination's own marketing and more and more by traveller UGC (user generated content) posted and consumed globally on platforms such as Facebook and Instagram. While marketers suffer a loss of control over the destination's own branding, UGC also provides the opportunity to discover what the audience itself associates with the destination [3] and adapt marketing strategies to emphasize more strongly the positively seen aspects and mitigate negative aspects [4]. Multiple studies have confirmed the increasingly important role of social media and UGC on travel inspiration and planning [5–8].

While destination brand is an aggregate of multiple sources of information and messaging, both online and offline, social media and UGC is playing a significant role.

Instagram is considered to be the most influential social network for travel[1], particularly among millennials and Generation Z where "Instagrammability" has become a criteria for travel. It is said that 70% of photos posted on Instagram are travel related[2]. 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 places[3]. Visual content is found to be a significant contributor to the formation of a destination image [9], enhanced by the public global sharing of photographs on social networks [10]. Both [11] and [12] have indicated that Instagram content can positively influence a person's perception of a destination. Therefore, destination marketing needs to include creating and publishing images and videos that will positively catch the attention of a potential consumer [13]. The emergence of digital photography and its global distribution on the Web led to studies to compare the contents of online destination photos, e.g. those on DMO Websites with UGC on Flickr [14, 15]. Tourism management research has only recently started to explore the use of image sharing social networks in destination marketing [16]. However, a limitation to studies has been the need to manually annotate each image and ensure inter-annotator agreement.

The inaccessibility of automated analytics for image data can be compared to text, where text mining has well established techniques for decades coming from natural language processing. This has changed in the last decade due to new advances in computer vision made possible through neural networks with multiple processing layers (deep learning) [17]. Year on year, new architectures are leading to even better accuracy scores on computer vision tasks, usually benchmarked against the ImageNet-1k dataset (1.2 million photos labelled with 1000 visual classes)[4]. At the time of writing, 9 of the 10 top models use the Transformers architecture. Many top performing computer vision models are available publicly and can be used in "transfer learning" [18]: models are pre-trained with large generic image datasets such as ImageNet-1k and are then fine-tuned with new data for more specific tasks.

To overcome the limitations of manual annotation, e-tourism research has recently begun to use such computer vision models to automatically annotate larger sets of photos. [19] compared tourist perceptions of Beijing, classifying 35,356 tourist photos into one of 103 scenes, which were reclassified manually into 11 categories using the ResNet-101 model. [20] analysed 58,392 Flickr photos geolocated to Hong Kong, comparing perceived destination image between residents and tourists, following the same approach as [19]. [21] used the DenseNet161 model to identify 365 scenes in 531,629 photos of Jiangxi, then LDA to determine the five major tourism topics. [22] used the InceptionV3

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model to assess the destination image of Seoul. They used 39,157 Flickr photos which were classified into 858 classes and then grouped into 14 categories. [23] measure the destination image of Austria presented by Instagram photography using the Google Cloud Vision API[5]. On average 8–12 labels were returned per image (with a confidence threshold of $> = 0.5$) and resulted in 5290 unique labels. Machine learning was then used with the textual labels to produce 15 clusters which were labelled by their most significant associated labels, e.g. Vienna photography was most related to the clusters 'random travel photography', followed by 'urban feelings', 'historical perspectives' and 'cathedral views'. In this literature, no computer vision model has been specifically trained for the tourism domain (e.g. with destination photography). Rather, a generic model trained on a broad range of visual categories (e.g. the 1000 labels of ImageNet) has been employed to annotate a set of tourism photographs and a subsequent clustering step used to reduce the larger number of unique labels to a smaller set of characteristics.

3 Methodology

One consequence of the previous approaches to classification of destination photography has been a lack of any consistent vocabulary for the visual characteristics of the destination. This means that different approaches cannot be compared, and even the same approach would produce a different set of cluster labels for different destinations. E-tourism research has long considered what would be an appropriate set of characteristics to measure the destination image or "the sum of beliefs, ideas and impressions that a person has of a destination." [24]. The visual or cognitive component of the destination image – the mental picture of the location [25] – relates to the physical aspects of a destination that a person is actively exposed to when searching for travel related information [26]. Destination image research has mostly focused on capturing and measuring the cognitive aspect through a finite set of disambiguated attributes considered as common to people's mental constructs of a destination [27]. However, there has been no agreement on these different cognitive attributes nor on the research methods to determine them [28]. The authors compared the attributes used in four key research works in the literature (based on number of citations provided by Google Scholar for the term "destination image") [15, 29–31] and aligned them into a list consistent with the task of visual classification. Table 1 compares the attributes in these works and presents the authors own list (rightmost column). The result (18 classes) covers the brand attributes used in past research as determined by surveys or expert elicitation; climate/weather and tourist activities/facilities were excluded by the authors as they were identified as too visually generic.

With the set of 18 visual classes, we have prepared a new, specific dataset of destination photography for training our visual classifier. The literature in deep learning has repeatedly highlighted the importance of appropriate training data regardless of the complexity or power of the neural network to be trained (imbalances in training data have led to widely reported cases of "AI bias"). After all, a neural network learns visual classification by building up an idea of the common features of the visual category over

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[5] Google Cloud Vision API. https://cloud.google.com/vision/.

its multiple layers, from simpler features (lines etc.) to more complex (shapes etc.) as the network gets deeper. Off-the-shelf models are usually trained on ImageNet, which has been criticized for the quality of its image annotations [32]. We fine tune an existing model with our training dataset for the 18 classes that represent a destination brand. Our training data is collected via Google Images search and results in a dataset of 4949 photos (ca. 275 photos per class, further details in [33]).

Table 1. Lists of cognitive attributes of destination image used in the research.

(Echtner & Richie, 1993)	(Baloglu & McClearly, 1999)	(Beerli & Martin, 2004)	(Stepchenkova & Zhan, 2013)	The author (Nixon, 2023)
Climate	Climate	Weather		
Scenery/nature	Scenery/nature	Countryside	Nature & landscape	Landscape
Tourist activities		Theme parks	Tourist facilities	
		Zoos	Animals; wildlife	Animals
Nightlife/entertainment	Nightlife/entertainment	Nightlife; Bars, discos and clubs		Entertainment
Fairs/exhibits/festivals		Festivals, concerts; Casinos		
Sport		Sports	Leisure activities	Sport
Parks/wilderness		Nature reserves	Country landscape	Trees
		Lakes, mountains, deserts	Outdoor/adventure	Water; mountains; desert
		Flora and fauna	Plants	Plants and flowers
Transportation	Infrastructure	Private and public transport	Transport/infrastructure	Roads and traffic
		Roads, airports, ports		
Architecture/buildings	Cultural attractions		Art object	Art and museums
			Archaelogical site	Monument
Historical sites/museums	Historical attractions	Museums, hist. buildings, monum	Architecture/buildings	Historical building
Beaches	Beaches/water	Beaches		Beach
Shopping		Shopping		Shops and markets
Accommodation/restaurants	Accommodation	Accommodations		Accommodation
	Cuisine	Restaurants; gastronomy	Food	Gastronomy
Cities			Urban landscape	Modern building

As is usual in the deep learning domain, we use a train-test split of the dataset (80%/20%) to improve the training of the model over multiple cycles (epochs) through evaluation against the test dataset. To also validate the resulting model and provide a basis for benchmarking different implementations, we also created a new ground truth dataset from the YFCC100M dataset (100 million tagged Flickr photos), using matching tags to collect 100 previously unseen photos per class (1800 photos total). Our initial classifier was fine-tuned from the InceptionNetV2 model trained on ImageNet and scored 0.91 accuracy on the test dataset and 0.75 accuracy on the ground truth dataset. We have then compared this implementation with the use of other models, focusing on the best performing Transformer architectures. ViT-L/16 has the best test accuracy score to date (0.986) but almost perfect test accuracy can also be a consequence of *overfitting* (fine tuning the model so well on the training data that it performs much worse on new, unknown data) so we focus on the model with the best accuracy score on the ground truth data, which is BEiT-L (0.944) [34].

4　Results

Tourism destination marketers aim to align the perceived destination image of the consumer to their projected destination image (the image they want consumers to have of their destination according to their marketing strategy, i.e. their intended destination brand). [15] state in their paper that "DMOs need to know what images dominate

the internet and whether these images are consistent with the information projected by the destination itself, so that they can reinforce positive images or counter unfavorable images, if necessary". Instagram is the most significant visual medium for sharing destination imagery today. Therefore, as an exploratory study for the use of our classifier, we choose to compare the extracted destination brand of nine different destinations using UGC on Instagram as the data source. The destinations are chosen from the top of the Forbes list of the top 50 destinations[6] so that we can trust that there is significant Instagram photography available and that these destinations would have a clearer brand in the mind of travellers. Using the Python library `instaloader` with the hashtag promoted by the tourist board, we downloaded the most recent photos posted on Instagram with the hashtag(s) (cf. Table 2). After classification, the data was deleted. We did not perform any further preparations on the dataset: we keep the potential randomness that can occur with "real world" data.

Table 2. Chosen destinations, hashtags and number of photos downloaded.

Bali	#balitravel, #visitbali	1137
New Orleans	#onetimeinnola	725
Marrakesh	#visitmarrakech	934
Maldives	#visitmaldives	1045
Paris	#jetaimeparis	625
Dubai	#visitdubai	813
Bora Bora	#visit_borabora	1258
New York	#itstimefornyc	745
Dubrovnik	#lovedubrovnik	695

The classifier labels each photo with a single visual class – a confidence score is calculated for all 18 classes and the class with the highest confidence is the chosen label as long as it crosses a threshold (after some heuristical testing, we chose 0.5). To provide a representation of the destination brand (based on the labels of all the photos), we can sum the number of photos labelled with each class. Since the number of photos differs for each destination, that sum is divided by the total number of photos from the destination to produce a part-to-whole ratio. This means values can now be compared across destinations. Mathematically, the list of 18 numbers which represent the ratios for each of the 18 visual classes can be represented as a *vector*. The resulting vector for Bali's destination brand, for example, is: `[0.07124011 0.04309587 0.10202287 0.01319261 0.02022867  0.03605981  0.06068602  0.06508355  0.09146878 0.01055409  0.01319261  0.01055409  0.09234828  0.05013193 0.08531223 0.0351803 0.02726473 0.17238347]`. The highest ratio is the

last number (in 18th position) which is the value for the visual class of *water*, followed by the third number which is the visual class of *beach*. However, how does Bali's destination brand compare to others? Vectors can be compared and manipulated mathematically. Cosine similarity is a common algorithmic choice which measures the angle between two vectors. The closer the angle between the two vectors, the more similar they are regarding the distribution of their features (the values). Table 3 shows the cosine similarity between four selected destination pairs (New Orleans, New York, Maldives, Bora Bora). The two most similar destinations are Maldives and Bora Bora (0.99) and the most dissimilar destinations New Orleans and Bora Bora (0.2).

Table 3. Cosine similarity between selected destination pairs.

	NORL	NYC	MAL	BOR
NORL	X	0.79	0.25	0.2
NYC	0.79	X	0.51	0.47
MAL	0.25	0.51	X	0.99
BOR	0.2	0.47	0.99	X

To have a visualisation of all nine destinations according to their overall destination brand, we need to do dimensionality reduction. We use the t-Distributed Stochastic Neighbor Embedding (t-SNE) which approximates the distances between multidimensional objects inside a lower dimensional space. Using the `sklearn` Python library, we reduce the 18-dimensional vectors representing the destination brands to two dimensions and plot them on a scatter plot (Fig. 1, created by matplotlib, mpl_toolkits and pylab Python libraries. t-SNE algorithm with perplexity = 5). While the reduction in dimensionality hides the complexity of in which individual features (visual classes) the different destinations are more or less similar, it can be seen how Maldives and Bora Bora are closest to one another in one corner of the 2D space, and New York and New Orleans form a pair in the opposite corner. These two pairs are those which are furthest away from one another, i.e. most dissimilar, and this fits with our cosine similarity measurements (Table 3). Such visualisations show *latent features* in the data, i.e. previously unknown similarities in the destination brands. For example, Marrakesh and Bali are close to one another and a vector subtraction to find the difference shows that both *accommodation* and *entertainment* have a similar presence in their brands. To explore the destinations along specific brand attributes, we can choose a subset of visual classes. We use sets of three classes since three-dimensional data is easier to be visualised and understood than additional dimensions:

- the three dimensions of beach, trees and water represent a "seaside" brand.
- the three dimensions of entertainment, gastronomy and shops & markets represent a "tourism services" brand.
- the three dimensions of historical buildings, modern buildings and roads & traffic represent an "urban" brand.
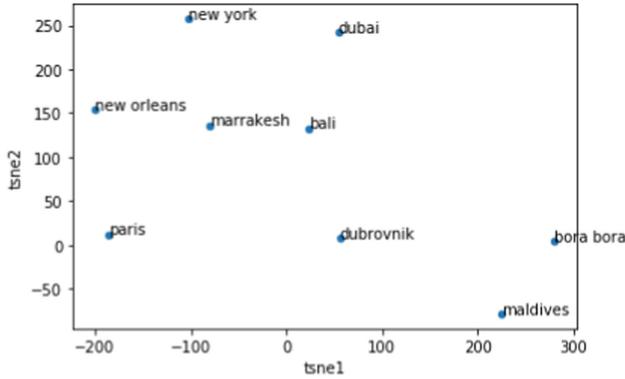
Fig. 1. 2D visualisation of the destination brand vectors.

Figure 2 (created by matplotlib, mpl_toolkits and pylab Python libraries) shows the seaside brand of the destinations. We see clearly Bora Bora and Maldives have the strongest brand (on top of one another on the right-hand side). Bali and Dubrovnik have an equally strong brand association with water but weaker association with beaches. The remaining destinations show weak seaside branding, with only New York and Dubai being slightly more associated with water than the others.
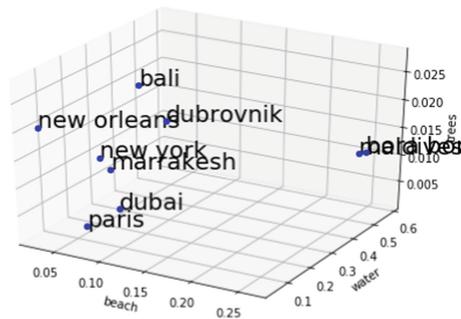
Fig. 2. 3D plot of the destination brand vectors for the "seaside" branding

Figure 3 shows the tourism service brand of the destinations. Bora Bora and Maldives are least focused on these services, i.e. the brand is more about relaxation. Dubrovnik, Paris and Dubai UGC show significant focus on gastronomy. Bali and Marrakesh are well balanced along all three dimensions, with Marrakesh having the stronger association with shops & markets. New York has the strongest brand in the entertainment and gastronomy dimensions, yet it is New Orleans with the strongest tourism services brand overall, particularly from the shops & markets perspective.
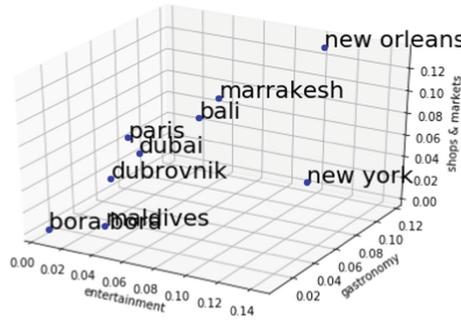
Fig. 3. 3D plot of the destination brand vectors for "tourism service" branding

Figure 4 shows the urban brand of the destinations. Maldives, Bora Bora and Marrakesh have the least urban branding. New Orleans, New York and Dubai are the most urban destinations with strong associations with both modern buildings and roads/traffic. Paris shows the strongest association with historical buildings. Interestingly, Dubrovnik and Bali have brands suggesting low urbanity but with one strong dimension: historical buildings for Dubrovnik and roads & traffic for Bali. The latter suggests that while Bali is also a "seaside" destination, it has a more urban image than Maldives and Bora Bora.
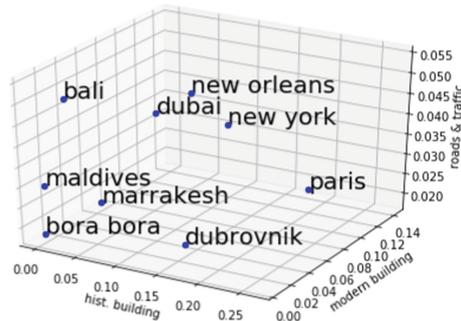
Fig. 4. 3D plot of the destination brand vectors for "urban" branding

5   Discussion

Our explanatory study has shown how the visual classifier can be used to extract a destination brand from image data, in this case Instagram UGC photography. The results indicate that this is an accurate approach to gain insights into how destinations are being presented visually to consumers, in effect the target audience of that destination. UGC is particularly important to destination marketers as photography is used by visitors to capture the most salient attributes of the destination from their experience [35]. A set of photos from a destination can be seen as a materialisation of the tourist's perceived

destination image [36], and thus are a valid data source to construct the existent destination brand [37]. For the marketer, this destination brand can be used to determine their marketing success (how much of their branding is reflected in UGC imagery). Comparisons of the UGC branding with the DMO's intended brand can help identify desirable aspects not in their brand strategy which are being focused on in the visitor photography as well as undesirable aspects that may need mitigation in an adapted marketing strategy. For example, it seems Bali UGC shows more urban infrastructure (roads & traffic) than maybe desirable, whereas beaches are underrepresented. Of course, it may be that Bali does not wish to be seen solely as a beaches-and-water destination like the Maldives. On the other hand, New Orleans – a destination with a strong entertainment brand – has a significant UGC representation of shopping and gastronomy attributes as well, which may indicate to the DMO new aspects to focus its marketing activities on. Finally, destinations can identify other destinations which present a similar brand to the same audience, suggesting targeting opportunities for their social media marketing (i.e., people who visited X may also want to visit…), e.g. Marrakesh and Bali present a similar brand in certain aspects.

6   Conclusion

This paper has presented our visual classifier, trained and fine-tuned specifically on destination photography to classify photos into one of 18 brand attributes. Since the same set of visual classes are used in each classification task, this approach can be used to compare different destinations brands or even track changes in a destination's brand over time or across platforms. Our current version uses the BEiT-L Transformer architecture, scoring 94% accuracy on previously unseen Flickr photography. It is available on the HuggingFace platform[7], where it is possible to classify individual photos via the Web interface or to classify larger photo sets via the API. Our ground truth data is available on Google Drive[8] for others who would like to benchmark their visual classifiers. We believe destination marketers and other tourism stakeholders will benefit from the classifier extracting the destination brand from visual UGC. Just as text mining has long helped marketers to understand what visitors associate with their destination through the analysis of blogs and reviews, visual classification makes it possible for the marketers to gain equivalent insights into the more important aspects of their destination for visitors through the analysis of their photography. While we have focused on 18 visual classes which cover differing sets of attributes established in past research on destination image, the visual classifier can be trained on different or additional classes as needed by the user, e.g. we did not include attributes like traditions or arts and crafts in our classifier as their visual representations would vary greatly across the world. While we focused on attributes with a globally consistent representation, a classifier for a specific purpose (e.g. a specific destination) could be additionally fine-tuned to unique aspects that we could not include, e.g. a hammock in a jungle might be accommodation. Having explored the measurement of a destinations brand 'in and of itself' as well as comparing different brands, we are interested in extending this work by correlating measured destination

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[7] https://huggingface.co/lyndonnixon/destination-image-classifier.

[8] https://bit.ly/visualdestination.

brands with other metrics of marketing success, e.g. social media engagement, visitor numbers or over-night stays. We hope that future research can use the measurement of the destination brand as a starting point to ask fundamental questions such as "is my brand distinct from my competitors?" or "what is the optimal branding to maximise my marketing success and gain visitors?".

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Exploring Post-COVID-19 Branding Strategies of African Destinations

Dandison Ukpabi[1]([✉]) [iD], Benjamin Quarshie[2] [iD], and Heikki Karjaluoto[1] [iD]

[1] University of Jyväskylä, Jyväskylä, Finland
{dandison.c.ukpabi,heikki.karjaluoto}@jyu.fi
[2] Mampong Technical College of Education, Ashanti Region, Mampong, Ghana
bquarshie@mtce.edu.gh

Abstract. The lifting of COVID-19 restrictions has led to the opening of many tourism destinations, with many destination marketing organizations (DMOs) adopting different strategies to attract tourists. This study explores the post-COVID-19 branding strategies of four award-winning African destinations (South Africa, Kenya, Morocco, and Mauritius) and how they utilize social media to communicate their destination brand identities. We curated the tweets of the National Tourism Boards of the examined destinations from their official Twitter accounts and analyzed them using Atlas.ti. We found that each of the destinations uniquely identifies and communicates its destination's competitive advantages. We provide insights and implications.

Keywords: Social media · Destination brand identity · Destination branding · Tourism · Twitter · Culture · Marketing

1 Introduction

The impact of COVID-19 has been felt all over the world in the past few years. As a result of the travel ban, airport closures, and airline groundings around the world, tourism almost came to a halt with attendant economic consequences. Though Africa was not badly affected by COVID-19 (in comparative terms with the number of deaths in other regions) the economic damage to the region was nonetheless huge [1]. With the lifting of restrictions and the resurgence of touristic activities, policymakers and academia are preoccupied with the best strategies to restart tourism activities [2–3]. Some studies have suggested the use of virtual reality [6–7] for tourism recovery. However, not many destinations possess the resources to adopt such technology as a post-COVID-19 reset strategy. [4] analyzed the YouTube ads of National Tourism Boards and suggest that destination branding strategies fall into two layers: during-lockdown and post-lockdown strategies. They extrapolate during-lockdown strategies to include such themes as spreading hope and inspiration, the brotherhood of man, and longing and nostalgia. They further contend that post-lockdown strategies include themes such as the welcome back, Covid-19-safe destinations, and restorative experience.

Though experts [e.g., 5] acknowledge the critical role of destination branding in a post-crisis' nation and communication in a post-covid-19 recovery [8], literature is however unclear on how destinations should communicate their destination brand identities and what role social media plays in the branding strategy in post-pandemic in an African context. The purpose of this study is two-fold: a) to explore the destination brand identity of selected destinations in Africa and, b) to examine how these brand identities are communicated as post-COVID-19 reset strategies. The remainder of this paper is structured as follows: section two looks at the review of related literature. Section three treats the methodology while sections four and five explore the data analyses and discussion sections respectively.

2   Review of Related Literature

Academic literature links destination image to destination brand identity and destination branding [5, 9]. Destination image is defined as "an individual's mental representation of knowledge (beliefs), feelings, and global impression about a destination" [10, p. 870]. Destination image is further decomposed into three components: the cognitive, affective, and conative image [12]. The cognitive image represents the tourist's belief about the destination, the affective image refers to the tourist's feelings about the destination while the conative image refers to the tourist's behavior toward the destination [5, 12]. Thus, a tourist's choice of destination is influenced by the interplay of these elements. Destination brand identity represents the marketer's desired image through efforts developed to influence the perceptions, impressions, and feelings of the tourist towards the destination [5], and mostly occurs through branding activities. Historically, branding's role seeks to identify the goods and services of one seller and differentiate them from those of other competitors [13], and like traditional brands, destinations also have unique identities which are distinct from others [9]. Thus, destination branding relates to marketing activities that create an image of a destination to differentiate it from other destinations and consistently convey a memorable travel experience that reinforces an emotional connection to the destination [16–17]. From a social media point of view, destination branding undergoes a mediatization process through which the imperceptible and intangible cultural elements are productized and consumed by tourists with overall effects on their experiences [18].

Interestingly, social media presents a great tool for managers to communicate the destination's attributes in an effective and targeted manner [18]. Experts have highlighted that the increasing reliance on social media for destination branding is attributed to its unique feature as a co-creation platform, thus elevating the tourist to a critical stakeholder who can also assume the role of a marketer via their destination content-sharing activities [11, 15]. However, during COVID-19, most user-generated messages were prevalent with fake news which fuelled hysteria and wrong purchase decisions [19]. [14] analyzed specific variables such as social media use during COVID-19, fear, perceived risk, attitude, customer brand engagement, brand co-creation, and revisit intention. The study found that fear of COVID-19 and perceived risk positively influence attitude and revisit intention. Similarly, social media has a positive influence on customer brand engagement and brand co-creation. Considering the uncertainty of the period, DMOs adapted

their marketing strategies to present hope and assurance to tourists [4], which were very critical at the time, especially considering the consequent immense human and material losses.

Following the lifting of restrictions, the need to revive tourism has placed significant challenges on destination managers regarding the best strategies to woo travellers [21]. [4] identify the shift of marketing strategy of DMOs' from hope and assurance to emphasis on safety and restorative experience. [20]'s analyses of post-COVID-19 branding strategies of four Italian tourism cities identify both changes and stability in brand attributes and brand values when compared with pre-pandemic strategies. Specifically, destination brand attributes represented by tangible heritage remained stable while intangible heritage such as culture, traditions, and local expertise increased in communication. There was also less emphasis on cityscape and gastronomy while the emphasis on nature increased. There was a greater emphasis on brand values as represented in an increased emphasis on excitement, ruggedness, and competence.

Africa is known for its natural wildlife and robust art culture, which greatly contribute to the world's tourism. There is a need to investigate various dimensions through which tourism in Africa can be sustained in recent times and even in times of dreadful pandemics. As part of the tourism reset strategies, many DMOs in Africa are utilizing social media as a channel to communicate their destination branding activities with varying results. In this regard, the study focuses on how selected national tourism organizations of some top African tourist destinations use their social media handles to promote tourism in their country through posts related to arts and culture.

3   Methods

Using qualitative inquiry, this study explored, through critical examination, to establish the pensiveness of destination image branding within the space of African tourism. The researchers purposefully [22–23] selected and examined the official Twitter handles of four African countries listed in 2021 among the best tourist places to visit by US Travel News and the United Nations World Tourism Organisation (UNWTO). The countries selected include *Kenya, Morocco, Mauritius, and South Africa.* All four countries constituting the sample have been listed as nominees for the World Travel Awards (WTA) for the World's Leading Destinations (WLD) from 2010 to 2021 [24] (Table 1). We accessed the tweets of the national tourism boards of the four countries using their official Twitter handle as follows – South Africa (@SATravelTrade) (662 tweets), Kenya (@magicalkenya) (401 tweets), Morocco (@Visit_Morocco_) (206 tweets), and Mauritius (@SeeMauritius) (102 tweets), from January to August 2022, with only 80 tweets deemed relevant for our use.

4   Data Analyses and Results

First, we employed content analysis to gain insights into the destinations' communication trends [20] and to understand the key themes within the tweets. We tabulated the tweets into three columns (column 1 – serial number, column 2 – the tweet, and column 3 - key themes in the tweet which are also the identified codes for the tweet). Second, we utilized

Table 1. The frequency of African countries nominated for the world's leading destinations

S/N	Country	Number of nominations	Year(s)
1	South Africa	12	2010, 2011, 2012, 2013, 2014, 2015, 2016, 2017, 2018, 2019, 2020, 2021
2	Morocco	9	2012, 2013, 2014, 2015, 2016, 2017, 2018, 2019, 2020
3	Kenya	5	2017, 2018, 2019, 2020, 2021
4	Mauritius	4	2010, 2011, 2012, 2020

Atlas.ti for more rigorous data analyses. Atlas.ti is a popular qualitative data software very useful in analyzing Twitter data [25]. Users can connect their Twitter handle to Atlas.ti, however, this process was problematic for us because we could not access the direct Twitter handle of the focal DMOs. We manually extracted the data, copied them into a Microsoft Word document and coded them as described above after which we uploaded to Atlas.ti. After generating the codes, we built the code groups which were later assembled in the Code Group Manager. Utilizing the feature of Network and Code Group, we extracted word cloud to gain insight into the dominant themes in the tweets (see Fig. 1). The network feature enhances the linking and visualization of connected themes. Moreover, the codes which were built in the first step above were used to synthesize the branding strategies of the focal DMOs as described below.

Fig. 1. Word cloud of the key themes

4.1 Arts, Culture, and Wellbeing

Culture occupies a central place in the destination brand identity of the focal DMOs (Fig. 1). Culture embraces a whole variety of different aspects of the life of the people

such as food, dance, art, language, and marriage, but the different DMOs marketed their culture differently. For instance, Moroccan National Tourism Office emphasized the uniqueness of the Moroccan culture such as its designs, architecture, and food (see Fig. 2). Strategically, Moroccan tourism consciously promotes the religious culture within the region in a subtle manner. We consider such tweets to be strategic because they not only target religious fashionists but also reach out to admirers of the aesthetic artistry in architecture, history, and dances. They also capitalize on their unique ancient artistry and historical landscapes as a brawny marketing approach. Tweeting about the beautiful religious architecture, the colorful murals, reliefs, friezes, and mosaics on the religious temples attracts tourists from around the world.
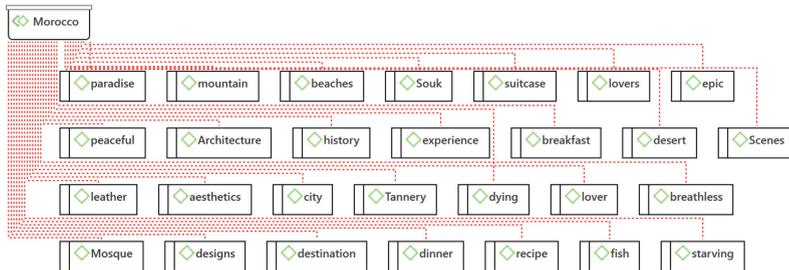
Fig. 2. Network of key themes of tweets of Moroccan National Tourism Office

Like other African countries, Kenya also possesses a unique cultural diversity. This has been well articulated through the social media handle. Some of the tweets show the traditional culture, while others show how the traditional culture, sports, and adventure in the wild are all part of the modern Kenyan culture. Strategically, the achievements of some local villages towards sustenance and promotion of domestic tourism were highlighted.

From Mauritius, we found the tweets about food to be more associated with therapy than a mark of culture. Analysis of the aura surrounding tweets containing food is suggestive of healthy living in a therapeutic destination. Mauritius also severally used love to encompass themes relating to erotic feelings, food, and the pleasurable encounter with natural space within the peaceful island. The therapy of love has been tweeted severally through the account, making Mauritius a destination where lovers rebuild and fortify their union. Similarly, there have been some direct tweets on getting a fussing connection for spiritual and psychological healing (see Fig. 3).

4.2 Wildlife and Adventure

The Kenyan tourism board has a keen interest in sustaining wildlife and the natural reserves as they continue to market Kenya as a preferred destination for wild experiences. Generally, wildlife is the major destination image of Kenya, and its marketing has seen increasing tourist arrival. Critically exploring the posts, we found that adventure with nature was very common (Fig. 4). Most of the tweets give the sensation of direct contact between adventurers and marine life. Whereas many other similar tweets aimed
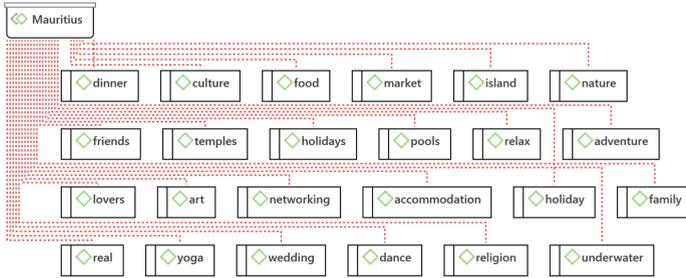
Fig. 3. Network of key themes of tweets of Mauritius National Tourism Office

at drawing visitors to choose Kenya as a destination for a nature experience, there were other tweets intended to call for the protection of wildlife.
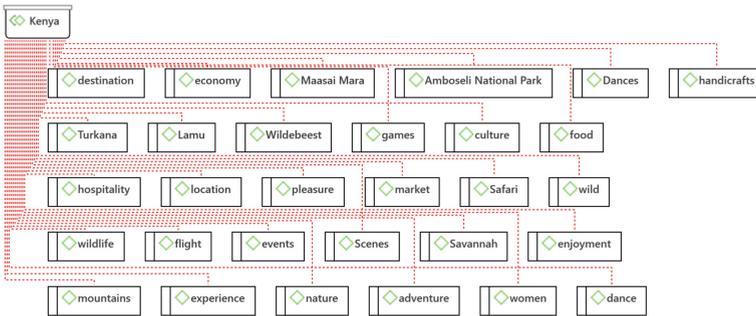

Fig. 4. Network of key themes of tweets of Kenya National Tourism Office

4.3 Business Promotion and Hospitality

A critical observation of the South African Twitter handle reveals most content relating to the travel trade. It creates the impression that the social media handle is serving as the exact reflection of its name—@SATravelTrade. The handle reveals a series of tweets advertising training programs, tourism businesses, and women in tourism. As a deliberate practice to promote the SAT, the tourism industry has been the pivotal focus of the tourism ministry. The warm invitation extended to tourists to visit SA is not only for leisure but to engage in a series of business and marketing events ranging from sports to agriculture and arts and culture. South Africa also has a deliberate attempt to promote the business aspects of the country, visitors, and especially the United States. Through social media, hospitality promotion has been aggressive in the SAT destination image branding. Such hospitality includes hotel accommodations, natural parks, wildlife, and warm receptions (Fig. 5). This strategy tends to draw the visitors closer to the hospitality firms where their accommodation and comfort will be assured upon visiting.

Our analysis of Moroccan tourism social media compared to that of South Africa shows that both countries have unique messages for their destination branding. Whereas
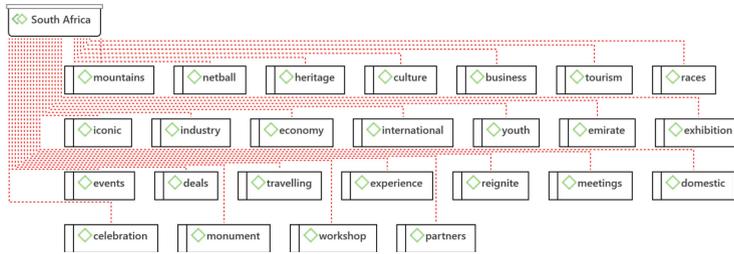
Fig. 5. Network of key themes of tweets of South Africa National Tourism Office

the former focuses on branding itself as a business hub for tourists, the latter prides itself on being a destination of comfort, peace, and leisure for tourists to feel at home. At a glance, the official Twitter account of the Moroccan tourism ministry portrays leisure and the feeling of domicile. Regardless of the type of tweet, be it art (architecture or souvenirs) or culture (local food or religion), hospitality appears to be a common theme that runs through all the tweets. Captivating tweets with well-organized videos of serene places with breathtaking views are frequent on the Moroccan tourism account. In most cases, a single post with an accompanying short video advertises interesting places for relaxation, including beaches and parks.

5   Discussion

This study aimed to explore the destination brand identity of selected destinations in Africa and examine how these brand identities are communicated as post-COVID-19 reset strategies. Following the criteria for the selection of best destinations in Africa by the US Travel News and the UNWTO, we choose four African countries comprising South Africa, Kenya, Morocco, and Mauritius, and analyzed the official Twitter accounts of their National Tourism Board using Atlas.ti. The consistency grounded in a deliberate strategy to rebuild the tourism sector transcends through the social media handles of all the top four leading destination countries in Africa studied. Each uniquely explores destination marketing strategies contextually using the local tourism sites available as a backbone. For instance, South Africa consciously explores business opportunities in all dimensions of its tourism, making its approach to destination branding targeted to business travelers. South Africa brands its destination as a hub for international events like games, conferences, and workshops. Against the backdrop of the consistent and unabated negatively stereotyped destination image of Africa by international media organizations [26], South Africa's brand identity and branding strategies as an attractive destination for business travelers have been yielding efforts in repeat tourism [27]. While Kenya markets other aspects of its destination, however, our study found that the focal point of its destination branding strategies revolves around wildlife tourism, and several studies have echoed the need to improve facilities [28] and capacity [29] to cater for the burgeoning wildlife tourist arrivals. We also found that Mauritius Archipelago positions it as an attractive destination for romantic and wedding tourism, thus confirming [30], while Morocco through its branding strategies valorizes its position as the leading gastronomy and religious tourism destination in Africa [31].

5.1 Implications

Theoretically, our study offers several implications for theory. First, the lifting of COVID-19 restrictions and the attendant restart of tourism activities have seen an uptick in the marketing activities of destinations to attract tourists. While there are several anecdotal literatures on the different post-COVID-19 destination branding strategies, our study is one of the first scientifically based studies examining four internationally recognized tourism destinations in Africa and their post-COVID-19 reset and branding strategies. Second, past studies have explored individual destinations in Africa [28, 30–31], our study through a cross-national comparison evidences the comparative advantage of the chosen destinations and highlight the branding strategies to amplify their attractiveness. Furthermore, our study highlights the universality of social media especially Twitter as a strategic branding tool. The use of Twitter for destination branding by the studied destinations is in sync with similar strategies adopted by popular destinations in advanced countries [9]. Moreover, while there is a scarcity of studies exploring post-COVID-19 branding strategies of destinations, the few available studies utilized YouTube [4] and Instagram [20], thus, our study is among the first to utilize Twitter in exploring post-COVID-19 branding strategies. Finally, while there is a plethora of articles employing quantitative methodologies in analyzing the tweets of destinations, such studies most of the time negate important contexts which could enhance understanding, our use of a qualitative tool provides an enhanced richness and context to the phenomenon under consideration.

From a managerial perspective, DMOs in Africa should realize that the negative destination image of Africa as orchestrated through sensationalized international media coverage is a huge image deficit for the continent. Thus, there should be consistency in emphasizing the uniqueness of their destination brand identities. They can step up the marketing campaign by using national and international social media influencers to promote their destinations. Admittedly, some of the focal DMOs utilized social media influencers, but they were more sporadic than strategic.

Additionally, other African DMOs should utilize the power of Twitter to market and emphasize their destinations' competitive advantage. For instance, the official Twitter handles of Nigeria Tourism Development Corporation @tournigeriang and the Ghana Tourism Authority @ghanatourismGTA can learn from the leading destinations in Africa on the destination brand identity they portray through their tweets. Nigeria for instance should focus on and emphasize the rich arts and culture as its destination brand identity, whereas Ghana focuses on heritage tourism by maximizing its destination brand as the hub of slavery heritage destination [32]. Consistency in the tweets in this regard will create unique destination images which will be much more appealing to tourists rather than just tweeting about tourist sites. Finally, there a is need for curriculum developers and National Tourism Boards in Africa to work together and develop subjects that highlight the competitive advantages of their countries. African child deserves to know the unique destination brand identities of their home countries and thus can be brand ambassadors particularly when they travel abroad.

5.2 Limitations and Future Research

As a limitation, a comparison study of the social media handles of other world's leading destination countries in Europe alongside those of Africa could have provided insight into why African tourism organizations are likely to fall short of winning the ultimate trophy of the world's leading destination. Again, the views of international tourists about what informs their destination choices could help in establishing whether the social media posts by the leading destination countries in Africa meet their satisfaction as tourists.

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Special Research Session on Big Data Analytics and Forecasting in Tourism Market

Estimating Tourist Arrivals by User Generated Content Volume in Periods of Extraordinary Demand Fluctuations

Wolfram Höpken[1]([✉]) [ID], Dominic Regitz[1], Nadine Liedtke[1], and Matthias Fuchs[2] [ID]

[1] Ravensburg-Weingarten University of Applied Sciences, Weingarten, Germany
{wolfram.hoepken,dominic.regitz,nadine.liedtke}@rwu.de
[2] The European Tourism Research Institute (ETOUR), Mid-Sweden University, Östersund, Sweden
matthias.fuchs@miun.se

Abstract. In extraordinary situations, like the Covid-19 pandemic, irregular demand fluctuations can hardly be predicted by traditional forecasting approaches. Even the current extent of decline of demand is typically unknown since tourism statistics are only available with a time delay. This study presents an approach to benefit from user generated content (UGC) in form of online reviews from TripAdvisor as input to estimate current tourism demand in near real-time. The approach builds on an additive time series component model and linear regression to estimate tourist arrivals. Results indicate that the proposed approach outperforms a traditional seasonal naïve forecasting approach when applied to a period of extraordinary demand fluctuations caused by a crisis, like Covid-19. The approach further enables a real-time monitoring of tourism demand and the benchmarking of tourism business in times of extraordinary demand fluctuations.

Keywords: Tourism demand forecasting · Additive component model · Linear regression · Extraordinary demand fluctuations · User generated content · Covid-19

1 Introduction

Compared to other branches, tourism is characterized as a highly volatile business with significant demand fluctuations (Chen et al., 2019). Long-term trends, like the increase of tourism demand over time, are typically overlapped by seasonal, i.e., cyclic, demand fluctuations. Furthermore, crises like SARS or the Covid-19 pandemic, as well as natural disasters, like volcanic eruptions (e.g., Eyjafjallajökull), additionally cause irregular and, as in case of Covid-19, even dramatic fluctuations of tourism demand, thus, threatening the existence of tourism business (Gretzel et al., 2020; UNWTO, 2022).

While long-term trends and seasonal fluctuations of tourism demand can adequately be forecasted even by relatively simple approaches, like the seasonal naïve method or by more complex time series models, like (S)ARIMA (Höpken et al., 2021), irregular

demand fluctuations, like those caused by the Covid-19 pandemic, can hardly be predicted by autoregressive approaches since the past demand is an ineligible predictor in such extraordinary situations. Even if a crisis already takes place, the current extent of decline of demand is typically unknown since tourism statistics are only available with a huge time delay. Thus, what is missing from a business perspective is a real-time monitoring of tourism demand, making demand fluctuations transparent even in extraordinary situations, such as global pandemics.

User generated content (UGC) and especially online reviews provided on online platforms like *TripAdvisor* or *Booking.com*, are increasingly being used by tourists to provide feedback during or shortly after their trip (Dedeoğlu et al., 2020). In general, 5–10% of customers provide feedback on online platforms (Hester, 2021). TripAdvisor, for example, covers over 1 billion reviews and opinions (PRNewswire, 2022) for tourism businesses and tourists typically provide their feedback within 24–48 h (TripAdvisor, 2022). As UGC usage can be observed directly on online review platforms, like TripAdvisor, the UGC volume can be monitored in real-time. If we additionally hypothesize that a certain and stable fraction of tourists provide feedback on online review platforms - a hypothesis which is validated by our study -, UGC constitutes a promising input to estimate the current tourism demand on a short-term basis as a mean of near real-time monitoring of tourism demand.

Based on these considerations, this study proposes an extended time series analysis approach which utilizes UGC data from TripAdvisor as input to estimate current tourism demand with a short time delay. The approach is validated both, under normal circumstances without any extraordinary demand fluctuations as well as for a period including the Covid-19 crisis, thus, considering extraordinary demand fluctuations. The approach is compared with the autoregressive time series approach seasonal Naïve, as the baseline approach to estimate current arrivals based on past values. By this, the study will answer the research question whether UGC from tourists' online reviews enables a short-term estimation of current tourism arrivals with superior accuracy compared to a seasonal Naïve autoregressive prediction in case of extraordinary demand fluctuations.

The paper is structured as follows. First, we offer a brief literature review on tourism demand forecasting, especially focusing on approaches using UGC as input to forecast tourist demand. The method section presents the techniques used for collecting tourism demand and UGC data as well as the methods to estimate tourism demand based on UGC volume. The next section discusses the empirical findings and the outlook section sketches an agenda for future research activities.

2   Related Work

Tourism demand forecasting is considered a thought-provoking science and art (Li et al., 2018). In fact, following Song et al. (2019), there is no single model that consistently outperforms other models in all situations. Consequently, the adopted methods used in modeling and forecasting tourism demand are highly diverse. In previous tourism literature, non-causal time series models and causal econometric models are the two dominant approaches used for quantitative demand modeling and forecasting (Li & Jiao, 2020). Moro and Rita (2016) show that time series-based approaches are the most

strongly applied forecasting methods and that the seasonality phenomena in tourism continues to justify this use. More concretely, autoregressive integrated moving average (ARIMA) models (Box & Jenkins, 1970) appear most frequently in the literature (Song et al., 2019). Moreover, exponential smoothing models (Cho, 2003) as well as shift-share techniques (Fuchs et al., 2000) are additionally found for modeling and forecasting tourism demand through non-causal time series-based methods. By contrast, econometric approaches offer the advantage to enable the analysis of causal relationships between tourism demand (i.e., the dependent variable) and its explanatory variables (Höpken et al., 2021, p. 1000). Literature proposed a broad range of determinants explaining tourism demand, like destinations' consumer price index, substitute prices, gross domestic product/capita, currency exchange rates, interest and unemployment rates as well as ex-/import rates (Athanasopoulos et al., 2018). Additionally, mega-events and advertising investments (Kronenberg et al., 2016), financial crises, terrorist attacks (Smeral, 2009; 2017), disasters and pandemics, like SARS and Covid-19, have shown to significantly impact tourism demand (Zhang, Song et al., 2021).

Following Önder (2017), a major challenge in tourism demand forecasting is the access to timely and cost-effective data. Other challenges comprise demand volatility and the lack of historical time series data (Song et al., 2019; Zhang, 2020). Especially the challenge of lacking historical time series data became critical after the breakdown of international tourism in the aftermath of the Covid-19 pandemic (Zhang, Song et al., 2021). In fact, traditional approaches for tourism demand modeling and forecasting (both, non-causal and econometric models) stop working reliably in case of extraordinary demand fluctuations. Therefore, new data sources and demand modeling techniques are crucial concerns of contemporary tourism research (Li et al., 2021). Particularly big data sources, like web and search engine traffic (Önder, 2017; Höpken et al., 2021; Zhang, Li et al., 2021) are showing the capacity to overcome the challenge of lacking historical time series data due to extraordinary demand fluctuations. Only recently, big data-based approaches employing both UGC from social media and review platforms as well as online news media have been utilized to estimate tourism demand.

Fronzetti Colladon et al. (2019) apply the social network method and semantic analysis to extract variables from UGC on TripAdvisor which were subsequently integrated in traditional forecasting models to prognosticate arrivals to several European city destinations. Results highlight communication network centralization and language complexity as key predictors. Notably, the extracted social media-based variables could improve accuracy compared with a model containing only volume-based web search query data as a predictor in most cases and over nearly all forecasting horizons. The study by Park et al. (2021) tests the role of online news in forecasting tourist arrivals in Hong Kong by employing structural topic modeling. Again, the inclusion of extracted news topics in seasonal ARIMA models significantly improved forecasting performance, especially when the Hong Kong destination was experiencing social unrest. The research by Hu et al. (2022) incorporates tourist-generated online review data regarding tourist attractions, hotels, and shopping markets to forecast tourist arrivals in Hong Kong. Findings indicate that mixed-data sampling models outperform other approaches especially when high-frequency online review data are included in traditional time-series models. Finally, Wu et al. (2022) explore the potential of sentiment information from customer reviews to

enhance hotel demand forecast in Macau. A deep learning-based model is employed to extract sentiment information from reviews of the two major travel-related social media platforms in China, i.e., Ctrip.com and Qunar.com. Subsequently, sentiment indices (i.e., a bullish, average and variance index, respectively) are constructed. Findings indicate that the inclusion of the sentiment indices into an ARIMA model could significantly improve forecast accuracy.

While the approaches above utilize past UGC to predict future tourism demand, our approach intends to estimate current tourism arrivals by the current UGC volume as a mean of real-time monitoring for extraordinary demand fluctuations. To the best of our knowledge, no similar approaches exist in tourism literature so far.

3 Method

3.1 Data Collection

The dataset regarding tourism arrivals has been extracted from the *Statistical Information System Berlin-Brandenburg* (StatIS-BBB), an information service which provides official statistical data from various areas for the German states *Berlin* and *Brandenburg*. The extracted dataset consists of a total amount of 132 entries, containing 13 numerical and one nominal attribute. Tourism arrivals are aggregated on a monthly level, spanning over a period of 11 total years. Each entry consists of information on monthly district-distributed tourism arrivals (e.g., Spandau) and of the total guest number (calculated based on the sum of all districts) of the state Berlin. In this study, only the total number of guests on a monthly basis is used.

The user generated content (i.e. hotel reviews) has been extracted from the travel platform *TripAdvisor*. TripAdvisor offers a huge portfolio of user reviews regarding hotels, bookings, trips or sightseeing attractions in general. Although reviews can be submitted for all kinds of purposes, in the context of this study, only reviews regarding hotels in the state of Berlin have been extracted using a web crawler. The extracted dataset consists of around 360,000 entries, each entry composed of 8 attributes, falling into the categories of *general information* (review title, review date, review text)*, trip information* (trip type, trip date)*,* and *hotel information* (hotel name, hotel-id, hotel-rating). In this study, we only used the amount of hotel reviews aggregated on a monthly level to match the structure of the dataset *tourism arrivals*. Figure 1 shows the two time series *hotel reviews* and *tourism arrivals* for the time period 2010–2020, including the period of the Covid-19 pandemic.

The hotel review time series shows a significant decline beginning in 2017/18, corresponding to the figures of *TripAdvisor*'s average monthly unique users having fallen from 490 million in 2018 to 411 million in the first quarter of 2019 (Dedeoğlu et al., 2020), probably caused by a raising competition by Google as a main competitor. Furthermore, from January 2020 onwards there is a noticeable drop in tourism arrivals and hotel reviews attributed to the Covid-19 crisis and its corresponding regulations and travel stops. As mentioned, the time series *tourism arrivals* and *hotel reviews* have been prepared accordingly to represent both a "normal" and a "crisis" period, respectively.
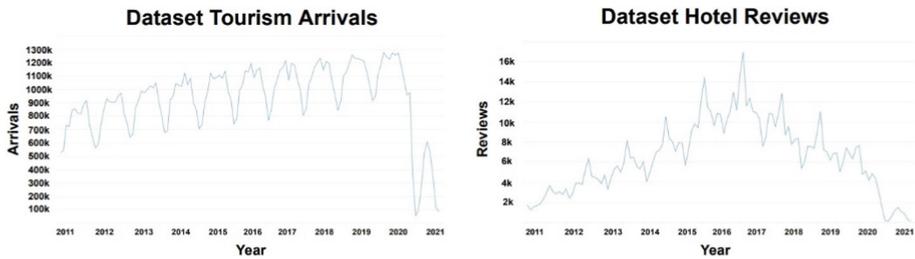
Fig. 1. Original time series of tourism arrivals and hotel reviews

3.2 Data Preparation

Basic pre-processing steps, such as removing missing values or aggregating the hotel reviews on a monthly level, have been executed using the data mining tool set *Rapid-Miner©*. Furthermore, hotel reviews have been classified into different categories (i.e., *friends and family* or *couples*) to represent the total quantity of visitors more accurately. To this extent, reviews of the category *friends and family* have been multiplied by factor four whereas reviews of the category *couples* have been multiplied by factor two. The resulting visitor quantity has been added to the dataset as alternative dependent variable.

Additionally, two separate datasets representing both "normal" and "crisis" periods have been prepared. While the first dataset representing "normal" times contains hotel reviews ranging from the years 2010–2017, the latter represents hotel reviews ranging from the years 2010–2020, thus, including the Covid-19 decline of tourism arrivals.

3.3 Component Model

Time series are commonly split into several different components. In the context of this study, both datasets representing "normal" and "crisis" periods, have been split into their corresponding *trend-*, *seasonal-* and *irregular* components based on the component model approach (Harvey, 2001) and the following steps have been executed:

1. Estimation of the trend component based on the moving average approach with a time window of 12 months
2. Calculation of a rigid seasonal figure based on the moving average of 2 months
3. Subtraction of the determined components from the original time series, resulting in the irregular component

By decomposing the time series, interfering patterns that could affect the results of the analysis are removed. Additionally, a greater understanding regarding the time series can be attained, whereas spurious correlations are avoided. From a statistical perspective, subtracting the trend and seasonal component leads to a stationary time series, which is a prerequisite to execute typical time series analysis methods.

3.4 Estimation of Tourism Arrivals Based on UGC

The correlation between the datasets *tourism arrivals* and *hotel reviews* has been determined using the *Pearson correlation* (Li & Jiao, 2020). Furthermore, the estimation of tourist arrivals based on the amount of hotel reviews was executed using linear regression. The linear regression models have been validated using a split validation, randomly selecting 70% of data entries as training data and 30% as test data, respectively. In total, four regression models were built based on each of the two datasets:

1. The first regression model was used to measure the explanation power of *hotel reviews* as input to estimate *tourism arrivals*. The resulting performance measurements are intended to provide a general explanation of the extent to which the two original time series (*hotel reviews* and *tourism arrivals*) are interrelated and influence each other.
2. For the second and third regression model (*trend-adjusted* and *seasonal adjusted*), the trend or the seasonal component was removed from the original time series, in order to identify the goodness of estimating tourism arrivals without one of these components, or, put differently, to identify their contribution to the explanation power of model one.
3. Ultimately, the fourth and final regression model was built based on the irregular component of the original time series, thus, subtracting both trend and seasonal component. The results of this model represent the explanation power of the estimation based solely on the stationary component of the original time series, without any non-stationary influences, like long-term or seasonal trends.

In order to be able to better compare the results of the fourth model, based on the irregular component, with the actual tourism arrivals, and thus, with the first model, we additionally transformed the estimated results of the fourth model back into the original value domain by adding the trend and seasonal component, again.

3.5 Seasonal Naïve Arrivals Prediction

In the context of this study, the *seasonal naive* prediction method was utilized to compare the results of the different linear regression models described above, with a simple autoregressive time series prediction method as baseline. The seasonal naive approach simply extrapolates the long-term trend and seasonal fluctuations into the future. This comparison was conducted on the two different, previously mentioned datasets representing both "normal" and "crisis" time periods, respectively.

4 Findings

4.1 Component Model

As described in the methods section, the time series regarding hotel reviews and tourism arrivals have been split into their corresponding components based on the additive component model. Figure 2 illustrates the original time series *hotel reviews* and *tourism arrivals* together with their trend, seasonal and irregular components, showcasing data spanning from the period 2010–2020.
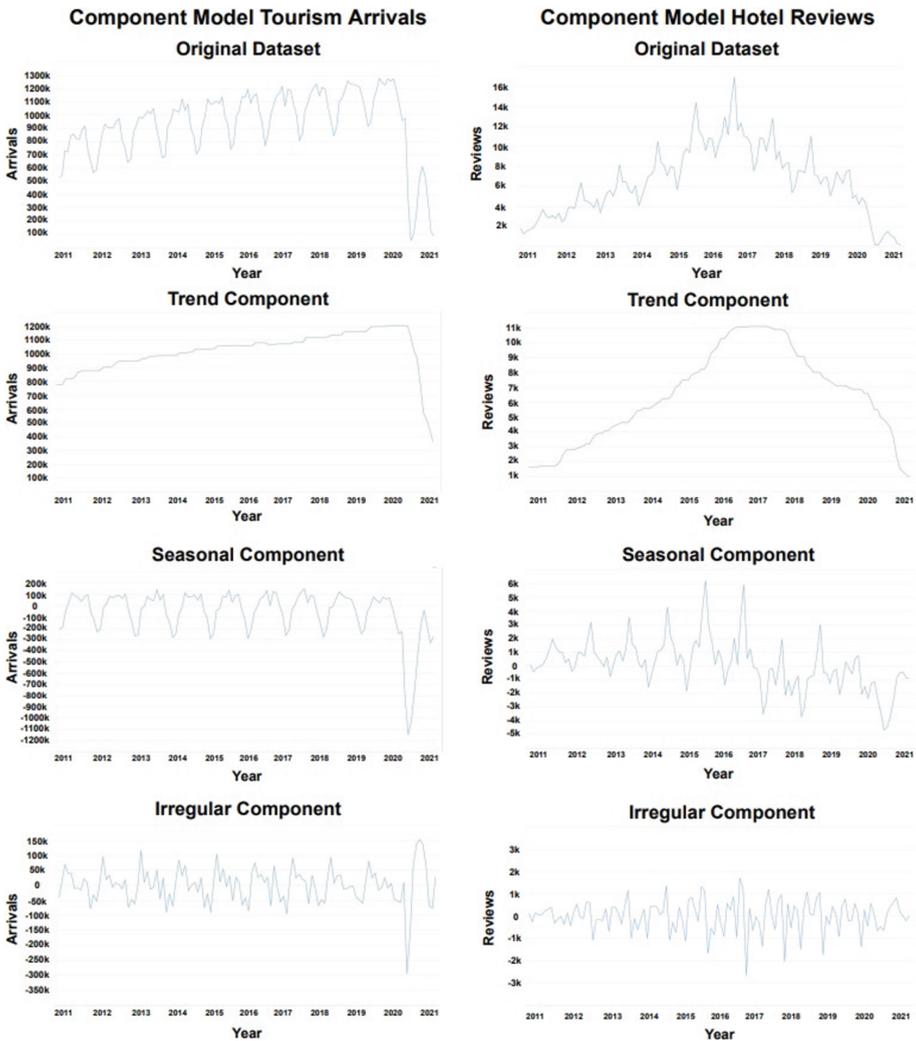
Component Model Tourism Arrivals
Original Dataset

Component Model Hotel Reviews
Original Dataset

Trend Component

Trend Component

Seasonal Component

Seasonal Component

Irregular Component

Irregular Component

Fig. 2. Original time series and components for tourism arrivals and hotel reviews

4.2   Estimation of Tourism Arrivals Based on UGC

In the following section, the results of the Naïve baseline, the correlation analysis and the linear regression models are compared. First, the results based on the dataset spanning from the years 2010–2017 are presented. Afterwards, the results of the models based on the dataset comprising the crisis (2010–2020) are showcased and further analyzed.

Correlation and regression analysis – The normal case. Table 1 summarizes the key insights gained based on the time series representing a normal time period, covering data from the years 2010–2017.

Table 1. Correlation and regression analysis results for normal case

	Original Data	Trend-adjusted	Seasonal-adjusted	Irregular Component	Prediction Model	Naïve Baseline	Improvement in Percent
Correlation	0.644	0.596	0.917	0.017	-	-	-
Squared Correlation	0.543	0.154	0.841	0	**0.976**	**0.976**	-
RMSE	107,036.09	112,479.32	35,085.30	28,284.85	25,049.04	25,052.54	**< 0.1%**

The first row of Table 1 shows the *Pearson correlation* coefficients between the tourism arrivals and hotel reviews for the original time series as well as the different components. The extent to which the trend and the seasonal component affect the correlation and regression results can be seen by the trend- and seasonally-adjusted time series, in comparison to the original time series. In this context, it can be observed that both time series show a strong positive linear correlation. The irregular component, on the other hand, shows only little to no correlation and contains fluctuations that are probably caused by individual actions, such as an increase in the number of guests due to events, like concerts, etc. Ultimately, however, such fluctuations have little to no impact on the amount of UGC.

The second and third row of Table 1 show the *squared correlation* and the *root mean squared error* (RMSE) of the different regression models. The overall prediction model, making use of the irregular component and adding the trend and seasonal component afterwards, can predict tourism arrivals based on UGC with a *squared correlation* of 97.6% whilst having a RMSE of around 25,049 tourism arrivals. The prediction based on the seasonal naive baseline on the other hand is able to predict tourism arrivals with a RMSE of around 25,052.

Based on these results it can be concluded that the model offers very little to no improvement over established forecasting methods such as the *seasonal Naïve* approach. Thus, the irregular component is worthless whilst arrivals can be completely derived from the trend and seasonal component, underpinned by a *squared correlation* of zero of the regression model built on the irregular component alone.

Correlation and Regression Analysis – The Crisis Case. Table 2 summarizes the key insights gained based on the time series comprising a crisis (i.e., the Covid-19 pandemic) including data from the years 2010–2020.

Table 2. Correlation and regression analysis results for crisis case

	Original data	Trend-adjusted	Seasonal-adjusted	Irregular component	Prediction model	Naïve baseline	Improvement in Percent
Correlation	0.696	0.688	0.704	0.680	–	–	–
Squared Correlation	0.503	0.275	0.622	0.421	**0.805**	**0.624**	–
RMSE	152,952.97	139,653.39	117,292.03	105,367.43	118,844.99	162,068.01	**26.6%**

Again, the first row of Table 2 shows the *Pearson correlation coefficients* between the tourism arrivals and hotel reviews for the original time series as well as the different components. When comparing results of the crisis case to the normal case presented above, it can be observed that the *correlation coefficient* of the irregular component has increased dramatically, although all other influences (i.e., the trend and seasonal components) have been removed. Thus, in the crisis case, the irregular component seems to represent an appropriate input to estimate tourism arrivals.

The second and third row of Table 2, again, show the *squared correlation* and the *root mean squared error* (RMSE) of the different regression models. The overall prediction model is now able to predict tourism arrivals based on UGC with a squared correlation of 80.5% whilst having a RMSE of around 118,844 tourism arrivals. The seasonal Naïve baseline however shows worse results. Arrivals can only be predicted with a *squared correlation* of around 62.4% and a RMSE of around 162,068. When comparing the results of the model with the Naïve baseline, predictions regarding tourism arrivals have become more accurate by 26.6%.

We can, thus, conclude that in a case of extraordinary demand fluctuations our model offers a significant improvement over established forecasting methods, such as the *seasonal Naïve* approach and the irregular component now has a clear impact in the regression model, underpinned by the squared correlation of 0.421 based on the irregular component alone.

Additionally, the analyses described above have been repeated for the feedback-prepared datasets as well (i.e. multiplying the amount of hotel reviews by the presumed number of visitors). While in normal times the overall model to predict tourist arrivals slightly increased by 2%, in the crisis period results are even worse by 7%. Thus, since the feedback-preparation process has not enhanced the results significantly, the results based on the feedback-prepared time series will not be considered for further evaluations.

4.3 Discussion of Results

The aim of this study is to answer the question, whether UGC in form of online reviews from platforms such as *TripAdvisor* enables a short-term estimation of current tourism arrivals with a superior accuracy compared to a seasonal Naïve autoregressive prediction in case of abnormal and extraordinary demand fluctuations.

Overall, the results show that based on the time series representing "normal" times, the estimation approach leads to little to no improvements when compared to the Naïve baseline. Thus, tourism arrivals can be best explained by the constant seasonal fluctuations and the linear trend. In case of a crisis, however, when comparing the approach to the Naïve baseline, tourism arrivals can be estimated around 27% more accurately. This gain in accuracy is mainly attributed to the fact that a rise and fall of tourism arrivals is directly and immediately reflected in the amount of UGC. Thus, as a theoretical contribution, we proposed a novel approach to estimate current tourism arrivals based on UGC in form of *TripAdvisor*-based hotel reviews, clearly outperforming traditional forecasting approaches in a crisis period with abnormal demand fluctuations.

As a main managerial contribution, our approach enables a near-realtime monitoring of tourism demand as a robust way to estimate current tourism demand fluctuations,

especially caused by a crisis like a pandemic or a natural disaster. Tourism statistics are typically available only with a time delay of several months.

On the other hand, traditional approaches of forecasting tourism demand based on long-term trends or seasonal fluctuations are meaningless in case of extraordinary demand fluctuations. In such situations, our approach fills a gap and provides valuable insights about current demand fluctuations with a short time-delay as relevant knowledge for tourism planning and management. The presented approach further supports benchmarking activities and enables a hotel manager, for example, to compare own demand fluctuations with a peer group of relevant competitors, to appropriately assess the own performance under circumstances of crises, such as Covid-19.

5   Conclusion and Outlook

This study presented a novel approach to estimate tourism arrivals based on UGC from travel platforms such as *TripAdvisor*. The dataset on *tourism arrivals* has been extracted from the *Statistical Information System Berlin-Brandenburg,* the dataset on *hotel reviews* from the online platform *TripAdvisor*. Both time series have been decomposed into a trend, seasonal and irregular component based on the additive component model, as input to a correlation and linear regression analysis. Furthermore, time series have been prepared to represent both a "normal" and "crisis" period to compare the suitability of the presented approach to estimate tourism arrivals utilizing UGC in these two modelling settings. The presented approach has been compared to a *seasonal Naïve* prediction method as a baseline.

Results demonstrate that the presented approach, when applied to the time series representing *normal* times, offers little to no improvement over established forecasting methods, such as the *seasonal Naïve*. This, however, changes when comparing the results with the Naïve baseline based on the time series comprising a crisis, since tourism arrivals can now be predicted more accurately by 27%. In conclusion, short-term fluctuations of tourism arrivals are directly reflected in the amount of UGC, thus, the latter can be utilized to estimate tourism arrivals more reliably. This discovered relationship is especially amplified during crisis situations, such as the Covid-19 pandemic, where past statistics are relatively worthless and cannot be used to reliably infer current tourism arrivals.

Notably, the study at hand does not come without limitations. First, the significant decline of *hotel reviews* on *TripAdvisor*, beginning in 2017/18, probably caused by a rising competition by Google, constitutes a potential bias and degradation of model performance. Thus, in future research, additional online review platforms could be used to cross-validate results and even further improve model performance. Second, the period showcasing the crisis has been combined with the normal period (2010–2017), as the Covid-19 crisis was still in its early stages when this study was conducted. For future work however, an even more expressive time series representing the Covid-19 crisis could be attained, containing data spanning from the beginning of 2020 to the end of 2022. Third, the approach is tested on one data set only, restricted to the region of Berlin. The same analysis should be executed on a broader scale, covering other tourism regions and countries as well.

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A Scoping Study of Ethics in Artificial Intelligence Research in Tourism and Hospitality

Pauline A. Milwood[1](✉) ⓘ, Sarah Hartman-Caverly[1] ⓘ, and Wesley S. Roehl[2]

[1] Pennsylvania State University—Berks, Reading, PA 19610, USA
{pam325,smh767}@psu.edu
[2] Temple University, Philadelphia, PA 19121, USA
wesley.roehl@temple.edu

> *"If artificial intelligence is trained on data from the real world, who loses out when that data reflects systemic injustices?"* [44]

Abstract. As e-tourism scholars advance innovative research on the use and study of artificially intelligent systems, it is important to reflect on how well we are advancing transformative philosophies which ask that emerging fields consider issues of ethics, power, and bias. We conduct a scoping study of review papers published between 2015–2021 to understand the extent to which ethical and social bias issues are identified and treated in AI research in tourism. Results suggest that the potential for ethical and bias issues in AI in tourism is high, but identification and treatment of these issues by tourism researchers is weak. We summarize key implications of this trend and offer suggestions for pursuing a research agenda which increasingly identifies and treats issues of ethics and bias when advancing research on artificial intelligence (AI) in tourism.

Keywords: Artificial intelligence (AI) · Bias · Ethics · Review · Service robots (SR) · Scoping study

1 Introduction

E-tourism researchers often "chase down" research deemed "sexy" and innovative, with no meaningful charting of ethical ontology within the subject or topic areas. There are benefits to this. For one thing, published scholarship and knowledge dissemination flourishes in real time, as innovative technologies are deployed in industry. Another benefit of the current publication model of e-tourism research is that knowledge organically develops and grows without constraints as scholarly search and scientific discovery exploit new and emerging ontologies. The explosive rate of "smartness" in tourism practice and the rapid pace of published research justifies deeper and more focused inquiry into the identification and treatment of ethical, human, and social bias issues in artificial intelligence (AI) in e-tourism research. It is important to note here, that this study does not

focus on the nature of artificially intelligent systems, the technology on which it is built or generated, nor the nature of its use in the production and consumption of tourism. Rather, the paper focuses on the collection of AI research review papers published between 2015–2021 to better understand how ethical issues related to AI in tourism are addressed.

AI research in tourism shows an increasing publication trend in recent years, as evidenced by publication indices (e.g., *Scopus, SSCI*). Much of this work has adopted a post-positivist stance in seeking to engage and make sense of the disruption AI is having on historically theorized models of tourism. There are specially published spaces within technology-focused (e.g., *Journal of Tourism Technology*) and non-technology-focused (e.g., *Journal of Hospitality and Tourism Technology*) titles as well as dedicated published collections (e.g., *Annals of Tourism Curated Collection, Robonomics*) which have focused primarily on the impact of AI.

At the same time, the global community has grown increasingly wary of "better, smarter, faster" innovations. Customers are keenly interested in understanding how personal data is collected, stored, and used in business processes. Tourism managers and policy influencers, having observed the historical awakening and present-day ideals for ethics, environmental sustainability, and corporate social responsibility, should therefore seek to understand the critical importance of issues of data privacy, transparency, and anthropomorphic developments. E-tourism researchers, and specifically those in AI, should also determine our collective responsibility to not merely chart the rapid deployment of AI systems in tourism, but lead scholarly discourse on the importance of maintaining ethics as part of the development of innovative research.

This paper takes a transformative approach [1, 2] to investigate the following research question: "to what extent has e-tourism research identified and treated ethics and bias issues within the topic area of artificial intelligence (AI)?" We employ a scoping study [3, 4], defined as "a form of knowledge synthesis that addresses an exploratory research question aimed at mapping key concepts, types of evidence, and gaps in research related to a defined area or field by systematically searching, selecting, and synthesizing existing knowledge" [5, p. 373] to systematically identify, chart, analyze and summarize identification and treatment of these issues in e-tourism research. In the following sections, we review literature and explain the methodological approach of conducting the scoping review. We then discuss results and close with implications and considerations for future work.

2 Literature

2.1 Artificial Intelligence

AI comprises training and input data, the algorithmic 'rules' by which data is processed and analyzed and output results [6]. AI is classified as limited or general. Much of the research in and around tourism has focused primarily on limited AI applications designed to complete a discrete and defined task [7]. Limited AI applications in tourism include big data analytics; smart devices in the Internet of Things (IoT); biometrics like speech and facial recognition; service robots; and blockchain technologies that enable services like personalized recommendations and smart chat bots; self-driving luggage carts in

airports; smart check-in, venue access, and security; contactless food delivery or house-keeping services; and identity verification at border crossings [8, 9]. Li et al. [8] classify limited AI in tourism into four categories of AI service encounters: 1) *AI-supplemented* which includes use of real-time and historical data from searching, purchasing, and social media activity to make personalized recommendations, streamline and deliver contactless services; 2) *AI-generated* which includes use of biometric facial, speech, and movement recognition systems to facilitate self-check-in, smart tourism, and health monitoring; 3) *AI-mediated* which comprises service robots, virtual and augmented reality (VR and AR) to enhance virtual booking; and 4) *AI-facilitated* which includes customer experience (CX) and customer relationship management (CRM) [8].

General AI describes (semi-)autonomous computation that solves complex problems. General AI approaches in tourism include the use of machine learning (ML), neural networks, or deep learning to discern trends in tourist behaviors, perceptions, and preferences to forecast demand, streamline service delivery, and upsell and cross-sell to optimize revenue [10, 11]. Further developments in biometrics, emotion detection, and sentiment analysis signal a shift from smart tourism to "neurotourism," experiences that are automatically responsive and customized to the unique preferences and even subconscious desires of individual travelers [10]. In their report on post-pandemic travel and tourism, McKinsey & Company declare that sentiment analysis and predictive analytics are necessary for prescriptive business models that maximize return-on-investment [12].

2.2 Ethics, Bias, and Artificial Intelligence (AI)

While there is significant debate in the computer science and technology fields on the need for ethical AI, ethical considerations, including bias, has seen comparatively less dialogue in smart tourism scholarship. In their systematic review, Xivuri and Twinomurinzi [6] determined that most research on AI fairness is not sector-specific (62% of studies examined), while 21% focused on public services sector (criminal justice, immigration, and government), 11% on the health sector, 2% on the financial sector, and 2% from the communications sector [6, p. 276]. In their 2021 systematic review of AI in tourism operations, Li et al. [8] acknowledge "the social and ethical issues of AI, such as ubiquitous surveillance, privacy, and equality, are important but not considered in the present study" [8, p. 8].

Ethical AI encompasses fairness, accountability, privacy, and autonomy. Fairness considers both individual attitudes toward AI outcomes, and the sociocultural context in which the system is deployed. "A fair AI system is one that aligns with shared human values and supports human flourishing" [14, p. 5]. Specific considerations include reciprocity and the ethics of care, beneficence and non-maleficence, fidelity and responsibility, integrity, equitable treatment, justice, and explicability [13, 14].

The introduction of automation poses a risk of economic dislocation and consideration for social responsibility within the tourism sector [8]. Saul and Etemad-Sajadi [11] observe that "seasonal, casual and some operational staff in the hospitality industry could be most impacted over time by the rise of artificial intelligence." The Organization for Economic Cooperation and Development (OECD) prioritizes "inclusive growth, sustainable development, and wellbeing" along with "human-centered values and fairness" in its "Recommendation of the Council on Artificial Intelligence" [15]. The European

Commission's Ethics Guidelines for Trustworthy AI articulates a framework based on four ethical principles: respect for human autonomy, prevention of harm, fairness, and explicability. Prevention of harm includes awareness of "where AI systems can cause or exacerbate adverse impacts due to asymmetries of power or information," while fairness describes conditions "free from unfair bias, discrimination, and stigmatization" [16, p. 12].As a component of ethical AI, algorithmic bias describes "systematically unfair outcomes that can arbitrarily put a particular individual or group at an advantage or disadvantage over another" [7, p. 2). AI bias is significant because it is felt on a wider scale than human bias, which tends to be more localized in its impact [17]; thus, "seemingly small error rates can still have a negative impact on a substantial number of individuals" [18]. Examples include the failure of facial recognition software to correctly identify Black and East Asian individuals as well as women and gender minorities; the disproportionate assignment of negative emotions to Black men in biometric sentiment analysis; discriminatory and exclusionary ad placements in search engines and social media platforms; bias in professional recruitment and candidate ranking in human resources; and racial bias in medical automation [7, 18, 19]. AI bias can arise from the training or input data, in which members of minoritized groups may be underrepresented (un-visible) or overrepresented (hypervisible) in the data to their disadvantage [14, 17], dynamics which Dancy & Saucier [20] characterize as "predatory inclusion" and "unwanted exposure" (2022), as well as from the design, development, features, processes, or outputs of the algorithmic model [7, 14]. Bias can also be introduced indirectly when input data is sufficiently correlated with a protected class or characteristic to act as a surrogate for that attribute, such as the Federal Trade Commission's warning that use of postal codes to determine financial creditworthiness can result in illegal racial and ethnic discrimination [21].

Additional AI ethical considerations include data protection, privacy, autonomy, trust, safety, and artificial intimacy. Akter et al. [7] found that the exploitation of search, browse, and purchase history to shape consumer behavior and decision-making can contribute to trust declines and reputational damage. Additionally, dynamic pricing and price personalization can evolve into actual or perceived price discrimination [7]. The Public Voice [45] name data quality, public safety, cybersecurity, and prohibitions on secret profiling and unitary scoring (so-called "social credit scores") among its "Universal Guidelines for Artificial Intelligence", while OECD includes robustness, security, and safety in its "Recommendation of the Council on Artificial Intelligence" [15]. Artificial intimacy describes AI applications designed to mimic social interactions, which can leverage emotional states and perceived closeness to influence customer behavior [22]. For a human-centered enterprise like travel and tourism, with all the complexity and idiosyncrasy that implies, Strauß [23] warns that "AI has a transformative capacity where 'natural' aspects of society are at a risk of becoming reduced to machine-readable, datafied models that fit the logics of the artificial" (p. 4).

3 Methods

3.1 Data Scoping Steps

By undertaking a scoping study of published review papers, we methodologically associate this study with what Arksey & O'Malley [3] and Pham et al. [5] refer to as "a scoping review of scoping reviews". While similar to systematic reviews, the aim of this study was narrower in nature. Specifically, we aimed to map the literature in tourism to better understand identification and treatment of ethics in AI research.

In response to the guiding research question, peer-reviewed articles which met the following criteria were selected for the study: published 1) in English, 2) in tourism-focused research journals, 3) between 2015 and 2021. Electronic database searches include *CAB, ProQuest, and Business Source Premier (BSP).* Search terms across all databases included "tourism" OR "hospitality" AND "artificial intelligence." Initial and updated searches were conducted in tourism and business databases, journals, and conference proceedings resulting in 33,848 and 15,414 articles, respectively. Further filtering for "type = peer reviewed", "language = English" and "time = 2015–2021" resulted in 2,030 articles.

Following Pham et al. [5], we conducted an initial title and abstract review of these articles. Next, we decided to refine the search strategy by applying the search criteria to the abstract field to increase the relevance of the corpus of literature that would be retained for the study. Two investigators independently reviewed abstracts and full titles to determine final inclusion. Discussions were held to address challenges and uncertainties related to articles to be included in the study. Review of these articles for relevance and accessibility led to the retention of 170 articles for manual screening. Two investigators manually screened these abstracts for relevance (i.e., review-type articles), duplicity, and accessibility. This was done until 100% agreement on the final pool of articles was achieved between the investigators. A pool of n = 27 articles which met all study criteria for relevance, publication period, language, accessibility, and review method was retained for charting analysis. Scoping identification, search, selection, and screening strategy steps are depicted in the first column and halfway down the middle column in Fig. 1 (see Supplementary Material).

3.2 Data Charting

Data charting was an iterative process which involved cross-charting between investigators to address discrepancies and divergencies in charting activities. Two investigators were responsible for charting the data to determine deficiencies in AI-focused tourism literature as it relates to empirically reflecting and treating underlying issues of ethics and bias. To determine this, investigators used thematic analysis to identify and document ethical and social bias implications of the AI technologies, techniques, or applications discussed in each article. This was followed by documenting the explicit discussion of ethics, and bias reduction specifically, in each article. Thus, the ethical and social bias implications documented in each article may be either explicit or inferred by us during charting analysis; while the treatment of ethics and bias was sought to be explicit in the article. The presence of an ethical or social bias implication that is not met with

considered discussion elucidates the gap in ethical consideration which we seek to discover and document in this scoping review. Discussion and debriefs were held before and after the first round of charting to determine variable parameters which would constitute relevance to the research question. To ensure validity of the final sample, charting entries were cross-checked by two investigators if there was uncertainty or challenge during charting (e.g., a viewpoint paper did not review literature; identical but differing chronology of authors revealed duplication; and use of primary data related to customer experience with service robots). This process of cross-charting resulted in the deletion of five articles from the sample pool resulting in a final sample of n = 23 articles. Summary charting notes are provided in the Appendix (see Supplementary Material).

3.3 Data Overview

Descriptive characteristics for the pool of (n = 23) review articles are shown in Table 1 (see Supplementary Material). One (1) review article was published in 2017 and one (1) in 2018, three (3) in 2019, eight (8) in 2020, and seven (7) in 2021. Based on author descriptor, most papers employed a literature review methodology or review derivative (e.g., comprehensive research review, systematic review), bibliometric analysis or critical analysis. Other articles reviewed trade literature and/or industry trends, while others adopted industry use-case analyses. Also included in the pool of review articles were viewpoint or perspective papers. The papers reviewed research on service automation, big data and artificial intelligence (BDAI), service robots (SR) and service automation, and artificial intelligence-enabled internet of things (AI-enabled IoT). The articles spread across eleven tourism and hospitality-focused journals with first author institution affiliation spanning North America and The Caribbean, The United Kingdom, South and Southeast Asia, Western and Southeastern Europe, and the South Pacific.

4   Results and Discussion

From preliminary analysis of results of this scoping study on identification and treatment of ethics and bias issues in AI research in tourism and hospitality, we identify five categories across articles reviewed: 1) privacy and bias, 2) protection and transparency, 3) (de)humanization and sustainability, 4) inclusion and safety, and 5) policy and legal. These issues, their treatment in reviewed literature, and implications for research and practice are summarized below.

4.1 Privacy and Bias

Ethical issues related to guest privacy were mentioned in several papers, and include behavioral tracking of guests [24, 25], use of sensitive guest data, privacy literacy, intimate privacy [26], employee privacy, voice-recognition algorithms, and other "creepy" human surveillance which could be deemed to violate the sense of trust between guests and hosts. Bowen and Whalen [24] suggest an article, *"Disclosing personal information via hotel apps: A privacy calculus perspective"* for "further reading". Hajal and Rowson [25] go further. They acknowledge that ethical concerns around the implementation of

AI-driven technology "could be considered a threat to personal privacy and data rights" [25, p. 55], given the inaccuracy shown in recent studies, when it comes to identifying African American and Asian faces in comparison to Caucasian faces. Other examples include the ability of IoT to keep companies connected to driverless vehicles post-sale and hotels and restaurants' ability to keep connected to guests beyond the initial stay or visit, for target marketing purposes. Research has found that behavioral tracking data may be used to enhance guest experience [24] and authors generally agree on AI as a source of social progress [25]. However, the use of sensitive guest data for targeted marketing raises issues of which data guests agree to disclose, and their control over when and how that data will be used. In keeping with guidelines for the respect for privacy and data governance [16], AI researchers should engage in applied research collaborative partnerships to address data privacy, trust of AI and implications for guest experiences. As well, we should support the establishment of normative practices for industry which promote sustainable target marketing, data privacy, protection and transparency.

4.2   Protection and Transparency

Protection and transparency involve aspects of artificial intimacy, data protection, ownership, consent [28], trustworthiness [29], and guest and employee protections. There is an urgent need for accountability and transparency in the secure use of sensitive biometric and psychographic data which feeds autonomous services and the IoT. Still, fulsome treatment of data protection and transparency issues have been relegated to futuristic possibilities in published research, leaving data ownership and safekeeping of sensitive data under-research. While Samara et al. [30] acknowledge the EU's recently introduced General Data Protection Regulation and the impact it is expected to have on the way BDAI is conducted, McCartney and McCartney [28] highlight several deficiencies. They acknowledge neglect of the topic of data protection and protocols; the need for the hospitality and tourism industry to consider legislative oversight for data protection; and weak protections for humans in the face of continued SR integration. They call for an SR hospitality research agenda to address emerging risks and security concerns to include data protection and protocols. Cobanoglu and Demicco [32] found that hotels bypass critical cybersecurity protections for computers and software, thereby exposing guest and employee data to cyber-related risk.

4.3   (De)humanization and Sustainability

(De)humanization and sustainability issues relate to employee protections and include socio-economic dislocation [33, 34] and environmental displacement [10]. The underlying value of AI rests in its anthropomorphic capabilities to perform humanlike tasks based on algorithmic programming. Several researchers highlight risks facing human workers whose talents are being supplemented by the very AI systems replicated from human design (e.g., Chipotle's Chippy). While AI researchers agree on the benefits to guest experiences, these models can lead to dehumanization [25, 36] of the workforce arising from emotional exhaustion among service employees [37] stemming from use of SR employees with whom absenteeism, workplace conflict, and performance-based compensation issues do not arise; and who are able to perform at higher levels of efficiency.

The result is social and economic dislocation due to replacement of low-skill and low-wage positions [35]. Environmental displacement concerns have also been raised based on the use of AR and VR technologies to facilitate immersive experiences for guests. On the one hand, environmental and socio-cultural sustainability can be enhanced [10]. On the other hand, cultural and heritage erosion, human-nature (dis)engagement, and unsustainable tourism communities emerge and should be researched.

4.4 Inclusion and Safety

Ethical issues of social inclusion and safety relate to linguistic and human bias towards anthropomorphic robots [28], algorithmic bias [30], gender bias [38], and biases related to e-human resource management [24]. For example, algorithmic bias related to AI linguistics [39, 40] can serve to exclude traditionally marginalized groups such as Black, Indigenous, and People of Color (BIPOC). AI recommender and information systems for example, are programmed mostly by non-BIPOC groups who unknowingly create algorithms reflective of social biases and inequities in society. Bhushan [31] encourages diversity in AI development teams as a means of controlling this form of bias. This is especially important given that much AI development has occurred in westernized, "white male" contexts, privileging this group over comparatively underserved gendered and minoritized groups when it comes to use of AI systems for voice- and face-recognition. Methods research dedicated to the measurement and management of diversity, equity, and inclusion in AI-use in tourism should address accessibility across stakeholder groups and accessibility across spatial-temporal dimensions. This would mean that fair and inclusive AI access form parts of key destination performance measures.

4.5 Policy and Legal

Policy and legal issues include capabilities and responsibilities of service robots, issues of risk and compliance [28], and rights of both SRs and humans interacting in the tourism space. Issues of digital and material inequalities in guest interactions with SRs and sexbots [35] suggest need for laws to adapt and protect both humans and robots, as well as to protect human sex workers from their algorithmic competition. McCartney and McCartney [28] identify the need to address ethical issues of trust and emotional attachment between SRs and children in their care. Also relevant are issues of power, discrimination, equality and justice between SRs and employees whose positions and roles become intelligently automated [39]. Li et al. [42] acknowledge social and ethical issues of AI, such as ubiquitous surveillance, privacy, and equality as important considerations for future research. Gaur et al. [40] state that it is essential to study the ethics involved in adopting AI and robotics in the hospitality industry, while Lv et al. [43] call for greater ethical care in the use of big data artificial intelligence (BDAI) in analytics and forecasting methods. These authors acknowledging that while existing research mainly focuses on the bright sides that big data brings into hospitality and tourism, the dark sides remain largely unexplored and could be investigated by future research. In response, Cain et al. [35] encourage the need for regulatory and legal frameworks in AI. These positions invariably reflect the overall neglected treatment of policy and legal issues in AI studies.

5 Conclusions and Future Work

The hospitality and tourism sector cannot afford to ignore ethical issues in AI. As Akter et al. [7] point out, there is convincing consensus among scholars that the future source of competitive advantage of a firm is dependent on the extent to which it can safely and securely deploy bias-free AI solutions to deliver real-time decisions and solve critical business problems. Tourism managers and policy influencers who ignore or fail to effectively incorporate AI ethics in the deployment of innovative technologies risk unfavorable scrutiny from a global community now keenly interested in safe and secure AI. Experienced and emerging AI researchers are encouraged to forge ahead of the ethics curve and lead critical discourse on the ethics of AI-use in tourism, even as we continue to expand cutting-edge AI research.

This study provides support for the shared responsibility we have as tourism researchers and practitioners to ensure that AI research and use are as ethically encompassing as they are novel. By placing attention on the occurrence and treatment of AI ethics issues in tourism scholarship, this study calls on e-tourism researchers to be more deliberate in addressing AI ethics in scholarly work; on conference organizers and journal editors to create meaningful spaces for AI ethics discourse; and on industry stakeholders to actively engage strategies to mitigate impact of unethical AI practices in designing service experiences. Furthermore, scanning the journal titles from our set of twenty identified articles suggests that the conversation about AI, ethics, and tourism appears to be occurring in our niche journals, rather than in the mainstream of our literature.

Limitations of this scoping study create opportunities for future work. For example, use of additional databases may have revealed other relevant articles. The dramatic level of shrinkage in the number of articles, from thousands down to twenty, suggests the need to further refine search terms, since the terms that were used were identifying both those articles relevant to this study's goals as well as many articles that mentioned AI and AI-related terms in passing. Finally, investigating treatment of ethics within specific application areas in tourism and hospitality (e.g., big data artificial intelligence, service robots) presents another future research direction to determine whether AI scholarship in tourism tracks with other service research fields.

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Tourist Flow Simulation in GAMA Using Historical Data Parameters

Ivan Majic[1] , Johannes Scholz[1(✉)] , Rizwan Bulbul[1] ,
and Stefanie Wallinger[2]

[1] Research Group Geoinformation, Institute of Geodesy,
Graz University of Technology, 8010 Graz, Austria
{majic,johannes.scholz,bulbul}@tugraz.at
[2] Department of Business and Tourism, FH Salzburg, 5412 Puch/Salzburg, Austria
stefanie.wallinger@fh-salzburg.ac.at

Abstract. Decision makers in the tourism sector deal with various issues and need high-quality information to support their decisions. We propose a data-centric approach that analyses historical point of interest (POI) check-in data to determine parameters for an Agent Based Model (ABM). ABM simulation is then run multiple times to simulate possible outcomes in terms of the tourist flow. We have tested the proposed approach on the city of Salzburg using check-in data from Salzburg Card users across 29 POIs. These data were used to parameterize the ABM model with the number of people, the number of POIs a person visits per day, and the preference for selecting POIs to visit. The simulation was performed in GAMA ABM platform and the spatial environment was based on buildings and roads from OpenStreetMap (OSM). Simulation for the duration of 1 day has been repeated 50 times to generate POI visiting patterns. The simulation results have been compared to the ground truth data for the same day and they show that the approach can recreate the long-term pattern of POI visits, but has over-estimated several POIs that had lower visitor counts on that specific day.

Keywords: ABM · Geo-simulation · Tourism

1 Introduction

Tourism sector deals with various issues and requires reliable information to support decision making. One tool that is established for this task is the ABM [1], which is a computational approach for modeling complex systems consisting of interacting autonomous agents and simulating their activities [2]. Contrary to the top-down approaches that can estimate total number of tourists and provide a high level overview [3], the bottom-up approach of ABM defines and tracks behaviors of each individual tourist and can answer "what if" scenarios. Thus,

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the simulations generated by ABM can provide valuable insights to decision makers in dealing with current and future situations (e.g., what happens if some POIs are closed or the number of tourists is doubled?).

For ABM to be successful in creating realistic simulations, it first needs to be initialized with the right parameters for agents' behavior. These parameters can be obtained by analyzing historical data, such as POI check-in data in the case of this study, for tourist flow patterns and behavior. Here we propose an approach for building a spatio-temporal ABM to simulate the behavior of tourists in the city of Salzburg based on the historical data of POI check-ins with tourist card. The main research question of this paper is *can ABM adequately simulate tourists' visiting patterns in terms of visits to POIs in one day*? The practical contribution of this study is the extraction of ABM simulation parameters from check-in data format which can be recreated for other similar input datasets. Theoretical novelty, which we have not seen elsewhere, is in the use of frequent itemset mining to define agents' decision making for the next destination.

2   Related Work

Baktash et al. [1] recently reviewed existing literature on ABM in tourism. According to their classification, our study falls between the tourist flow management and tourist decision making. Recent studies in these fields have looked at ABM for tourist flow management for 41 attractions in Sichuan [4], the spatial spillover effects across 314 Chinese cities [5], and user generated content analysis to deduce desired destinations [6]. What stands out about [1] is that there is no mention nor discussion of the role of machine learning (ML) and artificial intelligence (AI) for ABM in tourism. This shows us that even if such trend exists in other fields, there is a gap in the tourism ABM with potential to improve tourist behavior modeling by using ML and AI on historical data. Additionally, the tourist check-in data that is used here is not commonly found in literature and presents a new challenge.

3   Methodology

The proposed approach starts by analyzing the proprietary POI check-in data obtained from Salzburg Card[1] users (Fig. 1) who are usually short term visitors to Salzburg. The data hold anonymous check-ins into 29 different POIs from 2017 to 2019 where each row shows a unique user identifier, the name of the POI, and the date of the check-in.

There are three parameters of the ABM environment that need to be determined from the input data via statistical analysis and data mining including the number of tourists, the number of POIs visited per day, and the POI selection preference by tourists. The number of tourists for the day of the simulation is set to be the same as the number of active tourists on the previous day in the

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[1] https://www.salzburg.info/en/hotels-offers/salzburg-card, Data can only be shared within the dTS project consortium.
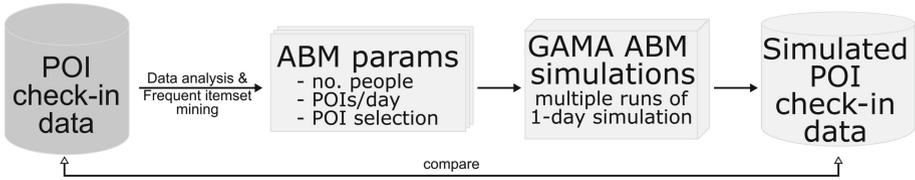
Fig. 1. The workflow of the proposed method. POI check-in data are analyzed up until the day of the simulation to extract ABM parameters, and the results of the 1-simulation are compared against the ground truth data.

data. For the number of POIs that tourists visit per day, we consider the distribution of these values for all the days in the data prior to the simulation day. We then use the mean, and standard deviation values to randomly select a number of POIs that each agent in the simulation has to visit using the *gauss (mean, standard_deviation)* GAMA function. The POI selection preference is defined by mining frequent itemsets of length 1 on individual POIs. The supports for POIs were calculated using the check-ins up until the day of the simulation and the support expresses the ratio of tourists that have visited the POI. The supports are then used as weights in the weighted random choice function used by tourists in the simulation to select their next destination.

The next step is to run multiple simulations of tourist flow in the city of Salzburg for the specified simulation day using the GAMA ABM platform[2] which supports the use of spatial datasets for defining the model environment [7]. We use OSM, the most prominent Volunteered Geographic Information (VGI) dataset [8], as a source of 2D vector information about road networks on which agents can move and building footprints as their origins and destinations.

The results of the simulation runs can be aggregated and compared to the ground truth POI check-in data for evaluation.

4   Experiment and Results

The experiment was performed on a standard PC with an I7 processor and 16 GB RAM running a Windows operating system. POIs were represented as point geometries sourced directly from Salzburg Card. The agents were initialized as sleeping at accommodations and would start visiting POIs around 8AM and would finish their visits when they have visited the requested number of POIs for the day. We ran 50 simulations for the simulation day March 1, 2019.

Figure 2 shows the histogram of visited POIs by a single user per day. The leftmost histogram shows the data from January 1, 2017 until March 1, 2019 which were used to train tourist-agents in the ABM simulation. The middle and right histograms show the simulation result for March 1, 2019 and the respective ground truth data. It can be noticed that the counts of simulated POI visits per

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[2] https://gama-platform.org/.

agent (middle) are distributed similarly to the actual POI visits per tourist on the simulation day (right), which is also confirmed by the chi-squared test value of $\chi^2 = 0.1455$ between these two histograms.
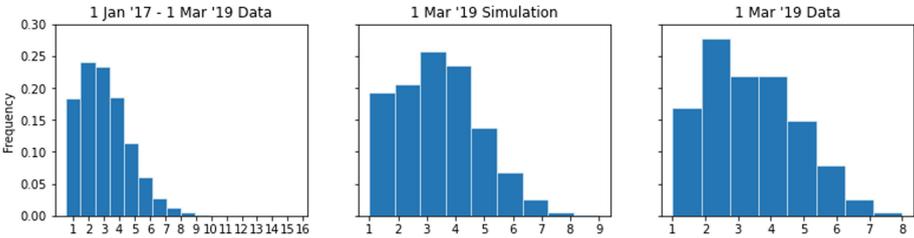
Fig. 2. Histogram showing the number of POIs visited by a user per day for the data until the simulation day (left), simulation results (middle), and the real data on the simulation day (right).

In Fig. 3 we list the 29 POIs within the City of Salzburg and their average visiting probability per tourist (dashed line). We then ran 50 simulation runs and analyzed the quantitative visitor numbers for each POI. Here, the blue bars represent the true visitor numbers for the simulation day (March 1, 2019), and the red line depicts the mean visitor numbers across all 50 simulations with 95% confidence interval indicated by the pink area.
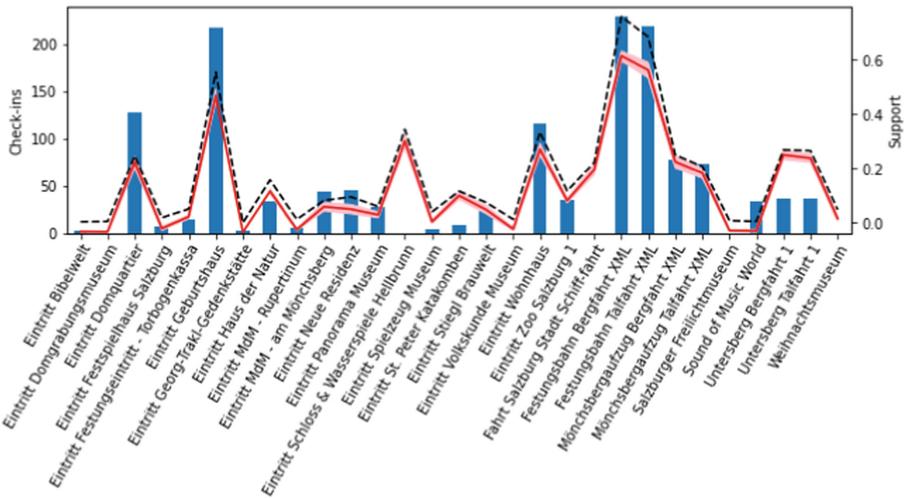
Fig. 3. Mean visitor check-in numbers per POI across all 50 simulations (red line) with the 95% confidence interval (pink area) shown against the real POI visitor numbers for the simulation day (blue bars). The dashed line shows supports of POIs in the period until the simulation day that were used to parametrize agents' POI selection. (Color figure online)

5   Conclusion and Future Work

We proposed a tourist flow simulation approach based on ABM that is parameterized by historical data of POI check-ins. The three parameters for the ABM simulation, the number of people agents, number of POIs each agent visits per day, and the selection of POIs that agents visit were determined from historical data analysis. The simulation was performed for a single day on the model of the city of Salzburg and repeated 50 times. The simulation results were then compared to the ground truth POI check-in data for the same day.

The results show that the simulations are able to create overall realistic patterns of POI check-ins. However, Fig. 3 shows discrepancies in some POIs where the simulated numbers are much larger than true values. The simulated values for these POIs are similar to the long term trend shown with dashed line (e.g., POI Entritt Schloss & Wasserspeile Hellbrunn) which is observed over the training period. Our method is limited in reflecting seasonal or daily changes where POI may be closed on the simulation day. Thus, we need to develop a more sophisticated POI selection approach for the simulation that is based on a more detailed trend analysis. We should also increase the behavior complexity of agents, relying on theories from social sciences.

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Comparing Marketing
and Computer-Based Methods
for Evaluating Online Reviews

Noudéhouénou Lionel Jaderne Houssou[1,4(✉)] [ID], Jeanne Lallement[2] [ID],
Mickael Coustaty[1] [ID], and Luc Béal[3] [ID]

[1] La Rochelle University, L3I Laboratory, 17042 La Rochelle, France
{noudehouenou.houssou1,mickael.coustaty}@univ-lr.fr
[2] La Rochelle University, NUDD Laboratory, 17042 La Rochelle, France
jeanne.lallement@univ-lr.fr
[3] Excelia Business School, CRIIM Laboratory, 17000 La Rochelle, France
beall@excelia-group.com
[4] RMD Technologies, 17000 La Rochelle, France

Abstract. This short paper aims to compare humanities and computer-
based online review analysis methods. In particular, we evaluate two
classical methodologies coming from marketing and natural language
processing fields. We assessed them through their ability to translate
online reviews into synthetic evaluations reflecting consumers' overall
feelings. Both methods were run in separate ways, then we confronted
the results.

Keywords: Online reviews · Text mining · Content analysis

1 Introduction

The predominance of digital booking platforms in the tourism industry has made
online reviews essential to get consumer insight and build e-reputation. Indeed,
online reviews influence consumers who often give them greater credibility than
expert reviews which they find more commercial and less persuasive. To extract
value from them, online reviews are usually analyzed by domain experts and
researchers from marketing or tourism management and computer science who
process them using their specific methods. While marketing or tourism man-
agement researchers focus on online reviews' effects on market effectiveness and
consumers' persuasion process, in computer science, attention is mainly put on
text analysis. However, researchers from these different fields have to deal with
the fact that online reviews are massive, not always consensual, and can be com-
plex or ambiguous. The originality of this paper is to conduct an interdisciplinary
work aiming at analyzing online reviews from humanities especially marketing
and computer science perspectives, to understand how they can complement
each other to manage the aforementioned limiting factors.

2   Literature Review

There is a rich literature in humanities mainly in marketing and tourism management related to consumer reviews on Tripadvisor, Booking, Yelp, and other online booking platforms [1–3]. They all acknowledge the decisive role of reviews and comments on consumer choice. These online reviews are considered more trustworthy than commercial information [4] and therefore influence travelers' decision-making processes. In the particular case of a hotel room, identified by Karpik [5] as a singular good, the uncertainty is high. Therefore, consumers pay importance to judgment provided by others, non-experts, through online reviews. Two dimensions help the consumer in his choice: the arithmetic dimension, through the rating, and the expressive dimension, based on texts. Other research works [6–11] focused on perceived value and its dimensions (functional, price, emotional and social). A consensus emerges on the most persuasive attributes of online reviews, highlighting the importance of source credibility, volume, and valence (average rating) of reviews. While overall, the reviews left are quite positive, reflecting pleasant experiences, some research has focused on negative reviews which, compared to positive ones, are more important because they have a halo effect. Finally, research in services marketing emphasizes the importance of contact staff in the subjective evaluation of tourists.

Besides humanities, the abundance of data (Booking.com hosts more than 200 million authenticated reviews) also stimulates research in computer science concerning the automation of online reviews data collection, processing, and content analysis [4, 12, 13]. Research questions include, among others, how data is collected and annotated but also methods for analyzing reviews content or extracting sentiments.

To the best of our knowledge, there haven't been comparative studies between both approaches. This is why we aim to assess the relative accuracy of the computer-based method compared to a marketing expert's work in extracting sentiment from online travel reviews, and more precisely, translating a customer review into a synthetic evaluation (positive or negative).

3   Methodology

3.1   Data Analysis in Marketing

Content analysis is widely used in social science for interpreting texts. This task relies on the use of a strict methodology, which cuts and classifies the text into semantic units in order to gain a better understanding of the object of study. In this case, we chose the method from Spiggle [14], where the author proposes a content analysis approach divided into 7 steps: categorization, abstraction, comparison, dimensionalization, integration, iteration, and refutation. In categorization, the researcher cuts out and organizes the text by a code system. In our case, the codes are derived from the classic criteria used for hotel classification which include but are not limited to the description of the room, the services offered to the customers, or the role of the contact staff. The first code, made a

priori using the literature on the field, was completed a posteriori by the analysis of the reviews. This results in the definition of more than 40 different categories that characterize the content of the reviews. These initial categories were then grouped during the abstraction stage, according to the frequency of occurrence, into 17 higher-level categories that we detail in Table 1. In the third step, we compare these high-level categories to each other. This helps us to highlight the features that make the overall experience positive or negative. Finally, in the integration step, the researcher attempts to identify the grounded theory in the results, before the iteration step.

Table 1. Higher-level categories according to the frequency of occurrence

Equipment's criteria	Relational and external criteria
Quality of bedding, quality of food, nature and quantity of food, size of room, presence of parking, additional equipment (spa, swimming pool, gym, digital equipment), nature and presence of welcome products (bathrobe, soap), characterization of reception, appreciation of the decoration (recentness, modernity, aesthetic taste)	Interaction with contact staff, accumulation of experience, presence of surrounding nature, sensory appreciation (smell, touch, temperature, security, cleanliness), surrounding noise, location close to the expected points (public transport or place of visit), appreciation of value for money, situational situation (covid, date)

3.2 Data Analysis in Computer Science

The computer-based analysis relies on a syntactic rule-based approach combined with a pre-trained language model, similar to [15], to extract aspects (hotel services and features) and opinions from customer reviews. The main idea is to take advantage of the grammatical structure of the sentences in reviews. Indeed, a brief analysis of the reviews shows that aspects are mainly nouns or noun groups and opinions correspond to adjectives which are sometimes associated with a modifier like an adverb or a negation word. Moreover, aspects are generally either directly preceded by opinions or part of a verbal phrase where the opinion is the complement and the aspect is the subject. These observations led to the definition of the following four rules:

1. $Subject + Verb + complement \Rightarrow aspect + opinion$
2. $Adjective + noungroup \Rightarrow aspect + opinion$
3. $Adverb + adjective \Rightarrow modifier + opinion$
4. $Negation\ word + adjective \Rightarrow modifier + opinion$

Before applying these different rules to reviews, we start with a classical pre-processing step (splitting reviews into sentences and tokens and then removing unnecessary items like numbers or URLs). The remaining words are processed through a grammatical parser that is able to detect the grammatical function of

each word and the connections between different words. More precisely, it labels words as subjects, verbs, complements, adverbs, and so on. Then, it creates a graph where nodes correspond to words and edges indicate the grammatical links (the subject of a verb for example). Figure 1 illustrate a graph obtained after parsing a sentence.
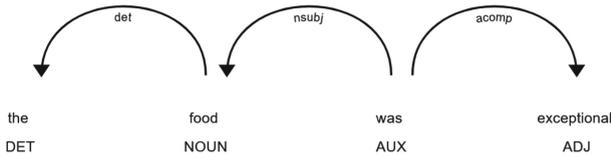

Fig. 1. Graph generated by the parser.

Once the graph is generated, we look for patterns corresponding to the prede-fined rules inside it. When a pattern is matched, we extract the aspect and the opinion with its negation or adverb separately before regrouping them. Then the general sentiment is obtained by aggregating the polarities corresponding to the different aspects and opinions extracted. The parser, the polarity generator, and the pre-trained language model are provided by Spacy[1]. We would like to mention that this approach is not designed to handle complex, ambiguous, or implicit sentiments.

3.3   Data Collection

The reviews exploited are in french and have been scrapped from Booking.com[2]. The collected data is related to the Seine-Maritime department (in the northwest of France). We randomly selected 32 hotels (17% of hotels in Seine-Maritime): 3 were located in the countryside, 9 in small touristic towns, and 21 in the largest cities. The average hotel size in the sample is 45 rooms, 20 hotels are of upper middle-scale class (3 stars), 4 upscale (4 stars) and 8 are mid-scale or economy class (2 and 1 star). Ten reviews, dated between 2011 and 2022, were randomly selected for each hotel in the sample for a total of 320 reviews analyzed.

4   Results

We started with a comparison of the qualitative classification of the reviews. This consists in highlighting the similarities and differences between the criteria found in the two methods (classification step of the marketing approach vs aspects obtained in the rule-based approach). We observe that the elements of catego-rization highlighted by the manual classification are similar to the computer-based method. However, the rule-based method appears to be more effective in

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[1] https://spacy.io/models/fr.
[2] https://www.booking.com/.

extracting hotels' aspects related to tangible amenities (bed, shower, elevator, carpark…) or contact personnel (reception, housekeeping, waiter) but its effectiveness decrease in interpreting aspects when the reviews punctuation, syntax and spelling are poor. Nevertheless, the rule-based approach remains relevant and able to manage millions of reviews, which can not be handled by the marketing method.

In the second step, we propose a quantitative analysis to reflect the customer's feelings ("positive or negative") regarding his stay in the hotel. We compared the sentiment analysis output provided by the marketing and the computer-based approaches. Results are presented in Table 2.

In a global overview, the two compared methods concur 93% of the time. This means that the expert and the automatic system globally agree on the decision about reviews sentiment analysis. The difference can be explained by the fact that the computer-based method is less effective when extracting opinions if instead of adjectives, idioms, verbs, or hyperboles are used in the review to express a point of view.

Finally, these results show the necessity to borrow technics and knowledge from the humanities in order to improve the computer-based processing of reviews. Particularly to deal with complex ambiguous or implicit sentiments.

Table 2. Comparison results between marketing and computer-based approaches output in terms of number and proportion of agreement/disagreement

	Number	Percentage
Agreement in positive evaluation	284	94%
Disagreement in positive evaluation	17	6%
Agreement in negative evaluation	15	79%
Disagreement in negative evaluation	4	21%

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Towards Recommender Systems in Augmented Reality for Tourism

Saikishore Kalloori$^{(\boxtimes)}$, Ribin Chalumattu, Felix Yang, Severin Klingler, and Markus Gross

Media Technology Center, ETH Zurich, Zurich, Switzerland
{ssaikishore,cribin}@ethz.ch

Abstract. Recent advances in augmented reality have enabled new ways of generating and presenting item recommendations. In tourism, AR applications can, for example, enhance points of interests (POIs) with virtual elements in AR and provide tourists with personalized recommendations for places to visit. In this paper, we present our prototype: a touristic AR application that augments various POIs with digital content and generates context-aware recommendations for POIs in the Niederdorf old town of Zurich, Switzerland. We demonstrate how useful information can be presented to users in an engaging way by combining AR technologies and recommender systems.

Keywords: Augmented reality · Tourism · Recommender systems

1 Introduction

Recommender systems are intelligent systems that exploit item preferences in the form of explicit or implicit feedback and identify novel items that are likely to be interesting and relevant to the user [7]. By incorporating these systems into augmented reality, recommendations can be visualized and superimposed on top of the view of the real world to create an appealing user experience.

In this work, we developed a mobile application for the Niederdorf old town in Zurich that shows personalized recommendations and useful information about the POIs in augmented reality. Our main motivation was to exploit contextual information and user-item preferences to generate personalized POI suggestions for each user in AR. Such a system might be able to reduce the overwhelming number of restaurants and shops that can be explored and prevent an overload of information that is irrelevant to the users. We also created a navigation system that helps users to find the system's recommended places. In the next section, we describe the AR experience and present the different components of our prototype.

2 Description of Our Prototype

Our prototype can be used on Android and iOS devices that support augmented reality. As the first step, new users have to complete a short registration process

when they open our application. After entering their name, age and gender, users have to fill out the Five-Item Personality Inventory (FIPI) questionnaire [6] to determine their personality traits. All of this information will be leveraged by our recommender system to provide a personalized experience for each user.

Once the user profile is created, the user can visit the area of the Niederdorf old town in Zurich that is supported by our prototype and point their mobile devices at the surrounding buildings. If the application manages to localize the mobile device within the environment containing the POIs (see Sect. 2.2), rotating icons appear in front of restaurants and shops as shown in Fig. 1a. If users are interested in learning more about a particular POI, they can simply click on the corresponding icon to reveal an additional window. This closeup view shows many details about the POI such as its name, description, rating and some user reviews (see Fig. 1b). For better usability, users can also perform a pinch gesture to transform the closeup view from world space (where the window is attached to the real world) to screen space (where the window has a fixed position on the screen). This can be helpful if the text on the window is too small to read when the user stands far away from it.

Additionally, we also have a map feature that shows the current position of the user as well as all the POI locations. Similarly to the rotating icons that float in front of the buildings, users can click on the icons on the map to open a closeup view that contains more information about the corresponding POI. This map is also useful to check which alleyways of the old town are supported by our application.

The core feature of our AR experience is a recommender system (see Sect. 2.1) that generates personalized POI recommendations for each user. Presenting these item recommendations in AR needs to be intuitive and easy to understand for users. For that, we designed a virtual 3D signpost that can be spawned anytime by pointing the camera at the floor and tapping on the screen. Each generated POI suggestion is visualized by a signboard on the signpost that displays the name, distance and POI type (restaurant or shop) and points towards the location of the recommended POI (see Fig. 1c). Clicking on a signboard will open the same closeup view as mentioned above and reveal a navigation line that shows the entire path to the suggested POI. I.e. if users like any of the POI recommendations, they can simply follow the corresponding navigation line to reach the desired destination (see Fig. 1d, yellow line). Users can also give feedback to the recommender system by clicking on a like button on the closeup view in case they are satisfied with a given suggestion. These explicit user-item preferences will be taken into account by our system for future recommendations.

2.1   Recommender System

To elicit user preferences, we used an active learning strategy proposed by [4] that exploits the user's personality traits defined by the Five-Factor Model (FFM). This approach is able to identify items to be presented to the user even in the absence of any rated items by the user. This is the case in our AR experience since there exist no ratings when a new user creates a user profile. Previous

(a) Rotating icon in front of a shop

(b) Closeup view with POI details

(c) Signpost with POI recommendations

(d) Path to a suggested POI

Fig. 1. Screenshots of the AR experience (Color figure online)

research [5] has shown that exploiting such additional sources of information about the user is effective to identify potentially useful items for the user. Moreover, personality-based active learning approaches have also been applied by other tourism applications [2,7].

For the recommendation logic, let $u \in U$ denote a user, and $i \in I$ a POI. r_{ui} is the rating that the user u gave to the POI i and r_{ui}^* is the rating predicted by a model for a POI i whose true rating r_{ui} is unknown. We implemented an extended version of the matrix factorization (MF) model [9], the most widely used technique for building collaborative filtering models. In the MF model, each POI i and each user u is associated with f-dimensional real vectors q_i and p_u. Let P denote the user-latent factor matrix and Q the item-latent factor matrix. The model parameters, i.e., the vector representations of the users and items (and other parameters such as item bias or user bias if present), are learned by minimizing the error of the model predictions on a training set of ratings [8]. We additionally enhanced the user representation by introducing parameters to the model that represent the known user attributes: age group, gender and the scores for the FFM personality traits. As mentioned above, these user attributes are

collected during the user registration for our system. The model parameters are learned by minimizing the associated regularized squared error function through stochastic gradient descent. More details about the objective function and model update rules can be found in [1,3].

2.2 Localization

For location-aware AR applications, it is essential to obtain a proper alignment of the virtual content with the real-world scene. For that, precise localization techniques are required to estimate the position and rotation of the user's device with respect to the environment of interest. If the localization is done inaccurately, the virtual content will be misplaced, which breaks the whole immersion of the AR experience. In this work, we made use of visual localization methods that estimate the pose of a camera based on its images.

We namely used the Immersal[1] software development kit for the Unity engine[2], which is an AR solution that lets developers spatially map real-world locations and then augment them with digital content. One of the main benefits of the Immersal SDK is its support for very large spaces and its scalability to entire cities. To create our AR experience, we first visited the Niederdorf old town to spatially map all the buildings by taking numerous images from different viewpoints. Each set of images was then sent to the Immersal cloud service that generated a 3D point cloud and a textured mesh of the mapped location by finding and matching distinct visual features in the submitted images. Additionally, each point cloud was tagged with the GPS coordinates of the corresponding location such that it is possible to narrow down nearby POIs when using the application, which speeds up the localization process. While the point clouds are only needed for the localization process, we used the textured meshes to create a digital twin of the Niederdorf old town inside the Unity editor. These meshes served as a point of reference and allowed us to carefully define the position, rotation and scale of each piece of virtual content and set up the navigation logic for the personalized signpost.

When users visit the Niederdorf old town in the final AR experience, our prototype periodically captures the current camera frame and sends it to the Immersal cloud service which tries to match it with a point cloud of one of the nearby POIs. If there is a match, the cloud service returns a projection matrix from which the current position and orientation of the device can be extracted. Once the localization process is completed, our application is able to align the digital version of the old town with the real one.

Implementation Details: As mentioned before, we developed our AR application[3] using the Unity engine, which is a popular development platform to create video games and 3D applications. We implemented our recommender

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[1] https://immersal.com/.

[2] https://unity.com/.

[3] A sample video of our application and the recommendations presentation can be found here: https://polybox.ethz.ch/index.php/s/jZYBKexpxRjAHPU.

system in Python as a server application using the Flask web framework and deployed it to Google Cloud Run in a Docker container. Finally, we stored all the POI data, user profiles and user-item preferences with Amazon Web Services. Our source code[4] is publicly available to extend our application for other cities.

3   Conclusion and Future Work

In this work, we aimed to design a personalized AR experience based on user preferences that shows content in AR which is adapted to the user's profile and interests. In particular, we presented our prototype, a mobile AR application that shows only personalized and relevant POIs to users when they are visiting a touristic city by exploiting and modeling users preferences which are elicited in AR.

With the vast increasing computing power of smartphones, AR technologies have enabled more and more stable, immersive and accessible AR experiences for consumers in recent years. As our future work, we want to understand the scalability of such applications to multiple cities and also want to look into a deeper analysis of localization techniques [10] combining object detection and prediction models.

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Special Research Session on: Metaverse in Hospitality

Gamification and Innovation Acceptance Among Finnish DMOs - Case King's Road

Minna Ahlstén[1]([envelope]), Johanna Heinonen[1,2] [ORCID], and Maria Murto[1]

[1] LAB University of Applied Sciences, Lahti, Finland
`minna.ahlsten@lab.fi`
[2] University of Eastern Finland, Joensuu, Finland

Abstract. According to Xu, Buhalis & Weber [1], gamification can enhance the on-site tourist experiences and be a marketing tool. However, the use of games in tourism development by DMOs is still an unexplored topic.

The King's Road in Finland combines the idea of gamified and storified live experiences with a video game. The development idea of a video game introduces King's Road to a broader audience. The idea of a storified mobile game leads tourists on-site and rebuilds historical sites with augmented reality while leading tourists to less crowded attractions.

This paper aims to provide new insights and increase understanding of gamification in tourism. To understand the innovation acceptance among Finnish DMOs, the gamified concept idea of King's Road was presented to them. With the inductive approach, their feedback was analysed thematically. The findings highlight the obstacles and possibilities of the proposed gamification concept from the DMOs' point of view. This paper aims to extend the previous research in innovation acceptance by identifying the level of acceptance regarding gamification in this case study and presenting solutions to advance it. Hence, this knowledge works as a basis for future research and development.

Keywords: Gamification · Innovation acceptance · Experience design

1 Introduction

Digitalisation has got new forms in tourism and creating experiences during the past years. When people have been forced to stay at home instead of experiencing places themselves, the meaning – and the challenges - of digital storytelling and experience design have increased. Gamification enables participants to engage actively and entertain themselves even online, and thus create cognitive ties towards the destinations and attractions. These digital experiences make visiting the places in real life better than merely promoting and marketing the destinations. Also, gamification in the attraction enhances the learning and sustainability requirements many slow travellers have [2] by providing immersiveness and guidance with the help of AR (augmented reality) -enabled small tasks challenging travellers.

The number of people playing games is ever-increasing, and the number of video game players is expected to be over 3 billion by 2023 [2]. Despite the typical stereotype

of only kids playing games, most players are adults capable [3] of making, e.g. travel decisions. However, despite their potential, games are less used in destination marketing among DMOs and businesses.

The objectives of this paper are 1) to provide new insights and 2) to increase understanding of acceptance and role of gamification tourism. Previous studies have identified the potential of gamification in tourism. [5–9] Thus, this paper aims to enlighten the challenges in adapting the gamification of tourism experiences among selected tourism organisations and DMOs and works as a basis for the future development of gamification.

King's Road is an old historical road from Bergen in Norway to St. Petersburg in Russia. In Finland, King's Road and its attractions are coordinated by King's Road Association. Local entrepreneurs presented the idea to gamify the road in a seminar hosted by King's Road Association. They thought it would advance productisation and storification to support their business operations and bring new customers down the road. This idea was given to a multidisciplinary group of young professionals to create two different but collaborative game forms (video game and mobile game) to enrich the experiences, highlight the authentic history and Finnish mythology and boost businesses by reaching new target groups. During the process, the idea was presented to different DMOs along the southern coastline of Finland. This paper analysed the results of these discussions by reflecting on the responses from DMOs to the innovation acceptance model.

The main research question in this case study is, *"On what level of acceptance are the DMOs along King's Road concerning new gamification ideas?"* This question is further defined in the following sub-questions: 1) What elements boost or hinder acceptance? Furthermore, 2) How to influence and ensure acceptance of gamification technologies? These questions allow us to analyse the concept of gamification from different perspectives and produce results that will advance the understanding of gamification in tourism. They also open a collaborative dialogue between the game industry and tourism organisations.

2 Gamification in Tourism

Gamification has many definitions, and one widely accepted definition defines it as "game design contextualising outside its original domain" [10]. Thus, gamification, as a word, entails a wide range of applications: dice games, board games, card games, ad- games, game elements at a trade fair, and even customer loyalty programs can be interpreted as a form of gamification. Game elements can be, for example, levels, points, progression, promotions, and badges [11].

Gamification aims to make the activity more attractive and entertaining. It is designed to boost hedonism encouraging the players to continue playing or return to it soon. Ryan and Deci [12] noted that the pure joy of playing and the hedonistic value it creates work as an intrinsic motivation for playing. In addition, gamification targets our natural desires for learning, achievement, status, competition and socialising [11, 13]. Successful gamification should aim to tap into this motivation base (Fig. 1).

Gamification would not succeed without experience design. Experience design is based on understanding customer experience, needs, and wants by researching and

Motivation base for gamification

Gamification	Intrinsic motivation for playing
Making activities more attractive and entertaining	The joy of playing and hedonistic value it creates
Boosting hedonism	Natural desires for learning, achievement, status, competition and socializing
Encouraging players to continue playing or come back to it soon	
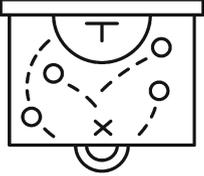
Adapted from:
Ryan, R. M., & Deci, E. L. (2000). Intrinsic and extrinsic motivations: Classic definitions and new directions. Contemporary educational psychology, 25(1), 54-67.
Zuo, L., Xiong, S., & Iida, H. (2017, November). An analysis of hotel loyalty program with a focus on the tiers and points system. In *2017 4th International Conference on Systems and Informatics (ICSAI)* (pp. 507-512). IEEE.

Fig. 1. Motivation base for gamification.

designing or developing services to match or exceed those expectations. It is a process that requires close collaboration with the customers. Theoretically, the tourism experience can be conceptualised as an outcome of design grounded in the holistic tourism experience [10].

When looking at how experiences are produced and delivered in tourism, entertainment and technology industries, Sundbo and Hagedorn-Rasmussen [6] suggest the term experience production system. This system develops an experience concept that connects the desired customer experiences with the organisation's strategic objectives. This generation process creates two concepts: a tourism experience concept to cover a meta-concept (i.e., strategic value propositions) and an operational concept (i.e., orchestration of design elements) of the tourism experience. The meta-concept of a tourism experience is made up of the primary experiences, secondary experiences, and the foundation for a narrative about these experiences. These are made in response to the meaning-making possibilities discovered during exploratory design research. The complete tourist journey, from pre-trip to post-trip experiences, is covered by an operational tourism experience concept. Sundbo and Hagedorn-Rasmussen [6] highlight two essential design elements which make the experience concept successful: interactivity and triggers, which can also be found in gamification. Interactions influence how travellers evaluate their journey. Providing tourists with the experiences they desire may be advantageous in managing how they interact with the various parts of the attractions [4].

When destinations design gamified experiences, all different forms of games, the customer journey, interactivity and triggers should be considered. Weber [7] has identified ten various applications for gamification in tourism (Fig. 2). These are for pre, during and after travelling and show how widely gamification can be applied to other parts of the customer journey: location-based augmented reality games, gamified travel tours for urban and rural environments, gaming in theme parks, gamified immersive experiences in cultural heritage, gamification and transmedia storytelling, gamified restaurant

experience, gamification in hospitality, gamified flying experience, experiencing virtual cultural heritage, and gamified virtual travel experience. In addition to enhancing existing services and products, gamification aims to create new innovative products and services [7].

10 applications of gamification for pre, during and after traveling

| Location-based augmented reality games | Gamified travel tours for urban and rural environments | Gaming in theme parks | Gamified immersive experiences in cultural heritage | Gamification and transmedia storytelling |

| Gamified restaurant experience | Gamification in hospitality | Gamified flying experience | Experiencing virtual cultural heritage | Gamified virtual travel experience |

Adapted from: Weber, J. (2014). Gaming and Gamification in Tourism – Best Practice Report. Digital Tourism Think Tank: 1-14.

Fig. 2. Ten gamification applications for pre, during and after travelling.

Games are often portrayed as rich narrative learning environments. Mobile games utilise three types of storification: receiving (spectator), constructing (director) and participating in (actor) the story. Types of storification affect engagement differently. Participating in the story, or living the narrative, elicited high activity in the game but less awareness of the story, while building the story generated awareness of the complete story. However, compared to receiving the story, both these types positively influenced activeness and motivation during the game. [8, 9] More intensive narratives create more engagement [14]. Engaging stories have emotional, cognitive and behavioural consequences, such as empathy, immersion and purchase intention [15]. Based on these facts, it can be argued that experience design strategically creates the points for interaction [6] which are then delivered through narrative in gamification to the tourists [8, 9], and those interactions affect how tourists perceive the trip [5].

Though most games are not created with tourism in mind, the sector can frequently use them. [1]. Corrêaa and Kitanoa [16] identified two predominant types of games in the tourism industry: (1) online/offline games and (2) location-based mobile games, aiming to increase engagement and enhance tourists' on-site experiences at the destination in an entertaining and informative manner.

Since video games as a tool for tourism are not discussed much in literature, King's Road concept idea provides a new approach and angle to the ongoing discussion.

3   Innovation Acceptance

The acceptance of innovations in this King's Road case is studied mainly from the Finnish DMOs' side to understand how this new concept is accepted. The theory allows us to pinpoint the challenges affecting the acceptance rate. New services and products follow the diffusion of innovations theory introduced by Rogers in 1962 [17, 18]. The diffusion of innovations is depicted with normal distribution to demonstrate how quickly people adapt to innovations (Fig. 3). Thus, it is a unified theory to apply in this use case.
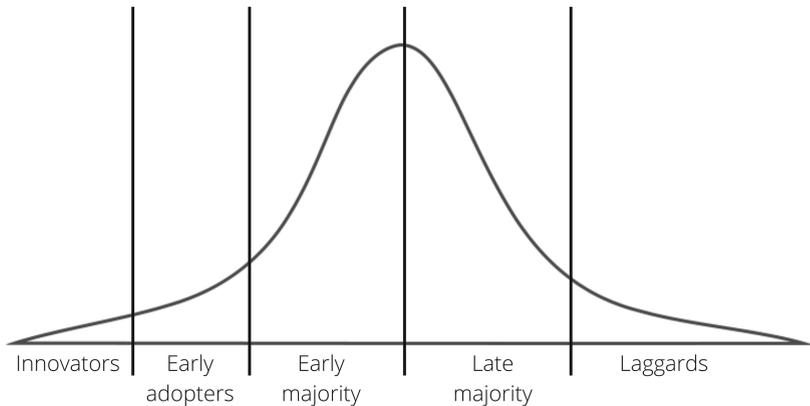
Adapted from:
Rogers, E.: Diffusion of Innovations. 3rd ed. The Free Press, New York (1986).
Carter, L., Bélanger, F.: The utilization of e-government services: citizen trust, innovation and acceptance factors. Information Systems Journal, vol. 15, no. 1, pp. 5-25 (2005).
Albertsen, L., Wiedmann, K.-P., Schmidt, S. The impact of innovation-related perception on consumer acceptance of food innovations – Development of an integrated framework of the consumer acceptance process. Food Quality and Preference, vol. 84, p. 1039 (2020).

Fig. 3. Diffusion of innovation.

Innovators comprise 2,5% of eager and bold individuals to test new ideas. For them, it is common to have a circle of other innovators around them and to possess substantial financial resources. Innovators have technical understanding, and they can tolerate uncertainty. Established habits do not stop them from trying innovations [17, 19].

Early adopters (13,5%) are an attractive group since they have remarkable opinion leadership in most social systems [17]. Early adopters can pressure other potential adopters and speed up the progress [20, 21]. People in this category enjoy the respect of their peers while simultaneously being role models [17]. In tourism, early adopters often have younger ages and higher education [22]. They also often have more knowledge and involvement in the product category or field than late adopters [23].

The early majority adopts innovations slightly before an average user, while the late majority is a bit after the average. The last 16% of people belong to the laggard category. Decisions are made based on what has been done previously, which is why often the others have already absorbed a more novel idea when the laggards are adapting the initial one [17]. Some say that the laggards are imitating or copying rather than innovating, which can be a good skill when forming incentive plans or setting strategic goals [24]. In tourism, laggards can be, for instance, the locals or entrepreneurs who are suspicious

or have no recognition [25]. The main issues are risks and a lack of understanding of innovation's advantages or benefits [19].

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The diffusion of innovation has been complemented later in the literature with other theories, such as the five stages of grief by Kubler-Ross [26], the technology acceptance model by Davis [27] or Parasuraman's [28, 29] technology readiness index [30, 31]. Additionally, one could compare innovation acceptance to readiness for change. Knowing how to persuade others towards a positive change is crucial to make people accept changes. [32, 33]. Technology does cause both negative and positive emotions, as well as insecurity and anxiety, which influences technology usage [28, 34]. Therefore, customer needs should not be forgotten to thrive [35]. The more satisfied customers are, the more they will use electronic services [30].

The most significant influencing factors on innovation diffusion have different viewpoints [20]. The critical element can be reaching the early adopters and early majority. On the other hand, reducing the price [20] or geography [36] is argued to affect the diffusion process. Geography in this context means both knowledge and technology transmission [36]. Depending on the innovation, the technological performance compared to the previous product or market demand can be the main component of innovation diffusion [37].

In this paper, the interest is to compare the diffusion of innovation model to the Finnish DMOs attitudes towards the presented gamification concept. The aim is to identify the categories where the Finnish DMOs currently belong and find solutions to upgrade one's category.

4 Method

To get an idea of the innovation acceptance among the DMOs and other tourism development organisations (Table 1) along King's Road, the idea of the gamified experience concept, including an interactive video game and a mobile game, was presented to 12 organisations between September 2021 and March 2022. These twelve organisations present 75% of the total Visit/development organisations or municipalities along King's Road.

The idea was to hear spontaneous comments and questions from the organisations, so qualitative and inductive methods were chosen. Since the concept of games and gamification is still relatively unfamiliar, the discussions started with the presentation of gamification and video games in general and how the new concept would function in real life. Also, a short trailer video [38] (proof of concept) was shown to illustrate

the looks of the video game, what it could be, and how it could present attractions of the area. Due to the unfamiliarity of gamification, a case example was needed for demonstration and inspiration. After the presentation, respondents were encouraged to share their thoughts and ideas without any specific guidance. The discussion went on without any particular agenda, instead of asking them structured questions or guiding the discussion one way or another. This supported the original idea of the inductive approach. Feedback and responses from the discussions were collected into an excel sheet and analysed thematically. The findings highlight the obstacles and possibilities of this presented gamification concept from the DMOs' point of view.

The inductive approach was chosen because it fits the interest in identifying patterns and central themes [38]. Qualitative research methods were more suitable in this study since the data is textual and collected via conversations [39]. The thematic analysis method allowed us to identify and interpret patterns of meaning and suited well to the inductive approach by helping examine the perspectives of different research participants, emphasising differences and similarities, and producing unexpected insights [40].

5   Findings and Conclusions

Once the presentation had finished, most of the respondents found it exciting and innovative for the future (Table 1). Based on the general responses, it was clear that gamification is not yet as efficiently utilised in tourism as possible. AR applications to walking routes also include storification, which can be developed further by adding other gamification elements. Even though the idea was found interesting, the responses were mostly reserved. Many (Table 1) were worried about monetary issues, how much the concept would cost and how much it would benefit. Also, the maintenance and further development were considered an issue for acceptance. Some responses emphasised that they already had some QR or Google maps-based solutions to which they wanted this new concept to fit, which showed a lack of technical knowledge.

The anticipations regarding the video game concerned the age of the players and the possibility that games would stop people from coming to the destination in real life. The inductive responses can be seen in Table 1.

When the discussion themes are viewed from the innovation acceptance perspective (Table 2), it can be stated that the private development organisations were the most eager and enthusiastic about the new concept. The monetary issues can also explain this; private development organisations have access to different, often superior, funding solutions compared to public organisations.

Most reluctant were a couple of DMOs and one national organisation. These respondents, situated in the late majority or laggards categories, raised concerns that video games would replace on-site travelling and wanted the concept to fit into existing solutions. Their hesitation could already be seen when arranging the meeting as it proved difficult. These concerns can be tackled by designing gamified experiences or services to fit the needs of the company and the traveller; hence, these concerns can be due to la ack of information regarding technological solutions for gamification.

As a whole, the innovation acceptance among these organisations is average at the early majority level. However, one can anticipate whether that is enough to compete in

Table 1. Central feedback from respondents

Respondent	Organisation type	Comments
R1	National development and marketing organisation	Attractive, new, interdisciplinary, needed
R2	DMO	It provides new opportunities and completes current work; essential to remember to connect this to existing solutions. Who will take care of this after the project, and to what cost? How does it help companies, and is it worth the effort?
R3	Regional development organisation	Attractive, new, provide new business and cooperation possibilities to different industries
R4	Private development organisation	Interesting and executable. I want to be part of the project, if possible. The idea provides a totally new approach to AR and gamification
R5	National development and marketing organisation	Interesting, it could be applied to historical and cultural heritage attractions. Follows but does not want to be actively involved. Does not fit into their plans
R6	DMO	Boosts the historical sites of the destination, new possibilities, and visibility for several companies and industries
R7	Regional development organisation	New idea. Unsure whether it support local companies
R8	DMO	Interesting and new. There are a couple like this already, but not to this extent. Important to connect it with current solutions and concepts. Who is going to take care of this after the project, and to what cost? Does this really bring any benefit?
R9	DMO	Sounds really interesting and executable. Brings new business opportunities to the area. Important to think about who is responsible for updating and maintenance in the future

(*continued*)

Table 1. (*continued*)

Respondent	Organisation type	Comments
R10	Private development organisation	Interesting and executable. I want to be part of the project, if possible. The idea provides a totally new approach and new segments. Really eager to be part of this
R11	DMO	New and innovative idea. Wants to join. Essential to connect to existing solutions and concepts and think about the future carefully
R12	DMO	Clear connection to existing goals and activities. This supports them and provides good new ideas. Important to think the future maintenance and responsibilities

Table 2. Innovation acceptance among respondents

	INNOVATOR	EARLY ADOPTER	EARLY MAJORITY	LATE MAJORITY	LAGGARDS
Elements of innovation acceptance based on literature	*Technical understanding*	*Respect of the peers*	*Interested, but waits for first experiences*	*Waits for many experiences*	*Follow others; imitating*
	Toleration of uncertainty	*Involvement*			*"What has been done earlier."*
	Eagerness to test new ideas	*Knowledge of the field*			*Lack of understanding*
Respondents	**R4 & R10**	**R1 & R3**		**R5, R2, R8, R11**	
			R9, R12, R7, R6		
				R2, R11	
Comments	*Eager to collaborate*	*Sees the idea as needed new disciplinary*			
	Sees the possibilities	*Sees possibilities and benefits for many*			
		Organisations are respected by others and have vast knowledge.			
			Worried about costs and maintenance		
			Hesitant whether the concept benefits the area and entrepreneurs		
				Worried about costs and maintenance	
				Interesting concept, but it has to fit existing solutions.	
				Worried if videogames replace onsite travelling	

the global market. Therefore, the value of this preliminary research for understanding is essential to find proper ways of selling new ideas and convincing organisations of the importance of gamification.

6 Discussion

The games designed for tourism benefit two industries: tourism and games, but also local communities and entrepreneurs will also benefit from marketing and productisation. On a strategic level, in the future, this collaboration will be a standard in the tourism and game industry. The games would welcome tourism-related knowledge and target specific tourists.

The answer to the question "On what level of acceptance are the DMOs along King's Road concerning new gamification ideas?" varies from the innovators to laggards depending on the organisation and its people. Personal traits were a vital issue in acceptance; this emphasises the importance of recruitment processes so that we find people in the industry with certain innovative personal traits. By interpreting the feedback word by word, the innovation acceptance level was easier to detect and analyse, also by DMOs themselves. When looking at the reason for the acceptance level, we can rely on the innovation acceptance literature, where technology acceptance [28, 29] and technology readiness [30, 31] are emphasised as a part of the whole resilience, the readiness and capability to change. In this study, it was clear that the DMOs were still in the middle of the acceptance curve. It was partially due to the technological readiness and knowledge, but also the emotions of insecurity and anxiety, as mentioned by Parasuraman [28] and Blut & Wang [34].

According to Bianchi et al. [20], the critical element for boosting acceptance is to reach the early adopters or early majority. This study revealed that those were usually private companies or organisations with a broader market view. Future studies could research this aspect more and discover why private organisations are more innovative than others.

Smartness and smart tourism are the keywords in destination development, and plenty of research has been done in that area. Nevertheless, the gamification research from the acceptance point of view is quite non-existing. Thus, the theoretical contributions of this study enlighten that area and lay a basis for future studies about the knowledge level and requirements among tourism professionals because the lack of knowledge was surprising in the modern days of information flow and technology. Also, structural issues among DMOs concerning management and governance are worth studying from a gamification aspect; it seemed that many respondents were very stuck in their old ways.

When assessing this case study, 12 respondents might not be enough to guarantee a reliable analysis for the whole Finland. However, organisations represented most of King's Road organisations, and the research showed similarities among organisations, and the key issues were quite common. Future research on the innovation adaptation of games, as well as follow-up for respondents in this study, is needed with more respondents, deeper analysis and different geographical areas.

From the managerial point of view, this study offered valuable information on the issues to tackle when introducing new concepts to DMOs. It also revealed some guidelines for innovators and early adopters who should be convinced first.

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Never-Ending Tourism: Tourism Experience Scenarios for 2030

Barbara Prodinger(✉) 🄳 and Barbara Neuhofer 🄳

University of Applied Sciences Salzburg, Urstein Süd 1, 5412 Puch, Austria
{bprodinger.lba,barbara.neuhofer}@fh-salzburg.ac.at

Abstract. The advent of recent technological advancements, and particularly, the metaverse, has brought unprecedented opportunities for tourism. The integration of multiple realities extends tourism beyond the traditional chronological classification of pre-travel, during-travel, and post-travel stages. The novel concept of never-ending tourism captures a holistic multi-dimensional experience in which technological solutions are at the foundation to elevate tourism to an on-going, never-ending activity that permeates every day and travel life. This study adopted a futures methods approach through qualitative in-depth interviews and a scenario development supported by a storytelling technique. The findings present three distinct scenarios of never-ending tourism on a spectrum of digital companion, digital escape and digital connection. The scenarios suggest a growing importance of the pre-travel and post-travel phases, while technologies continue support visitors to enjoy the irreplaceable multisensory experiences on site. Towards 2030, the metaverse will enable visitors to mentally teleport themselves to destinations, regardless of time, financial resources and physical abilities. Individuals will seamlessly move between integrated digital and physical realities, where the engagement with travel becomes a part of daily life. The study is novel and original in that it empirically explores the emerging concept of never-ending tourism and contributes to the wider metaverse discourse in the tourism context. Several practical suggestions and future research directions are given to unlock the potential of never-ending tourism in relation to integrated experience design, new business models and long-term customer engagement.

Keywords: Metaverse · Virtual tourism · Never-ending tourism · Digital experiences · Digital twin

1 Introduction

In recent years, and particularly driven by the global pandemic, disruptive innovations in the digital sphere appeared, causing an acceleration of information and communication technologies becoming part of everyday life. Destination management organizations and other tourism service providers have adapted their offers by expanding physical experiences into digital and virtual domains [1, 2]. Useful in the marketplace for a while, online platforms and QR codes gained in importance to access tourism products

and services [3]. These and more recent digitalization efforts appear to expand to all phases of the customer journey.

Further advancements flourishing within the technology field focus on computing innovation through Augmented and Virtual Reality (AR & VR). This has opened possibilities for a new paradigm in the so-called Metaverse [4]. This post-reality universe is uniting physical reality with digital virtuality. By bridging the core elements of social media with affordable AR and VR applications, a creative interplay that is transforming education and entertainment is currently being unleashed [5]. This novel form of Mixed Reality (MR) has the potential to deliver additional value through co-creative engagements between the consumer and the producer [6].

For the contexts of travel, tourism, hospitality and heritage, this means unlocking novel ways in which to create customer experiences that transcend the limits of current physical and virtual dimensions. For instance, in cultural heritage tourism, visitors can dynamically interact with virtual artifacts and travelers with special needs can participate in personalized options with inclusive access [7, 8]. While some destinations might seek to supplement their physical spaces with digital and virtual offers, there is increasing evidence that virtual destinations can become attractions in their own right [2].

This shift towards professionalization of virtual offers is not only seen by pioneers within the destination management organization space, but also increasingly in policy making. Indeed, the extension of physical experiences into attractive hybrid and virtual offers has become a key concern on the European policy level. For instance, the Tourism Transition Pathway, a document that sets out the tourism agenda of Europe for 2030 by the European Commission, declared the digitalization of travel and heritage experiences as a key pillar for tomorrow's tourism [8, 9]. In order to tap fully into the potential of holistic virtual experiences, it is thus necessary to expand fragmented digital offers in the pre-travel, during and post-travel stages and develop a virtualization level that encompasses the notion of *never-ending tourism*, a term originally coined by the Digital Innovation in Tourism in Tourism Observatory of Politecnico di Milano (2022) [10, 11]. To this end, this research paper dives into the novel concept of never-ending tourism and sets out to answer two main research questions, namely:

1. What does never-ending tourism look like?
2. What are scenarios for a never-ending tourism future in 2030?

2   Literature Review

2.1   Tourism Experiences and the Metaverse

Technology is an essential part of the tourism and hospitality industry [12]. Beside standalone technologies, a major focus had traditionally been placed on network solutions that support operational efficiency, profitability, sustainability and competitiveness in the form of smart tourism [13]. In this context, particularly VR, AR and MR solutions find increasing application. New opportunities emerge for the so-called metaverse. The term comes from the word meta, the Greek prefix meaning after and beyond and the second word describing the universe. The idea is to unify a universe of merging physical reality

and digital virtuality [5]. In tourism, the metaverse is expected to provide active participation and co-creation of immersive place experiences. Interconnecting actual reality with virtuality enhances the physical space. In this virtual shared space, services and products emerge as a collective [7]. With increasing network capabilities and improved hardware, visitors may be switching between these worlds seamlessly [14]. Therefore, visitors will no longer distinguish between physical and real objects [15].

The key is to offer diversity from normality. Attractions spark excitement and provide added value, potentially triggering memorable customer experiences [16]. Herewith, Mixed Reality unlocks new possibilities for cultural heritage sites [7]. With inclusive access for people with disabilities, additional value is generated through the technology-enhanced interplay between education and entertainment [5]. AR is adding an additional layer of information on monuments and artefacts, or in gastronomy where people scan a QR code for additional information on the menu provided. The metaverse is not only expected to be used for promoting the industry's intangible products, it may also be used for guiding and navigating onsite and on top, new virtual hospitality experiences will be designed and monetized [4]. The metaverse is about interaction, immersion and communication, changing the way individuals learn, work and shop, by bringing together people without the physical limitations of the real world [4, 17].

A hybrid metaverse tourism ecosystem is expected to arise, where new stakeholders will provide different services. Therefore, metaverse tourism organizations will have to conceptualize marketing solutions to cater for both, the digital and virtual world, as well as the space in-between [4]. Some best practice examples converging technology, music, film, education and culture are already on the market. For instance, combining natural heritage sites with latest technologies is the mission of the company Our Worlds Inc.. By launching an immersive 360° Extended Reality, users can explore the unique stories of indigenous people, their culture and land [18]. Another testimony to provide sensory rich digital experience are "the architects of taste" Bompass & Parr. People worldwide are meeting at the 3D virtual world Decentraland to enjoy their virtual tequila education sessions [19]. These are but a few of the latest examples showing how hospitality operators are starting to experiment, enrich experiences along all phases of the customer journey and take a lead role in this field [4].

2.2 Never-Ending Tourism

The majority of technological solutions on the market heavily focus on the pre-travel and on-site-phases of the customer journey. With the pandemic shift towards travel restrictions and long-term sustainable change [20], ICTs are increasingly implemented to create attractive virtual offers in which no actual trip is needed. While the tourism industry is recovering to pre-pandemic levels, there remains a demand for the virtual experience of places. This could take place in lieu of travel, as a nostalgic revisiting of places in the post-travel phase, or as an anticipatory preparing within the pre-travel phase. As an information-intense activity, reliable information is inevitable in tourism, when thinking of natural disaster, weather, safety, politics, social unrest and economics that may make travel unavailable or unsafe [15]. Therefore, tourism service providers need to increasingly provide offers that give travelers access to media-rich data and the

opportunity to experience digital or photorealistic reconstructions of places, attractions and archaeological sites [4].

The extension of digital information into more experiential virtuality has become a trend, not only with the rise of the metaverse. It goes hand in hand with the latest policy and strategic directions made by destination management organizations and the European Commission. The extension of physical experiences into hybrid and virtual offers has become a key concern. The Tourism Transition Pathway, a document launched in 2022 to set out the tourism agenda of Europe for 2030 by the European Commission, identified the digitalization and virtualization of travel and heritage experiences a key pillar for tomorrow's tourism [8]. Thereby, never-ending tourism is proposed as an overarching idea to encompass tourism as an ubiquitous activity, which supported by technology, can be experienced on-site and off-site. With a particular focus on some of tourism's biggest issues, including overtourism, overcrowding, sites at risk, natural and cultural heritage preservation and accessibility [21], digitalized tourism offers and virtual spaces are seen as a powerful way to allow visitors to experience a digital twin of attractions on-site [8, 9].

The notion of the digital twin concept comes from the information technology and manufacturing sectors. It is a virtual replica of the structure, functionality and behavioral traits of a product or service [22]. With tourism being a physical, emotional, mutli-phasic and multisensory experience [6, 23], the construction of digital twins in a virtual environment can be understood as a complex challenge. To this end, this study aims to explore what never-ending tourism could entail as a future scenario. The methodological approach is explained next.

3 Methodology

Never-ending tourism is a term largely used conceptually today, while empirical research is still lacking. This study thus aimed at understanding and empirically exploring never-ending tourism as a potential future reality. An exploratory qualitative research study was used. A total of 15 online in-depth semi-structured interviews were conducted with experts, held via Zoom in summer 2022. Study participants were recruited based on a set of inclusion criteria. According to a purposive sampling approach, experts had to have a) a good understanding of new media, such as VR, AR and MR and b) work experience in the tourism and hospitality industry. For instance, interviewed experts included individuals who work as a Web 3.0 consultant, MR producer, university professor, VR startup founder or researcher in the field of digital tourism solutions.

With no incentives being offered, all participants were invited and recruited with personal e-mails. The interview guideline was based on the foregone literature review and consisted of a series of open-ended questions. Interview participants were asked questions around the tourism customer journey, tourism experiences, mixed reality solutions and the metaverse. For instance, questions asked included: 1) When thinking about a traveler's customer journey from pre-, during- to post-stay, where do you see the greatest benefit of these experiences? (2) What future scenarios do you see for 2023, 2025 and 2030? What is happening when? (3) What is the benefit/added value of digital and virtual travel experiences?

All online interviews were voice-recorded. A multi-step analysis process was adopted. First, all interviews were transcribed by the automatized functionality on Zoom. Subsequently, all interview transcripts were double-checked, organized and prepared for coding. The qualitative analysis software NVivo was used to manually code each interview through an inductive coding process. A sorting, re-arranging and clustering process followed. This final step enabled to group codes based on the most dominant similarities and distinctions. This led to three manually determined and plausible scenarios that emerged as most distinct from one another, outlining possible 2030 avenues of never-ending tourism.

Following recent future studies, including Yeoman et al. [24], Rincon et al. [25] and Neuhofer et al. [26], a storytelling approach was adopted to present the data representing future scenarios in an accessible and personal way. The raw data that are most representative of each scenario were added in the form of quotes throughout the storytelling narratives in their original form, shown in italics.

The 15 interviewed experts are between the ages of 28 and 50. The gender represented are 12 male and 3 female, from a diversity of geographical regions, including Spain, Austria, the United Kingdom, the United States of America, Russia and Belarus. The findings are structured into three scenarios, including 1) Never-ending support "The digital companion", 2) Never-ending balance "The digital escape", and 3) Never-ending relationship "The digital connection".

4   Findings

4.1   Scenario 1: Never-Ending Support "THE Digital Companion"

Seline and Alicia are friends that work together for a famous shoe brand in London. In 2025, the company *"split their marketing department into two teams"*. Seline is responsible for the company's IRL "In Real Life" marketing strategy and Alicia for the URL strategy, basically their digital appearance. Twice a year they go on vacation. Each time, one of the women is choosing a destination. While Seline loves *"to plunge into an adventure without knowing what is going to happen there"*, Alicia is eager to plan their desired holidays months ahead. *"The planning behavior very much depends on the individuals personality"*. For her it is *"the high amount of dopamine that is released by the brain into her body while thinking about traveling"*. Meanwhile, Alicia's *"virtual assistant appears through her AR glasses showcasing the three destinations she was talking about the most over the last year"*. Number one was Paris. Both automatically envision the city of lights, getting the first impressions and information about the place on their devices. Working in the fashion industry, both think about the outfit they want to wear in front of the Eiffel Tower. The women love *"the fact they can be whoever they want to be when on vacation"*. *"The virtual assistant is presenting the trendiest outfits in their social media feed and the latest Netflix series about Paris to refresh their memories and get into the right mood"*. *"Therefore, the expectations towards the destination are high"*. The dates are automatically matched with their calendars, and the cheapest connections are booked. They only have to check-in at the train station by the recognition of their faces.

Alicia loves everything about heritage and history. When *"wandering through the city on-site with her hands in the pockets"*, the virtual assistant asks for acceptance to start the historical tour. Her *"AR glasses automatically visualize historical occasions when moving through that space"*. Besides an additional layer of information, holograms appear that reskin the location in a new way. It displays what the buildings used to look like, it *"dramatizes a historical event on the street and allows her to view an X-ray of the archeology below the street"*. Amazed by *"a reconstruction of something that doesn't exist anymore"*, she loves to *"physically interact with the space"*. Beside other travelers enjoying the multilingual experience, Alicia realized *"a visualization of a future building project where the local community gathered to participate with their ideas"*. A place where *"digital applications and narrative meet traditional information materials"*, such as flyers and a large advertising panel.

Meanwhile, Seline sat down on a bench. Unlike her friend, she loves art, fantasy and entertainment. One of her favorite NFT (non-fungible token) artists is said to launch a surprise at exactly on that spot. Suddenly an avatar appears, guiding her trough the spectacle, buildings start to change their façade with *"perfectly synchronized music and storyline"*. *"Through this multiple layers of engagement"*, she really got *"involved into the story"*. When reflecting on the customized spectacle with the stranger next to hear, Seline realizes that they know each other from a virtual gathering. The friends continue strolling around the city and enjoying all sights and fantastic places in the physical world, with their virtual assistant catering for their every need. They *"embrace the full presence of their stay"*.

When flying back home, *"their smart glasses automatically created a 360°-degree after movie for their social platforms"* and for Seline a physical photo album as a special memorabilia of their stay. When having lunchbreak at the firm, the friends love to put on their VR glasses and immerse themselves into Paris repeatedly. *"The digital and physical world go hand-in-hand"*. To enhance their throwback memories, the women order some croissants online, which they enjoy eating, while virtually immersing themselves into this beautiful French city once again.

4.2   Scenario 2: Never-Ending Balance "The Digital Escape"

Laura is a 45 year-old CEO of a New York based tech company. Every day at 6 am, she switches on the screen to enjoy her morning yoga session. Afterwards the alarm of her children's smart watches go off. Her countdown to prepare them for school. Just like her husband, Laura is working from home. By putting on her new AR glasses, she is joining the team remotely, asking for her virtual assistant to appear. After launching the company's new application, it is time for their annual vacation. As *"traveling got more expensive over the years"*, the family is lucky to have both access and the finances to fly to the south for two weeks.

The *"trip is automatically planned from flights to hotels and tickets for the attractions according to their preferences"* from last year's stay. The family is leaving all their devices behind. For Laura and her husband, it feels like *"escaping from reality as most of their daily interactions are digitally-enabled"*. The couple is forced to be organized due to their daily life responsibilities. When *"arriving at their destination they want to relax without being stressed to meet every point on the schedule"*. She feels that all our *"bodies*

are rooted in the real world". "To allow the full range of emotions, especially when the feeling of novelty is gone, we need physical items, lights and people around us". These days are reserved to "*re-connect as a family and to take care of everybody's physical and mental health".* The family enjoys doing sports and appreciate discovering new places. Mostly the two kids are the tour guides, as their friends showed them beforehand around the destination in the digital twin replication of the place. Throughout the two weeks, the family is in awe of the places and its beauty, as well as the memories they make with the locals and other fellow travelers.

When flying back home, the family talks and laughs about the unexpected incidents that happened on their journey. Laura is looking forward to going back to the office for a visit to share all her vivid experiences and new ideas with her employees. The children are a little upset that they couldn't capture every moment as usual while being on an all-offline holiday. When they get back home and enter their apartment, the children immediately race to their devices, activate their digital worlds and avatars, *"seeing the places they visited in person with new eyes and memories".*

4.3   Scenario 3: Never-Ending Relationship "The Digital Connection"

Max, Eva, Lukas, Alex and Nick got to know one other online due to long lasting football and Formula 1 battles they have been playing on their PlayStations. *"Being in those games feels for them like diving into a good book. You are captivated by the story and its characters, not wanting it to stop".* As they live all over Europe, they have not met each other in-person before. Over the last couple of years, their attention shifted to one of the Metaverse' virtual spaces. They appreciate the *"immersive experiences where you can find yourself within a story".* Each space can be designed on its own. This is *"where they got to know each other, different brands and other people even better".* The places they traveled to virtually, *"are spaces that someone else, maybe a metaverse designer from a destination, hotel, attraction or other brand created for them".*

Spending a lot of time together in daily life, the friends decided that they finally want to meet in person. *"Everyone is a little bit frightened, as they are not used to a face-to-face interaction".* From switching on their devices within seconds, it was easy to book flights and trains. The destination is clear. They want to see their favorite racetrack, Monaco. All planning is happening in a sophisticated and creative way within virtual spaces. *"Therefore, the metaverse starts stoking a lot of joy already early in the travel process."*

"Due to all the games they played and movies watched, they think they know all the secret places of that destination". "The big difference however was, that the digital journey involved no risk." Additionally, their virtual trips to Monaco did not *"degrade their environmental footprint",* aligning with their values for a sustainable life which is very important to them. They were able to *"experience dangerous adventures in this virtual replications, challenges where they would not have been able to accomplish physically".* While in reality, *"visiting certain sights can come with barriers."*

Arriving in Monaco, meeting each other *"in person feels fundamentally different".* They are used to each other's avatars, a form of presenting oneself in the way one desires to be. At the same time, the IRL meeting experience is very different *"due to all the multisensory impressions".* The group of friends recognize their personalities in

a new way. Due to their intense virtual engagement beforehand, the friends feel this *"strong connection to each other, as well as to the place itself, the locals residents and businesses"*, a strange feeling of familiarity, while actually never having been there physically before. *"Everyone moves around the space in a very conscious way and knows exactly where to go, even if the Formula 1 track is somewhat different in reality"*. When coming back home, the friends implement their digital memorabilia into their virtual spaces, which reminds them every time of the physical travel experience they had shared. The constant and profound memories trigger their wish to visit the destination again.

5 Conclusion and Implications

5.1 Discussion

This study's aim was to explore the novel concept of never-ending tourism and develop potential future scenarios for 2030. Having taken a look into the much-anticipated metaverse [4], the tourism industry has the potential to truly integrate physical and virtual realms [23] into a cyclical never-ending engagement and experience of a place, an attraction or a destination.

The three distinct scenarios that emerged in this study indicate that never-ending tourism may have different intensity levels of ICTs throughout the pre-travel, during and post-travel stages. The first scenario "The digital companion" indicates the presence of technology permeating all areas of life, including home, work and travel. Travel is as an extension of life, and life is an extension of travel. Through virtual assistants, virtual tools and mixed realities, one's everyday life and travel are interconnected with information, managed seamlessly and experienced as an on-going integration.

The second scenario "The digital escape" represents a highly technology-facilitated everyday life, while the physical travel is seen as a preserved enclave that represents an escapism from technology for a change. This scenario is from the first one, yet consistent with previous studies [e.g. 27, 28], supporting the need for intentional and desired disconnection as a choice for on-site travel. Everyday life and work realities toward 2030 are expected to become more technology-enabled. Besides its many noted advantages, travel may be seen as one of the few remaining spaces to afford escapism, immersion and a reversal of everyday by offering an opportunity for disconnection and digital detox [28] from an intensely-technology led life.

In the third scenario "The digital connection", a future 2030 reality is painted, in which social connections are formed in and through virtual spaces (e.g. e-sports, games and gamified virtual spaces). Physical meetings and travel thereby becomes an add-on to the primary experience that is taking place in the virtual space. Recent studies on video gaming confirm the role that virtual space experiences play in the intention to visit physical destinations [29]. This scenario points to a metaverse reality in priorities are shifted. Virtual spaces and digital twins dominate while physical attractions and destinations might become a natural extension thereof.

What all three scenarios, while distinct from one another, have in common is that highly developed virtual offers, assistants, solutions and spaces become a dominant extension of physical travel. Previously, ICTs might have served the purpose to operationally assist, enable, empower and enhance different travel stages and experiences

on-site [30]. This study shows goes beyond these technology-enhanced tourist experiences [30] and shows that in the next decade, the virtual experience is expected to mature significantly and becomes both, an extension and an experience on its own. We are on the verge to shift from *technology-enhanced tourism experiences* to *integrated never-ending tourism experiences.*

Travelling the real world will become more and more exclusive, valuable and expensive than its virtual counterpart. Therefore, the inspirational pre-booking phase is gaining in importance. Organisations and brands will succeed that have strategies for both realms – the physical and the virtual. Overall, there is going to be a customer segment that desire spatial distance, want to escape and immerse themselves into real-life travel experiences. At the same time, an entirely new generation of people may not understand the concept of getting on an airplane to go see new places, when all can be experienced in the metaverse from the comfort of one's home. This shift will be determined by the development of metaverse platforms that are faster, cheaper, more sustainable, and by the year 2030, more accessible. For this reason, the virtually immersive experience that this medium allows can be seen as a new form of sustainable and accessible travel. People will be able to experience travel regardless of space, time, financial resources, political restrictions or own physical abilities.

It is a new reality of imagination to teleport oneself mentally into a new world, only seen through books and movies today. The metaverse is a new medium to cater for that need. The digital twin reconstruction of certain real-world locations will enable travelers to visit a variety of places, engage with their history, local people, religions and traditions. Additionally, through virtual spaces, natural scenery and cultural attractions can be preserved when at risk and reconstructed from the past when no longer there. Thus, never-ending tourism is not only an integrated experience in which travel becomes part of everyday life; it also encompasses a type of time travel that allows us to gaze into the past and the future.

5.2   Implications for Tourism Practice and Future Research

Several practical implications unfold for tourism designers and destination management organizations. Considering post-covid and sustainability considerations, attractive virtual tourism offers will be essential to any integrated destination marketing and management strategy. The participation in the metaverse will be critical, especially when considering traveler needs and demands with regards to special needs, accessibility, cost of traveling, personal restrictions, or sustainability and mobility concerns.

The goal of never-ending tourism is not to substitute physical travel or the destination, but rather to complement and extend its offer, and to render it 'experienceable' at all times in the virtual space. For tourism and technology businesses, this study's scenarios imply the possibility for new business models and solutions that tap into the representation of tourism offers in mixed realities. For instance, memorabilia through multisensory VR glasses could be early prototypes tapping into mixed reality of travel that never ends [6, 23, 31]. The key direction of never-ending tourism is a new way of engaging customers in a cyclical experience through an integrated multi-media and multi-reality approach. Most importantly, the engagement, interactions and relationship with the traveler are not completed after post-travel operational transactions (e.g. reviews, ratings) stage, but

extend experientially into everyday life. The experience in never-ending tourism is not insular but embedded into everyday life in a meaningful way.

For tourism research, the metaverse, and particularly, the concept of never-ending tourism is just at the starting point of conceptual and empirical research. This study is thus not without limitations. Contextually, the study was conducted in summer 2022, after a global pandemic and at the beginning of the war in Ukraine. A time when travel became unsafe and expensive, which might have influenced the experts' estimations of 2030 and thus the emerged scenario results. In 2022, a lot of venture capital is currently flowing into the advancement of VR, AR and Metaverse applications and platforms. A year from now, the scenarios for 2030 could vary. Furthermore, the interviews were conducted individually with each expert online. Face-to-face or virtual focus groups could potentially lead to a more extensive and co-created image of the concept and scenarios. Although the experts themselves are travelers, the research questions would be fruitful to be examined purely from a customer's perspective. How do travelers perceive the potential and possibilities of never-ending tourism? This came clearly from an expert's statement: "*Never-ending tourism sounds exhausting. Sometimes we simply want inner peace by staying at home on our couch.*"

This study opened both the discourse and empirical exploration of never-ending tourism as a distinct phenomenon that exceeds existing focused studies on AR, VR, MR and technology-enhanced tourism experiences [30]. The study contributes to recent metaverse studies in the tourism context [4]. While the metaverse holds applicability to many industries, the particularities of the never-ending tourism with its multi-phasic nature of crossing from everyday life to extraordinary consumption contexts is worth further exploring. In particular, examining never-ending tourism in relation to accessibility in specific tourism sectors (e.g. heritage, visitor attractions, museums) is suggested for further research. Moreover, researching new tourism business models that focus on closing the loop between the post-travel stage and the next pre-travel stage are of interest to understand how long-term customer engagement, relationship and brand loyalty can be successfully maintained in the virtual space.

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Metaverse and Tourism: From a New Niche to a Transformation

Katerina Volchek[1](✉) and Armin Brysch[2]

[1] Deggendorf Institute of Technology, Max-Breiherr-Straße 32, 84347 Pfarrkirchen, Germany
katerina.volchek@th-deg.de
[2] Kempten University of Applied Sciences, 61 Bahnhofstraße, 87435 Kempten, Germany
armin.brysch@hs-kempten.de

Abstract. Metaverse is named among the technologies that are predicted to transform everyday life. The proliferation of such technologies as the Internet and smartphones has triggered major transformations in the tourism industry. This paper conceptualises the phenomenon of Metaverse towards the phenomenon of tourism. It applies a semi-systematic literature review methodology to identify existing alignment between the phenomena. The paper concludes that there is a conceptual alignment between the critical dimensions of the Metaverse and tourism. Tourism should be ready for the reciprocal effects of metaverse development on tourism and vice versa, from new opportunities to enhance tourist experience to a possible dissolution of the contemporary understanding of tourism.

Keywords: Tourism · Metaverse · Transformation · Niche · Conceptual paper

1 Introduction

The phenomenon of tourism as a subject of scientific inquiry got attention only in the past decades, alongside the recognition of its scale and possible impacts on society [1]. For a long time, it was understood as a coherent, clearly delineated activity based primarily on the assumption that people travel physically by relevant means of transport to pre-selected locations for a planned amount of time [2]. Such an assumption became a background for a contemporary explanation of the tourism phenomenon.

Technologies are known to have transformative power over life. Information and Communication Technologies (ICTs) have transformed the tourist industry over the last decades [3]. Service providers in tourist destinations, tour operators, and other intermediaries develop new models for addressing customers, invest in new sales channels, and reorganise their production processes for travel and leisure products. New tourism services, such as virtual reality (VR) day trips in museums, amusement parks, or exit rooms, have emerged due to digital transformation [4, 5]. The 4th Technological Revolution has led to structural changes among market players in terms of supply and demand. It has created new opportunities for advancing the tourist experience and challenged business competitiveness through innovations.

Metaverse has been named among the transformational technologies believed to have a revolutionary effect on human life. It goes beyond augmented reality (AR) and virtual reality (VR) and offers the transformational experience of a virtual world with economic, social and cultural interactions on a large scale [6]. Thus, Disney works towards blending the physical Disneyland and Disney World experience with real-time virtual concerts, shops for virtual avatars and AR location-based personalised communication with the Disney characters [7]. Large technology companies, venture capital, private equities, startups, and established brands are interested in capitalising on the opportunities presented by the Metaverse. Investments by these businesses resulted in more than $120 billion in the first five months of 2022, more than double the $57 billion from 2021 [8]. Buhalis & Karatay [9] highlight that Metaverse will have a transformative effect on tourism. However, the degree of the possible change of tourism under the influence of the Metaverse remains underexplored.

This paper aims to conceptualise the phenomenon of Metaverse towards the phenomenon of tourism to identify possible alignment and discrepancies between the phenomena. It reports the results of a semi-systematic literature review and subsequent conceptualisation of the term "metaverse". The paper concludes that there is a conceptual overlap between the phenomena of the Metaverse and tourism. The tourism industry should be ready for the reciprocal effects of tourism on metaverse development and vice versa, as well as a possible dissolution of the contemporary understanding of tourism.

2 Literature Review

2.1 The Phenomenon of Metaverse

Metaverse is a technology-driven "virtual world" that is expected to transform human interactions. The "Metaverse" was first mentioned in a science-fiction novel in 1992 and was envisioned as an alternative virtual world. It represented an interconnected network of virtual spaces aimed to amplify an individual world [10]. Cameron [11] conceptualises metaspace as a "bigger outside" that lies beyond the space where humanity operates now. According to them, it may be presented by a utopia (i.e., a fictional unrealistically perfect space), endotopia (i.e., a realistically looking standardised representation of any space), and xenotopia or Metaverse (i.e., a space beyond the current human spatiality). In all three cases, artificially created metaspaces are characterised by economic, cultural, moral, and legal norms and regulations.

Metaverse implementation relies on a range of technologies [6, 12]. The advancements in technologies and the proliferation of extended reality (XR) devices have enabled the envisioned version of a metaverse in real life [6]. This made an online world an integral part of the real one to co-create and personalise external reality [11, 12]. The technology to create the Metaverse is rapidly evolving with the use of VR headsets, haptic gloves, AR, and XR [10]. The Metaverse can effectively interconnect virtuality with reality by contributing new opportunities for users to participate actively in immersive experiences. This creates preconditions for new experiences and services to be created in tourism through interactions and immersive experiences.

The 4th technological revolution with constant connectivity, the high processing power of personal devices, and innovative computing paradigms, including artificial

intelligence and blockchain, have triggered a revolution, making the Metaverse possible to implement [13]. According to the Financial Times [14], interactions within Metaverse will replace smartphone-based communication in the upcoming decade. It is becoming increasingly important to understand the contemporary phenomenon of the Metaverse with a view to its potential effect on tourism.

2.2 The Contemporary Phenomenon of Tourism

Tourism has been widely recognised as a distinctive type of human activity. In 1979, Leiper [15] highlighted five "elements" that create a functional and spatial tourism system: tourists, demand-generating regions, destination regions, a tourist industry, and transit routes. Kaspar et al. [16] explain that tourism essentially consists of two subsystems: "tourism-subject" (i.e., tourist) and "tourism-object" (i.e., tourism locations, tourism enterprises and tourism organisations). The contemporary definition by UNWTO [17] highlights people who travel, the purpose of travel, places outside of tourists' normal environment, and the process of transitioning from a normal to a tourist place as building blocks of the tourism phenomenon. The existence of tourism as a standalone phenomenon is determined by people who generate tourism demand, destinations that can satisfy this demand, the ecosystem that provides relevant services and, importantly, the tourist escape as a process that enables the satisfaction of the tourism demand.

Tourist Needs and the Purpose of Travel. UNWTO [17] summarises travelling as being motivated by "business, leisure or other personal" purposes. To introduce a taxonomy of tourist products, McKercher [18] proposes a more diverse classification of tourist needs (pleasure, business, personal quest, nature, and human endeavour) that ought to be satisfied. Crompton [19] additionally emphasises the need for socio-psychological and cultural escape from daily routine. Tourism is largely determined by tourism demand and tourism products' potential to satisfy it.

Tourist Destination and Place Concept. People are motivated to travel from their usual places to satisfy their needs. Regardless of its type, size, popularity, etc., place is defined as any destination outside the tourist's usual environment [15]. There are practices of distinguishing between "usual" and tourist environment by the frequency or the length of stay [20] and by measuring physical distance [21]. Lehto et al. [22] emphasise that being "outside of a usual environment" might mean being in a virtual place or a mental state of leisure. The concept of a tourist destination refers not only to a physical location but to any environment that is different from the everyday one.

Tourism Ecosystem. Ryan [23] defines tourism as a phenomenon that is characterised by economic activities performed by demand generators who are staying away from home and by supplies which offer accommodation and related services to satisfy this demand. McIntosh and Goeldner [24] specify that tourism is a collection of specific tourism activities with associated services (i.e. accommodation, dining, transportation, shopping, entertaining) and business entities. Being one of the largest global industries, tourism can be a beneficial and destructive factor for the economic and socio-cultural environment [25]. An in-depth understanding of tourism as a phenomenon is essential for the sustainable development of destinations, countries, and entire regions [26].

Escape from the Usual Environment to Become a Tourist. The spatial and temporal parameters have been introduced as the differentiators for quantifying tourism effects. Thus, an overnight stay outside the home has been applied to differentiate between a visitor and a tourist [15]. The maximum threshold recommended for distinguishing tourists from residents has been set as one year since 2008 [17]. However, the escape is related not only to the physical state but to the state of mind and experience, such as relaxation experiences, experiences of nature or culinary experiences, etc. Tourism is commonly known as a liminal activity, defined as a 'transition from known to unknown' [27] and is associated with the change in human behaviour from everyday routines to often uncommon preferences. The parameters of transitioning from normal to tourist behaviour and back remain underexplored [28].

The tourism phenomenon is not static [1, 29]. Historically, social, economic, political, and other factors have already triggered the stages of its development. They have also changed the understanding of who a traveller is, what can be the purpose of travel, and its possible effects on sustainable development [26, 30]. The complexity of the tourism phenomenon and its dimensions determine its adaptiveness [15]. Tourism footprints, political importance, and transformational technologies are forecasted to trigger future turning points in tourism development [30]. The 4th Technological Revolution made completely new forms of tourism and leisure activities possible. Thus, virtual travel to the Middle Ages became a reality via games. The borders of space and time are being challenged. The traditional understanding of tourism can become too narrow to incorporate the new reality. However, the intersection between the tourism phenomena and the Metaverse is still not well understood. Both concepts involve people as users or tourists, address real or virtual spaces, describe otherness with experiences, and ultimately need an ecosystem to function. Envisioning a possible alignment between these factors is essential to understanding the future of tourism and its impacts on society.

3   Methodology

This paper represents a semi-systematic literature review [31]. This methodology is advantageous for developing an overview of research areas, tracking conceptual development, and providing theoretical perspectives for topics from diverse disciplines. The study consisted of five stages (Fig. 1).
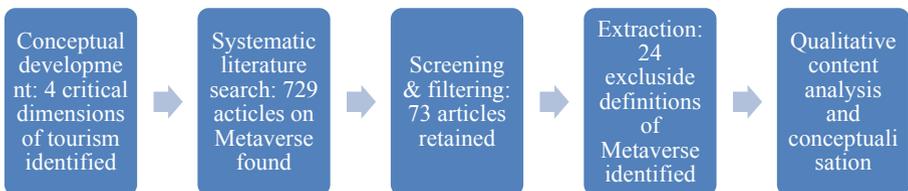
Fig. 1. Semi-systematic literature review process

First, the literature review conceptualised the knowledge on tourism to define critical dimensions that distinguish tourism from other activities. Four dimensions were

identified to guide the analysis. Second, a systematic literature search was conducted. Historically, the term "Metaverse" was used to represent one of the utopic ideas of alternative worlds. However, the technology-enabled alternative world, which became possible with the advancements of the 4th Industrial Revolution, is commonly referred to as the "Metaverse". Other keywords, such as AR and VR, represent tools which can be used by Metaverse and are not helpful in understanding the phenomenon itself. The study used the single keyword "metaverse" to increase data validity. The search was performed in peer-review journals and conference proceedings across Web of Science, Science Direct, and Google Scholar databases for the studies published from January 1992 till July 2022. The systematic literature search identified 729 articles that conceptualised Metaverse as a phenomenon. Third, the screening and filtering were conducted by reading the abstracts to exclude repeating and irrelevant articles, such as IT/software development papers. 73 papers in which the Metaverse was the subject under investigation were retained for the analysis. Forth, the extraction process searched for exclusive definitions of Metaverse across the selected papers. 24 exclusive definitions of Metaverse have been retrieved. Fifth, the extracted definitions were analysed qualitatively and quantitatively. The critical dimensions of the tourism phenomenon identified in the literature review (Satisfaction of needs, Destination, Ecosystem and Escape) were applied as codes for the metaverse definitions analysis to identify possible alignment between the phenomena. Additionally, the study calculated the frequency of each code in the metaverse definitions to ensure the reliability of inferences and establish potential gaps in the knowledge. Last, the acquired knowledge on the Metaverse within the four dimensions was conceptualised with the knowledge about tourism to envision a possible interplay between tourism and the Metaverse.

4   Findings

The findings indicate major attention to the concept of the Metaverse, with the number of definitions doubling since 2021. Table 1 summarises the codes identified in the analysed definitions. Earlier explanations of the Metaverse largely focused on the technical aspect of designing ecosystems in virtual worlds. Recent developments offer a more holistic view of the phenomena.

4.1   Tourist Needs in Metaverse

Metaverse is initially envisioned to enhance real spaces and existing services [9]. This opens opportunities to enhance and diversify customer experience [32]. Thus, the Metaverse provides innovative opportunities for communication, collaboration and socialisation [33], which leads to new ways for value co-creation for its stakeholders [9]. The Metaverse is also expected to affect sustainability [34]. Together, this creates a potential to satisfy diverse needs.

Metaverse, therefore, can support some of the activities currently common for tourism. It can be conceptualised as a phenomenon that creates new potential for enhancing touristic experiences [37] and satisfying tourist needs [10]. However, ways to deliver experiences reliably remain underdefined.

Table 1. Identified themes in metaverse definitions

Author	Ref	Needs	Destination	Ecosystem	Escape
(S.-G. Lee, Trimi, Byun, & Kang, 2011)	[35]		x	x	x
(Bourlakis, Papagiannidis, & Li, 2009)	[10]		x	x	
(Gupta, 2022)	[32]	x	x	x	x
(Dionisio, III, & Gilbert, 2013)	[12]		x	x	x
(Choi & Kim, 2017)	[36]	x	x		x
(Cameron, 2012)	[11]		x	x	x
(L.-H. Lee et al., 2021)	[37]		x	x	x
(Seok, 2021)	[38]		x		
(Shen, Tan, Guo, Zhao, & Qin, 2021)	[13]		x	x	
(Ning et al., 2021)	[6]	x	x	x	x
(Buhalis & Karatay, 2022)	[9]	x	x	x	x
(Um et al., 2022)	[39]		x	x	
(Kim, 2021)	[40]		x	x	x
(Mystakidis, 2022)	[41]	x	x	x	x
(Allam, Sharifi, Bibri, Jones, & Krogstie, 2022)	[42]		x	x	x
(Park & Kim, 2022)	[43]		x	x	
(Bibri & Allam, 2022)	[44]		x		
(Gursoy, Malodia, & Dhir, 2022)	[33]		x	x	x
(Dwivedi et al., 2022)	[34]	x	x	x	x
(Zhao et al., 2022)	[45]		x		x
(Hollensen, Kotler, & Opresnik, 2022)	[46]			x	
(Wang et al., 2022)	[47]	x	x	x	x
(Lim et al., 2022)	[48]			x	x
(Koo et al., 2022)	[49]		x	x	x
No. of explanations		**7**	**22**	**20**	**17**

4.2 Destination Metaverse

Metaverse offers its users different types of created environments. Technological advancements currently enable the creation of two distinguished types of simulated reality: real-based and virtual-based spaces [39]. Real-based Metaverse is an augmentation of an existing physical space, such as a tourist sight, with artificially designed digital objects or people. Virtual-based Metaverse simulates an alternative, digital world, where interactions occur instead of the real location [12; 35]. The design of metaverse infrastructure and different combinations of AR, VR and XR technologies opens a range of options for envisioning environments.

Tourism destinations serve as means for satisfying tourism demand outside of their usual environment. Metaverse destinations, created for tourism, may synthesise real and virtual environments [9, 33]. This could range from 2D or 3D virtual objects overlaying real travel sights to full "incarnations" [42] of existing tourist sights. They can offer extra services, such as additional information and entertainment at tourist sights [12] while retaining the main attractions. Alternatively, the Metaverse may provide a revolutionary approach to designing alternative, fully immersive and self-sustaining virtual travel destinations that do not exist and are even impossible in the real world [47]. Advancing the technical capabilities of the metaverse offer opportunities from satisfying the existing tourist demands to creating new "pull" factors to attract tourists.

4.3 Metaverse Ecosystem

The Metaverse is explained as a simulated reality. Rather than being a product that satisfies specific needs (e.g., a virtual game or a shop), the Metaverse is initially planned to reconstruct the ecosystem of relationships that are natural for the real world. Such ecosystems include multiple players with economic, financial, social, and cultural institutions [39; 40]. Metaverse can be explained as a virtual copy of smart cities with technology driving value co-creation for its players [42]. Importantly, the Metaverse is defined as having potential alternating social environments and norms [42]. Political and legal frameworks should be established to moderate such an ecosystem [6].

Metaverse and tourism ecosystems conceptually align with each other. This alignment opens the potential for multiple scenarios of co-development. Thus, the metaverse ecosystem might become integrated into a tourist ecosystem, supplementing it with resources to provide tourists with additional services. Alternatively, the tourism ecosystem might become constitute a larger metaverse ecosystem, offering its users a specific context.

4.4 Escape with Metaverse

The metaverse concept itself represents an escape from reality [37]. Lee et al. [41] explain that the Metaverse requires constant connectivity and interoperability of the devices that provide access to the Metaverse. Lim et al. [45] and Wang et al. [43] emphasise that Metaverse is the next generation of "embodied Internet". Users can access augmented and virtual objects at any time and location [9]. Moreover, the Metaverse can be conceptualised as an open space for logging into a simulated world – pausing the experience – and logging back into the same context [9, 46]. Experiencing the Metaverse outside of a real environment can be a continuous process [14].

For tourism, Metaverse gives the promise to provide a liminal place for an escape from the everyday environment. Access to the Metaverse can technically be granted to tourists, who virtually transition there from any place and any time themselves and via their avatars [43, 45]. This creates space for transitioning to tourist behaviour in the metaverse environment. Meanwhile, in the case of an AR overlay of reality, tourists technically need to see the tourism destination, i.e., to be there. A fully created metaverse travel destination can technically provide a continuous embodied experience free from physical space and time.

The analysis shows an intersection between tourism and metaverse phenomena. Both phenomena offer an escape from the everyday environment at their core. In tourism and Metaverse, alternative environments with specific attractions serve as spaces for such an escape. Both tourism and Metaverse develop conceptually similar ecosystems to enable economic, social, cultural, and political relationships in the new places. Importantly, the metaverse ecosystem is technically suitable for supporting some of the activities relevant to tourism, thereby creating a potential to satisfy tourist demands. However, the strategic and service design questions, i.e., what kind of specific needs can be satisfied and how to design the metaverse ecosystem to provide the escape and these needs satisfaction, remains underdefined.

5   Discussion

The alignment between the critical dimensions of tourism and metaverse concepts opens an opportunity for mutual and reciprocal effects. The study supports the idea that the Metaverse will have a transformative effect on tourism [9]. It proceeds with envisioning the possible discrepancies in tourism under the influence of the Metaverse.

5.1   Metaverse Services as a Niche for Tourism

The metaverse destination can manifest itself in the physical world [39]. Metaverse creates an opportunity for technology-enhanced and reinforced tourist experiences. On the demand side, both consumer interest and the desire for virtual supplements already exist [8]. The demand for a deeper cultural experience, learning, self-actualisation in society, and ethical and sustainable tourism, is expected to increase, opening a space for new technology-driven services [50]. On the supply side, the elements of metaverse tourism destinations already exist (e.g., Incheon in Korea, Deutsches Museum Munich). Characteristics of these services, such as 2D or 3D objects, animations, or text, already enrich the physical tourist destinations. The evolving technologies and the promise to realise the Metaverse and a realistic, self-sustaining cultural, social and economic environment [6] will expand opportunities for designing tourism services. The intersection of Metaverse and tourism establishes a potential for complementary tourism services and new niche services to satisfy the demand of specific target groups.

5.2   Transformation of Tourism Under Metaverse

The Metaverse is designed to create an alternative reality that enables continuous escape from the everyday environment [12]. On the supply side, the virtual-based Metaverse creates a space for new experiences, as well as for alternative destinations that do not or cannot exist in the physical world. The specific features of the Metaverse, such as the possibility of two-way interaction and new self-made egos (i.e. avatars) [39], immersion and embodied experience [42], enable multiple scenarios of co-development. For example, several vacation experiences become possible in temporally short sequences, in different roles and at various metaverse locations. Metaverse has the technological potential to create new tourist experiences that transcend the traditional understanding

of time and space and erase the border between virtual and real tourist escape. Importantly, an increasing digital affinity of young target groups such as Gen Z or Alpha lead is expected to spread the demand for metaverse experience. This forecast is supported by large technology companies, venture capital (VC), private equity (PE), startups, and established brands that are making large investments to capitalise on the opportunities presented by the Metaverse [8]. Depending on the scenario, the Metaverse might become an integral component of the tourist ecosystem with so far unknown virtual possibilities to experience people, objects, attractions, time travel, etc. Vice versa, tourism might become a niche product within the metaverse ecosystem.

The abovenamed integration of the Metaverse and tourism phenomena may ultimately lead to a dissolution of the traditional understanding of tourism. It has already been acknowledged that the concept of place in tourism may be understood both as a physical location, as a virtually created destination and even as a mentality or a state of mind [22]. New experiences in the Metaverse, which are free from physical space and time, might require expanding the borders of the tourism phenomenon, which is currently measured by time and distance. The proliferation of the Metaverse as a disruptive technology may trigger the need to revise the current definition of tourism, which might soon become a broader phenomenon of "*a social, cultural, and economic phenomenon that entails the transit of people or their digital twins to real or virtual places outside their usual environment for personal or business/ professional purposes*".

6   Conclusion

This study conceptualised the phenomenon of Metaverse towards the phenomenon of tourism. It has identified a substantial alignment between the two concepts. The study concludes that reciprocal effects of tourism on metaverse development and vice versa are possible. The tourism industry needs to be ready for multiple scenarios of co-development. This could range from the technological capabilities of Metaverse becoming tools to enhance tourist experience to Metaverse becoming a disruptive force that will require the entire tourism definition to be changed.

The study creates an ontological contribution by providing a better understanding of the meaning of the metaverse phenomenon, as well as envisioning a possible need for a change in the way tourism is defined. It also contributes to tourism service management and e-Tourism design by creating a first background for the research in these domains. The key practical implication of the research is a call for tourism experts to design advantageous scenarios for hybrid tourism–metaverse ecosystems. The key limitation of the study is its theoretical nature, with a lack of empirical evidence. Continuous monitoring of the joined metaverse & tourism development with a focus on a deeper understanding of the evolution of Metaverse for tourism, success factors of tourist metaverse experiences and sustainable development of tourism ecosystems, including businesses and entire destinations, is required.

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Back in Time with Immersive Heritage Tourism Experience: A Study of Virtual Reality in Archaeological Sites

Mujde Bideci[1](✉) and Caglar Bideci[2]

[1] Canterbury Christ Church University, Canterbury CT1 1QU, UK
mujde.bideci@canterbury.ac.uk
[2] University for Creative Arts, Epsom KT18 5BE, UK
caglar.bideci@uca.ac.uk

Abstract. This study focuses on how virtual reality applications might evoke nostalgic sensations in travellers during cultural heritage tourism. While extensive research on the tourism experience has revealed different extrinsic and intrinsic dynamics that affect the tourist experience, this research aims to explore what feeling of back in time VR users experience in an archaeological destination. The gap in visitor experience employing VR research still persists, despite the rising adoption rate of immersive technology, such as virtual reality. In this study, a qualitative method has been applied to analyse online reviews of VR users who visited the Olympia Archaeological Site in Greece and used the 'Back in Time Olympia' VR application. The findings drawn from the results show that nostalgia, presence, engagement by learning, and service experience are essential determinants of tourist VR experiences in such cultural heritage destinations.

Keywords: Heritage tourism · Tourist experience · Virtual reality

1 Introduction

Immersive technologies such as augmented (AR), virtual (VR), and mixed (MR) reality have recently provided enhanced immersion in tourist experiences by mixing physical and virtual settings and are primarily centred on cognition and emotions [6]. Tourists experience VR applications designed for multiple purposes such as providing entertainment, education, or enriched marketing strategies [10]. Existing research on VR applications in tourism has primarily concentrated on either positive [16] or negative [10] impacts of those applications on tourists' experiences, or conceptual/theoretical approaches [7] that have contributed to marketing and heritage preservation. Others have studied VR applications in understanding the behavioural intention of tourists [13], especially in museum settings. Based on previous research, our potential contribution to research and sector is two-fold: (1) due to the infancy of research on VR applications in heritage tourism, we focus on the usage of VR practises in tourism and explore the multidimensional structure of immersive heritage tourism experiences in an archaeological

site; (2) contrary to the popular myth of nostalgia, which can only be evoked with the link between the tourist's memory and the destination rather than the destination itself, we focus on the usage of VR practises in tourism and explore the multidimensional structure of immersive heritage tourism. This study's findings would guide marketers in understanding tourists' multi-dimensional VR experiences in heritage tourism. From a theoretical perspective, these research findings might encourage comprehension of VR experiences of presence, learning engagement, and service in such locations.

2 Literature Review

2.1 Tourism Experience and Immersive Technologies

Tourism experience is a socially constructed, gradually evolving term, influenced by various dynamics, stages, and meanings [14, 2]. Moreover, tourists tend to store those moments of experience in memory not only for satisfactory reasons but also to immerse the nostalgia along with the fantasies behind the stories [3]. Tourists visiting historical tourism destinations are either passive receivers who are motivated to recall their ancestral history or active searchers who have no link but want authenticity in their experiences [8]. Herein, the use of immersive technologies in destinations helps tourists experience feeling ai. Being back in time. In other words, when the tourism industry develops appealing storylines to engage with visitors [1] immersive technology can assist tourists in dreaming beyond and immersing themselves in a new cognitive experience.

AR and VR are different immersion technologies that bring users enjoyment, engagement, and interactivity [5] and are widely employed in service areas such as tourism. Although both immersive technologies give users richer experiences through cognitive immersion [6] AR mainly exposes synthetic archetypes such as avatars or objects over the real-world and helps users enhance their engagement [5], while VR provides a physical immersion with all senses and a realistic preview of what they would expect from a product/destination. Existing immersive technology research has focused on the consequences of AR/VR applications [9], the theoretical review of AR/VR technologies via meta-analysis [5], designing a conceptual model of heritage preservation for managing heritage into digital tourism experiences [1], and comparing AR and VR technologies to reveal their effect on tourist experiences [15].

2.2 Virtual Reality in Heritage Sites

Heritage sites are places where tourists experience nostalgic feelings by fantasizing about what happened in the past [4]. Due to a lack of first-hand experience in such places, nostalgia feeling can be gained through tangible and intangible historical facilities such as historical buildings, events, or cultural archetypes e.g., mythical stories [4, 3]. In this regard, heritage tourism offers to experience the past by engaging and immersing in the place [1]. Heritage tourism researchers have mainly focused on documenting its market share, contribution to the economy, and tourist visit patterns including motivations and behaviour. Some researchers have recently examined the latter aspect of AR, such as why and how it might improve place satisfaction in Beijing's nine heritage gates [13]

or whether mixed reality applications with culturally engaging activities affect visitors' immersion, like with HoloTour (3D virtual tourism application) when they visit a virtual heritage site - Temple of the Moon [11]. In destination-based applications, however, especially VR offers an alternate world in a simulated environment by blocking users' view of the real world with head-mounted displays. Therefore, VR applications embedded in cultural heritage sites add value to their nostalgic experiences. In this connection, this study focuses on exploring the feeling of the past and present through VR experience while visiting an archaeological site.

3   Methodology

To investigate travellers' VR-based experiences, data from two online review platforms were analysed. We purposefully confined our sampling to completely immersed VR experiences to capture users' immersive feedback. The study comprised tourists who visited the Olympia Archaeology Site in Greece from 2019 to 2022 and purchased a commercial VR service called 'Olympia Back in Time.' The VR service offers standalone headsets, an audio tour, and a GPS-based virtual map. The idea behind this service is to provide travellers with a unique experience that allows them to compare the current to the past. To achieve this, the VR application uses a 3D illusion of historical elements such as seeing athletes of the Ancient Olympic Games in the Stadium. With a qualitative approach, the reviews were anonymized from any personal information such as name or email address. A pseudonym list has been created for 402 reviews (e.g., user_1) and the thematic data coding has been conducted including finding similarities and removing repetitions. Because the research is exploratory in nature, we used MAXQDA-22 to analyse the contents and an inductive approach to the designs and categories developed from the reviews. The exploratory and confirmatory stages were employed to analyse the 10,864-word content. The experimental phase started with line-by-line coding, which entailed comparing and understanding the texts. A relationship between categories was sought at the next level, and tentative codes were created. Finally, a variety of code lists were employed to construct secondary codes.

4   Preliminary Results and Implications

The preliminary findings of the study show consistency with existing research and add on by presenting how a comparison of past and present with VR can shape tourists' experiences. After a qualitative insight into user experiences was gathered through online reviews, the initial themes were categorized into pre-defined themes and are (1) *presence* – feeling in the virtual environment [14], (2) *nostalgia* – including elaborative experiences [12], and (3) *service experience* – ease of use [17]. (4) *Engagement by learning* has been also revealed during the second coding process. Regarding the presence, 'feeling present at the site but at another time' was the common statement between reviews. Accordingly, as [17] advise, the mental imagery of spaces is an important element of presence that visitors feel when they are fully immersed in a VR-mediated environment. The mental imagination of ancient Olympia has been stressed by *User_ 71* as '*The VR glasses gave us a sense of ancient Olympia, complete with athletes exercising, people*

speaking or applauding full-sized temples, and a stunning statue of Zeus, which would have been difficult to picture otherwise'.

VR users interact with athletes in the simulation which evoke a 'sense of being with others' at the virtual Olympia. Like previous studies on **presence**, virtual reality allows users to interact with holograms and virtual images in an almost real-time manner as *User_ 6* explains '*We had been to Olympia the day before and thought it magnificent, but it was difficult (particularly for my kid) to truly comprehend and appreciate the magnitude of the area! The encounters with athletes were incredible, and you could practically reach out and touch ancient Greeks!'*.

Despite **nostalgia**'s concept as a recall and interaction with the ancestral past, nostalgic archetypes can actively stimulate imagination and fantasy by evoking emotional senses [8] in tourism destinations. History, reimagination, and transforming ideas are important elements of nostalgia. Accordingly, User_13 states an unknown history can be internalized by everyone instead of the ancestral past '*We all found it engaging and enjoyable, and it was a different experience from what we had done at other ancient sites. It invigorated the neighbourhood in a… Olympia has a fascinating past'. Reimagination* is delivered by fantasies as a part of historical nostalgia. In such an environment cognitive creation is active and helps to see beyond 'sole rocks' and *transform ideas* as *User_22* stated '*It not only brings the stones to life (which you need a lot of while merely staring at stones), but it also brings the entire place to life! It was quite nicely put up, with just enough information and entertaining elements such as seeing the virtual athletes compete'.*

Since VR **services** are an addition to the already-existing offerings at tourist locations, customers, particularly those who travel with kids, evaluate the personnel, payment, and simplicity of use such as '*Awesome experience. We contacted the owner via - and he replied within a couple of minutes. We gave him a time, and everything (including payment) was set up. He gave us a quick instruction on VR glasses, and we walked from there to the archaeological site (User_356)'.*

Although the imagination of the past links to nostalgia and presence, we have also found *that* visitors stress ***engagement with learning***. In line with [15] study, our study revealed that engagement is an important factor for visitors to the Olympia Heritage Site and is based on family, *learning, and comparing with previous experiences*. Accordingly, the desire of learning about how people lived back in the ancient Greek ages and how visitors engaged is given by *User_276* regarding family engagement '*…it was a wonderful trip, and our 8-year-old daughter never complained about "just stones", it is a fun way for kids to discover the history of Olympia (User_276, family engagement'.* Regarding learning from stories, User_105 states *'The audio and visual facility provided by VR was excellent with relevant information to each location within the site as options to hear further facts relating to every aspect of the history of Olympia'.*

Based on the findings from this study, we propose an immersive heritage tourism experience framework. Consequently, our research strengthens the understanding of the multidimensional structure of VR experiences and reveals the feeling of being 'back in time,' extending the literature on presence, engagement, and service. A key finding of our study is how nostalgia transforms into fantasies and imagination instead of traditional memories based on collective memory or ancestral history. While an increasing

number of research has been applied to VR (e.g., limitations [7]; effects as a marketing tool [14]), the relevant research goes beyond past work to explore its role in user experiences at heritage sites. Given that the findings will shed light on the undiscovered parts of VR and the tourist experience, we believe this study will provide practical implications for tourism marketers seeking innovative ways to enhance the tourist experience through immersive technologies. For future research, although there seems to be an upsurge demand in VR based tourism experiences, it should be noted that the multidimensional and complicated structure of the tourist experience should be explored through immersive technologies. Future studies can therefore examine the role of social presence including family engagement and negative impacts of such technologies (e.g., loneliness and addiction [8]) while exploring enhanced interactivity in different research areas.

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Marketing Tourism Products in Virtual Reality: Moderating Effect of Product Complexity

Chung-Hao Chan[1], King Yin Wong[2] , and Tsz-Wai Lui[1(✉)]

[1] National Taiwan Normal University, Taipei, Taiwan
irislui@ntnu.edu.tw
[2] Nanyang Technological University, Singapore, Singapore

Abstract. As the tourism industry faces growing competition and digital transformation in the post-pandemic era, virtual reality has emerged as a creative marketing strategy. However, investing in virtual reality may be costly. Evaluating what type of products can generate higher returns through virtual reality is critical. Our study explored the moderating effect of product complexity on the relationship between virtual reality characteristics and behavioral intention. Our results indicated that the relationship between telepresence and consumer trust is stronger for a complex tourism product than a simple product. Firms with limited resources should invest in virtual reality to market complex products.

Keywords: Product complexity · Virtual reality · Metaverse

1 Introduction

The rapid development of tourism has challenged the tourism operators to be more efficient and effective to remain competitive, and they are turning to creative marketing strategies. One example is the metaverse. The architecture of the metaverse enables the linkage between the physical and virtual worlds, and virtual reality (VR) is regarded as the main interaction interface to achieve immersive user experience [1].

While traditional media platforms (paper brochures and video clips) have been sufficient for marketing standard products (e.g., 3-night accommodation in a three-star hotel), more complex tourism products (e.g., a 3-night cruise package) can leverage the immersive and interactive characteristics of VR for marketing. However, the metaverse can be an expensive technological investment. Therefore, it is crucial to understand the effect of VR based on product type and to strategically allocate resources to maximize returns. A recent review on virtual reality in tourism indicated that research has not sufficiently investigated fully immersive VR, compared to non-immersive and semi-immersive VR [2]. Questions related to the benefits of fully immersive VR, a costlier system compared to semi- and non-immersive VR, remain unanswered [3]. Our study intends to fill this research void and also assist tourism organizations with allocating internal resources when making decisions on metaverse investments.

2   Literature Review and Theoretical Framework

VR technology replicates an environment, real or imagined, and simulates a user's physical presence to allow users to interact with the environment [4, 5]. "A VR experience can be described by its capacity to provide physical immersion and psychological presence" [6]. A higher level of immersion provides more extensive sensory information to users, which results in a stronger sense of presence in the virtual space. These characteristics of VR can serve as a powerful tool to improve product discovery and selection experience [7, 8] and facilitate immersive, engaging, social, and entertaining experiences [9–11]. Many past studies on VR in the tourism industry have addressed the simulation type, social interaction, prior visitation, and experience type as moderators of the effect of VR on cognitive/affective response and behavioral intention [12]. To the best of our knowledge, there has been no study on product complexity and our study is the first to explore the interaction effect of product complexity.

2.1   Media Richness and Telepresence

Media richness theory classifies the richness of a medium based on four criteria: feedback, multiple cues, language variety, and personal focus [13]. Face-to-face interactions are considered the richest medium, capable of reduce equivocality and uncertainty in information processing [14]. VR simulates real-world environments and is considered a rich medium that is comparable with face-to-face interactions [15]. Telepresence is the sense of presence in a virtual environment [16], which can enhance consumers' perception about service offerings [17]. Trust, or the belief that a trusted party (e.g., a travel agency) will fulfill its commitments in an exchange relationship [18] is crucial especially when the transactions involve a certain level of risk, such as purchasing tourism products online [19]. Experiencing a richer medium through an embodied virtual representation provides users with a more realistic and vivid service officering, which enhances users' trust in the service providers [17]. Therefore, we hypothesize:

H1: Media richness positively enhances consumer trust.

H2: Telepresence positively enhances consumer trust.

2.2   Product Complexity

The complexity of a tourism product is a function of the number of elements that a tourism product is composed of and the internal relationships among these elements. More cognitive resources from consumers are required when more complex products are offered owing to higher levels of ambiguity and uncertainty. Because of the high level of media richness and telepresence in VR, customers can receive more types of informational cues to understand and build trust in a complex product. Therefore, the effects of media richness and telepresence on consumer trust are stronger for complex products than for simple products. As a result, we propose:

H3: Product complexity moderates the relationship between media richness and consumer trust.

H4: Product complexity moderates the relationship between telepresence and consumer trust.

2.3   Purchase Intention

After comprehending the product information, consumers form a positive, neutral, or negative attitude that affects their actions [20]. Because marketing through VR increases consumer trust in the company and subsequently affects purchase intention, we propose:

H5: Consumer trust positively affects purchase intention.

3   Methodology

We conducted a survey-based experiment to test our hypotheses, and selected a leisure farm as a complex tourism product and a 3-star hotel as a simple tourism product. The leisure farm offered more product elements (room, breakfast, leisure activities, and farm experience) than the hotel (room and breakfast). We inspected both locations in-person and crafted the virtual environments to scale in the Unity engine. Please refer to the video capture of the leisure farm at https://youtu.be/T_2S48ptycM and the virtual hotel at https://youtu.be/CsKA3Ku627A for the virtual environments built. The experiment was conducted on campus in three universities in Taiwan where we set up the experiment in a lab setting. The recruitment of participants was announced on social media sites and open to general public. The participants include students, faculty and staff members of the universities, as well as the residents living nearby the universities. The participants were randomly assigned to experience either the leisure farm or the hotel by using an HTC Vive VR set. Participants were then asked to complete a survey after the experiment. The data collection period was from July 17 to August 14, 2022. A total of 207 participants were recruited; 103 participants experienced the virtual leisure farm, and the other 104 participants visited the virtual hotel.

4   Data Analysis

We used SmartPLS 4.0 for partial least squares structural equation modeling to conduct the data analysis. The factor loadings of the measurements were all greater than 0.681. The Cronbach's alpha coefficient (all greater than 0.848), composite reliability (all greater than 0.853), and average variance extracted (all greater than 0.593) met the requirements of reliability and convergent validity. The heterotrait–monotrait (HTMT) ratios were all below 0.764 except telepresence (0.882) and exhibited satisfactory discriminant validity. Telepresence is related to media richness. Therefore, an HTMT ratio of 0.882 (below 0.9) was acceptable. The significance of the path coefficients was evaluated using bootstrapping. The results supported H1, H4, and H5 (Fig. 1). The model explained 46.8% and 27.2% of the variance in consumer trust and purchase intention, respectively.
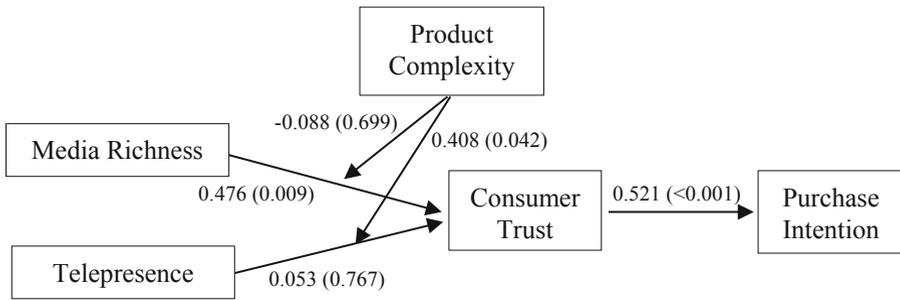
Fig. 1. PLS structural model

5   Discussion and Conclusion

Our results revealed that media richness has a positive effect on consumer trust, regardless of product complexity. Telepresence does not have a positive effect on consumer trust when the product is simple but exhibits a positive effect on consumer trust when the product is complex. Our results suggest that tourism operators should strategically allocate resources when developing VR content in metaverse as it can be an expensive technological investment, depending on the level of detail and interaction in the virtual environment. Specifically, the sense of presence through VR enhances consumer trust and hence purchase intention only when the tourism product is complex. Therefore, when developing VR content in metaverse, resources should be prioritized for complex tourism products.

In our future studies, we will extend the proposed model by comparing VR with video as a marketing tool. We expect that the participants will experience a higher level of media richness and telepresence when exploring tourism products through VR than video clips. However, when promoting a simple product, the effect of VR and video may be similar on consumer trust and purchase intention, and a video clip may be sufficient. When promoting a complex product, VR may promote telepresence more than video and hence enhance consumer trust and purchase intention. Although the metaverse is gaining traction, not all products are suitable for VR. More research on the metaverse should be conducted to understand how VR affects consumer behavior.

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AI-Generated Content, Creative Freelance Work and Hospitality and Tourism Marketing

Aarni Tuomi(✉)

Haaga-Helia University of Applied Sciences, Pajuniityntie 11, 00320 Helsinki, Finland
aarni.tuomi@haaga-helia.fi

Abstract. Powerful new AI models such as OpenAI's DALL-E 2 or GPT-3 afford creative freelancers as well as hospitality and tourism SMEs new ways of generating and using creative content for marketing purposes. However, given AI's rapid development, little is known about the current and potential future applications and implications of AI-generated content on the key stakeholders involved in hospitality and tourism marketing management. This conceptual research note presents preliminary ideas from an ongoing research project. Examples of AI models used for marketing content generation are reviewed and potential implications for hospitality and tourism marketing management are discussed from an e-tourism research point of view.

Keywords: Platform economy · Freelance · Marketing · DALL-E 2 · GPT-3

1 Introduction

Recent years have seen significant progress in artificial intelligence (AI) designed to generate seemingly realistic-looking marketing content, e.g. still images, video or text. The increase in technological capability sees society, including hospitality and tourism industries, enter what some scholars are calling the'era of falsity' [1]. Academic and media discourse has vocally explored e.g. the concept of deepfakes, i.e. content that is generated through machine learning systems with the aim of closely mimicking content created by humans [2]. Popular examples include the website ThisPersonDoesNotExist.com and its many derivatives, e.g. WhichFaceIsReal.com, building on StyleGAN by Nvidia researchers Karras et al. (2018) [3]. Other examples of AI-generated content include e.g. work by OpenAI's researchers: Codex generates lines of code based on natural language prompts (e.g. JavaScript used for creating interactive websites), DALL-E 2 generates high-resolution images on par with human graphic designers and other creatives, and GPT-3 generates coherent, context-specific sentences that could potentially replace e.g. copywriters, translators, or employees responsible for replying to routine queries and consumer reviews [4, 5]. The underlying argument seems to be that as AI gets more 'intelligent', tasks that used to require human input are increasingly delegated to machines [6].

Novel AI models like StyleGAN, DALL-E 2 or GPT-3 offer powerful affordances for traditional creative work, including in the context of hospitality and tourism marketing management. The advent of generative AI tools for automatically creating high

quality lines of code, artistic images or accurate instant translation across languages brings pressing considerations for the future of hospitality and tourism marketing management generally and freelance creative work, a key service provider for hospitality and tourism SMEs, specifically [7, 8]. On one hand, new tools are posed to further boost the 'freelancer' or 'creator' economy [7], underlined by a shift from traditional full-time employment contracts to new types of work, e.g., freelancing on digital labor platforms such as Upwork. New tools also afford hospitality and tourism SMEs themselves more control over their creative endeavors. On the other hand, the increasing capability of AI models to generate high quality and useful content poses existential threats to human creatives, as well as considerations for the perceived authenticity of hospitality and tourism marketing content. Conceptually exploring the use of AI-generated creative content in the context of hospitality and tourism is important and timely due to labor economic shifts caused by technological progress and COVID-19 [9], whereby the hospitality and tourism sector is experiencing a severe labor crisis [10] and simultaneously the creator economy has seen an uptick in creative freelancing in the wake of the 'great resignation' [11–13].

2 Creative Freelance Work

Freelance work or on-line web-based cloudwork, often mediated by digital labor platforms (e.g. Upwork, MTurk) [14], refers to self-employment sustained by short- or long-term projects commissioned by external task requesters [12]. As defined by ILO (2021) [15], digital labor platform is a company that uses digital resources to "mediate labor exchange between different users, such as businesses, workers and consumers". According to Upwork (2021) [13], a digital labor platform which calls itself the world's largest marketplace for freelance work, 35% of the US workforce has tried or actively engages in freelance or gig work. In 2019, the value created through gig work represented 5% of the US' GDP [16]. On Upwork's platform, the company reports around 12 million active freelancer accounts globally [13]. Of these, the biggest segment of freelance work offered through the platform is 'arts and design', the second biggest 'marketing' and the third biggest 'coding'. A recent report commissioned by Fiverr (2022) [17], one of Upwork's biggest global competitors, finds that COVID-19 has boosted the gig economy particularly in the skilled professional category, with a significant increase in new account registrations related to creative freelancing.

While the creator economy seems to be experiencing a boom, the hospitality and tourism industries are struggling with labor shortages [10]. Prior research has identified labor shortage as a key driver for automation of tasks in hospitality and tourism organizations [18], whereby businesses employ novel technological innovations to find creative new ways for increasing productivity and serving customers [19]. Overall, the bulk of hospitality and tourism companies in many countries tends to consist of small- and medium-sized enterprises (SMEs) which are de facto characterized by tight resources, including human resources. In order to carry out many supportive business functions, hospitality and tourism SMEs often elicit the services of others, e.g. freelancers, to outsource labor needs [8]. One such area is producing various forms of marketing material, from graphic design and social media content creation and management to copyediting

and translation services. The rise of social media has exacerbated this, whereby research has identified hospitality and tourism as key beneficiaries of social media marketing [20], leading to the pursuit of ever-greater "instragrammability" [21].

3   AI-Generated Content and the Era of 'Falsity'

The advent of new digital tools for content-creation, from AI-generated deepfakes to the metaverse, has prompted academics to put forward conceptualizations for marketing and managing in the era of 'falsity' [1, 22]. As discussed by Brower (1998) [23], the concept of falsification is however nothing new, whereby in the past, as soon as technologists have created new digital tools to allow for the manipulation of images (e.g. Photoshop, launched in 1990), photographers, journalists, and marketers alike have tried to make the most of them. In this line of reasoning, AI models capable of generating high quality, human-like marketing content represent a continuation to a pre-existing trend. However, the degree of falsification seems to be rapidly increasing, whereby content generated by AI models passes as or surpasses similar content generated by humans in terms of believability. For example Tuomi (2021) [4] explored the use of AI to generate human-like restaurant reviews, demonstrating that several AI-generated reviews passed as human-written when their credibility was evaluated by human judges. Besides OpenAI's Codex, GPT-3 or DALL-E 2, several other free examples of AI tools for creative content generation already exist. Craiyon is a text-to-image AI tool that has spun out of the development of DALL-E; Rytr is an AI writer-assistant based on OpenAI's GPT-3; Autodraw is the "autocorrect" for digital drawing; Fontjoy generates aesthetically pleasant font pairings for use in e.g., brochures; and Namelix allows users to generate simple business names and logos from key words. Simply describing a business or a project makes the contextually trained neural network generate hundreds of high-quality logos, business names and marketing material automatically.

4   Implications for Hospitality and Tourism Marketing

Novel AI models bring new affordances to stakeholders involved in hospitality and tourism marketing, from the creative freelancers often commissioned by hospitality and tourism SMEs, to the hospitality and tourism businesses, to the end consumer. The e-tourism research community plays a pivotal role in guiding and steering the socially sustainable development and deployment of AI in the sector [24]. For the creative freelancer, new AI models offer new tools to the already extensive toolkit, whereby systems like DALL-E 2 may enable new forms of creativity to emerge in human-AI teams. The automation of creative tasks changes workflows, whereby the importance of assessing when the human should be kept in-, on-, or off-the-loop [9] becomes imperative. Further, according to Huws (2010) [25], central to the concept of creative work is the feeling of ownership of one's work, even after it is sold to a commissioner (e.g. hospitality or tourism SME). New ways of creativity change the perception of ownership as well as considerations for intellectual property. Whose property should content generated by AI tools be [9]? Finally, the proliferation of AI tools for creative content generation

lowers the bar to enter the freelancer economy, meaning increased competition for visibility for existing creators, whereby research topics related to personal branding and differentiation become important.

For the hospitality and tourism SMEs, new AI models offer more control over creative endeavors and the possibility to do more in-house, should the company wish to do so. As often is the case in ICT, technology adoption becomes the likely bottleneck, whereby entrepreneurs will consider e.g. the ease-of-use and usefulness of creative AI tools. Which tools to commit to, and which to ignore? What features benefit marketers in the hospitality and tourism sector the most? Besides technology adoption, training and education of hospitality and tourism workforce, including e.g. changes to curricula or micro-credentials, become important research topics to consider. Finally for the end consumer, the indistinguishability of AI-generated content from human-generated marketing material presents a double-edged sword. On the one hand, new tools mean an abundance of higher quality content, but on the other, an authenticity crisis might follow. In part complementing existing debates over finding the right balance between high-touch and high-tech in hospitality and tourism service contexts [19], using AI-generated marketing content might offer a point of differentiation as well as influence purchase decisions in unforeseen ways.

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Legal Considerations on the Relationship Between Tourism Marketing and AR

Akira Ide[(✉)] [iD]

Kanazawa University, Ishikawa 9201192 Kanazawa, Japan
`akiraide@staff.kanazawa-u.ac.jp`

Abstract. Augmented reality (AR) is greatly changing the tourism scene in this decade. With the recent expansion of AR, it is now possible to obtain digital flyers and coupons by physically visiting a place. Various AR-based games, such as Pokémon Go, have encouraged many people to visit various locations in the real world. However, the use of AR as a marketing strategy to attract customers and induce movements in humans has created new legal issues, such as the appropriateness of placing coupons on private properties and its use in public parks by private companies for sales promotions. In addition, since AR can make valuable digital information appear in a space for a specific period, it raises new issues regarding time management. This paper considers the problems that arise in guiding people using AR, mainly from a legal perspective, and discusses the future direction.

Keywords: Argumented reality · Pokémon Go · Digital flyers · Coupons

1 AR and Marketing

Before smartphones became popular, marketing that associated place and time was quite difficult. If a promoter wants to revitalize an event by trying to realize a mechanism to hand out discount coupons when customers visit a certain place at a certain time, how could paper coupons be distributed in addition to announcing the date, time and place? Even a small number of visitors would require staff to handle the situation. On the other hand, if there are too many customers, other problems may arise, such as running out of coupons.

The widespread use of smartphones and AR has fundamentally resolved this problem. Smartphone users running an application linked to GPS can receive coupons via either e-mail or the application itself when they reach certain coordinates. The human staffing element is eliminated, dramatically reducing associated problems. The timing of coupon distribution can easily be controlled via the Internet.

In the United States, even convenience stores in have used Niantic's Ingress application to attract customers, and marketing using AR has already been put to practical use. Are there any problems associated with this situation? [1].

2 Previous Research

2.1 Privacy

Location data are personal, and privacy concerns exist regarding the use of such by companies like Google; Hulse & Reeves (2014) have reviewed this topic [2]. This topic is off course important. However, I would not like to discuss this topic because of limit of words.

2.2 The Impact of Pokémon Go

In addition to privacy concerns, the use of AR to channel human behavior can cause specific problems. For much of the past decade, application of AR has been a hot topic around the world; the AR application that has had the most impact on our lives is probably Pokémon Go. Since operators can superimpose fictional bases at which to acquire monsters and items in real space, ethical issues have arisen, such as whether it is permissible to play within the precincts of the Atomic Bomb Dome in Hiroshima [3]. Similar issues have also been raised at Auschwitz [4]. These concerns have largely been treated as matters of courtesy, and in practice have been resolved by the aggrieved party submitting individual requests to Niantic. In the case of players entering private property, those affected have asked Niantic to remove the location from the game, and the company has agreed to the request.

There is then the question of public space. The 'appearance' of a rare Pokémon Go monster in a park can result in a large crowd congregating, with associated issues of noise and parking limitations on the streets around the park, affecting the lives of local individuals.

Since requests to Niantic are only "requests" and are not legally enforceable, residents may suffer. After a bad experience with Pokémon Go, the US city of Milwaukee enacted an ordinance requiring game developers to obtain prior permission before placing any AR game on public land. However, the game developer Candy Laboratory Inc. Appealed the ordinance on the basis that the regulation violated the "freedom of expression" guaranteed by the First Amendment of the Constitution, and the local government lost the ruling. For more information on this matter, see the "Candy Lab Inc. v. Milwaukee Cnty." lawsuit [5].

3 The Need for Systematic Research

The practical solutions to the problems mentioned above have thus far been ad hoc and have not been subjected to systematic study. This chapter takes AR-based coupon distribution as an example and discusses what problems may arise especially in terms of law.

3.1 The Case of Private Property

In considering the issue of whether digital coupons can be distributed on private property, the question arises as to whether the distribution of digital coupons can be stopped, even

though the current law can regulate locations off-limits to coupon recipients. In the case of AR-based coupon distribution, the distributor does not need to enter the real site and can place the coupons electronically, making this a difficult issue to regulate under current law. There may be a possibility of ex-post-facto punishment for inducing people to enter a private area illegally. However, that is a sanction after the fact, not a deterrent at the stage before trouble occurs.

Not only coupons, but also digital castles and monsters can easily be made to appear on private property using AR. Since such things cannot be seen unless the player is physically present at the scene, the likelihood of encroachment on private property increases.

Furthermore, there are some places on private property that are open to the public, such as shopping centers. Real-world distribution of paper coupons in such locations usually requires permission from the manager, but facility managers cannot physically regulate intangible digital coupons, making it difficult to regulate their distribution in such places.

It is technically possible to distribute Burger King coupons in McDonalds outlets, and under the current law there seems to be no mechanism to curb such de facto obstruction of business.

For example, the Burger King app in Brazil has a very interesting feature. If you point your phone camera at an outdoor advertisement of a competitor (effectively targeting McDonald's), you can play with AR to burn it. Once the burning process is completed on the phone, users are given a coupon [6]. This may effectively be obstructing business, but there may be no way to regulate this under current law.

For private companies to use AR strategy safety, prior guidelines or legal regulations should be considered as to whether digital information can be placed on private property using AR.

3.2 Public Land

In the case of public land, the problem becomes more complicated. In liberal societies, freedom of expression is guaranteed constitutionally in many countries. For example, Speaker's Corner, in Hyde Park, London, is famous for freedom of expression, and such freedom in public spaces must be guaranteed as much as possible [7]. In the recent trends, discussion the relationships between public forum and cyberspace is increasing in number [8].

The above-mentioned regulation regarding the need to obtain permission before developing AR games that use public spaces is a clear violation of the Constitution, but the problems associated with AR in real space appear to be a subtle annoyance that cannot easily be said to be illegal. If a large crowd of people converges on a park because of AR games or digital coupons when a family with small children is relaxing there, is that situation acceptable? In relation to AR, some kind of permission may be required to allow applications to interact with the real world. However, until now, clear rules have not made.

3.3 Concept of Time

So far, we have looked at the regulation of AR with a focus on location, but time is also an important factor in AR regulation.

Although situated on private property, shopping centers are widely open to the public, and there may be no problem if digital coupons or unusual items from games are 'placed' there during the daytime. In addition, since the principle of "freedom of expression" is important in parks, it is basically difficult to prohibit the distribution of coupons and games.

However, at night, shopping centers are usually locked and many public parks are also off-limits. In such cases, if digital coupons or game items are placed in such places using AR outside open hours, they could potentially alarm the facility management. Distribution of rare coupons or game items at such times might induce illegal trespassing. To address such cases, a time-based decision scale would be necessary for the regulation of using AR.

4 Summary and Future Work

As we have seen, the distribution of digital coupons and attracting customers using AR could cause unprecedented trouble. On the other hand, modern society that uses digital space also seeks to enjoy the benefits thereof. In the near future, it will be necessary for industry groups and governments to formulate appropriate guidelines that address the situation in each country, while taking into consideration the above-mentioned problems. As regulation of AR is connected with the culture of each country, it is very difficult to make rules. However, standards are needed for evolution of information society.

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Talking Houses: Transforming Touristic Buildings into Intelligent Characters in Augmented Reality

Saikishore Kalloori[1(✉)], Ribin Chalumattu[1], François Chalet[2],
Martin Zimper[2], Severin Klingler[1], and Markus Gross[1]

[1] Media Technology Center, ETH Zurich, Zurich, Switzerland
{ssaikishore,cribin}@ethz.ch
[2] Zurich University of the Arts, Zurich, Switzerland
{francois.chalet,martin.zimper}@zhdk.ch

Abstract. Augmented reality (AR) technologies can enhance the user's experience of visiting attractions, shops, and restaurants by using AR-based virtual elements and additional information about the places they are visiting. In this work, we transform the city landscape or iconic buildings into a unique experience by bringing iconic characters onto the buildings to increase users' engagement. Our techniques transform buildings or parts of a building into a virtual character with which the user can interact. We designed two unique experiences: (a) 'The Square' in which the character will talk about the building's history and other anecdotes about the area, and (b) 'The Hunt' in which the user is involved in a scavenger hunt where they have to identify buildings using the hints given by virtual characters. We have conducted a live user study to assess our prototype's usability. Our preliminary experimental results demonstrated that our prototype has high usability and users using our system felt a pleasant and enjoyable experience.

Keywords: Augmented reality · Tourism · Intelligent characters

1 Introduction

The application of augmented reality (AR) technologies in recent years opened up many new possibilities to incorporate AR into our daily lives. In [3], by conducting a live user study, it has been shown that augmenting various points of interest (POIs) with images and facts about each POI has a potential to enhance user experience in tourism. In this work, we aim towards this goal of exploiting the AR technologies for tourism and transform the famous buildings into an unique experience by bringing iconic characters onto the buildings wall to increase the engagement of users. With a goal to create a unique experience using the virtual characters and the iconic buildings of a touristic city, we developed a mobile application that projects a virtual character when a user visits the building. By conducting a live user study, our system demonstrated has a high usability and users using our system felt a pleasant and enjoyable experience.

Fig. 1. On the left we present some of the selected buildings with their corresponding augmented characters to the right.

2   Talking House: Transforming Buildings into Characters

Augmented reality has the potential to enhances a touristic experience by inserting virtual elements onto the buildings in a city. In general, famous touristic buildings and architectures attract a large number people. In this work, we propose a technology which is based on AR to transform buildings into intelligent characters to increase the engagement of users when visiting new places. Our

techniques transforms a building or part of a building into a visible character with which the user can interact in order to learn useful information (or listen to stories) about the building. In this section, we describe the details of our prototype and various steps we adopted in creating the AR experience.

We have developed an AR mobile application called 'Talking House' for a small part of Zurich city's old town called Niederdorf. This area offers a variety of buildings with visually distinct features, which enabled us to craft unique virtual characters. Furthermore, many buildings in Niederdorf offer a rich history of Zurich's past. Users can then visit buildings in the city of Zurich that are supported by our application and experience our talking house functionalities.

As a first step, we manually selected the buildings by visiting the areas in Niederdorf and researching the history of the place. For our final application, we selected 11 buildings and one monument to augment with virtual characters. In Fig. 1, the left images gives an overview of some of the selected buildings. Once the buildings are identified, the next step is writing engaging character dialogues using the history of the buildings and their surrounding area. These dialogues vary in content ranging from a conversation between characters and historical facts to jokes and poems. Afterwards, we recorded the dialogues with the help of two professional voice actors. We then created a visual look and animation for each character by considering the geometry of the buildings and the spoken dialogues. Our characters are designed using simple shapes like squares and circles to better blend the virtual elements with the real world buildings. For example, the window of a building is used to create animated eyes for a character. Finally, we enhanced the dialogues by adding background music and sound effects to make the AR experience more immersive. We also share the videos[1] of our virtual characters talking to a user about the building.

(a) Real World Building in Niederdorf   (b) Virtual Reconstruction of Building
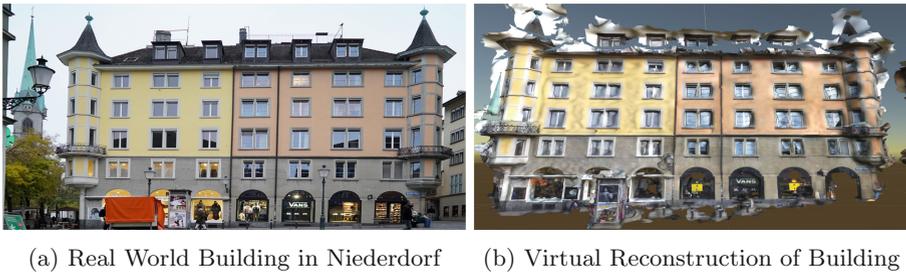
Fig. 2. Virtual reconstruction with immersal

3   AR Technology and Localization

To achieve a seamless experience, the AR virtual content objects must be properly rendered and aligned with the buildings (onto the walls) in the real world [2]. Augmenting buildings and monuments with virtual characters requires precise techniques to estimate the position and rotation of the user's device. This is

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[1] *shorturl.at/btvw*8.

one the main aspects to ensure an authentic AR experience since otherwise the virtual content would be misaligned with the real world. For our application, we use the Immersal SDK[2] which allowed us to spatially map real-world locations and then augment them with digital content. As an initial step, we went to our selected locations of the buildings to create a spatial map of the area. This is done by taking numerous pictures of the streets and buildings from multiple viewpoints. Then, each set of images is uploaded to the Immersal Cloud Service which generates a 3D point cloud and a textured mesh (see Fig. 2). This textured mesh can then be used inside the Unity editor as a point of reference to align the virtual characters with their corresponding buildings. Aligning the character manually by drag and drop with the mouse is too imprecise. We therefore used the Kabsch algorithm[3] to automate the alignment process by selecting reference points between the character assets and the textured mesh. When a user visits one of the augmented buildings, they first have to move the mobile device across the surrounding buildings. Immersal then captures the current camera frame, computes its point cloud and tries to find a match with one of the stored point clouds. If there is a match, the digital character is shown correctly aligned with the building.

Implementation Details: We developed our AR application using the Unity engine which is a popular development platform to create video games and 3D applications. In order to optimize the memory usage and performance of our mobile application, we split the animation for each character into smaller parts (face, mouth, eyes etc.) and imported each of them as a sprite sheet into Unity. Each sprite sheet contains a sequence of images which are then combined by our app to create the final animation. Our source code[4] is publicly available to extend our application for other cities. We also released our app as a beta version in the Google Play Store[5] supporting the experience for the Niederdorf area of Zurich.

4   The AR Experience: The Square and the Hunt

In this work, we present two unique experiences that we designed to interact with the users. The first one is called as 'The Square' and in this experience the character will tell the story about the building's history and other anecdotes about the building's surroundings. The user can remain in one location and interact with different virtual characters appearing in front of surrounding buildings. The second experience is called as 'The Hunt' which is similar to a scavenger hunt where the user has to find buildings using the hints given by virtual characters. The experience will start with a virtual ghost named as 'Stussi' who appears to provides the hint to find the buildings. The user has to find these buildings based on the given hints and collect rewards like 'rings' at each building.

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[2] https://immersal.com/.
[3] https://en.wikipedia.org/wiki/Kabsch_algorithm.
[4] https://tinyurl.com/vravcp8s.
[5] https://play.google.com/store/apps/details?id=com.mtc.TalkingHouses.

5   Experimental Evaluation

We conducted a user study to test and evaluate the usability of our application. We asked the participants to experience both the Square and the Hunt. In total, 9 people participated in our experiments. They were aged between 18 to 35 and the majority were either undergraduates, research students or working employees. In our experiments all our participants had to complete both the square and the hunt experiences. At the end, to evaluate the perceived usefulness of our application users filled out a questionnaire. We used System Usability Scale (SUS) [1], a simple and well established tool which consists of 10 statements for measuring usability. Our user study demonstrated that our prototype has a high usability and was generally perceived as pleasant and enjoyable experience. For perceived user enjoyment, we asked users about how much they enjoyed both the experiences. We found that 70% of users strongly enjoyed the hunt and 100% enjoyed the square. All participants of the user study agreed that our application was enjoyable to use when visiting the city buildings. 70% users strongly enjoyed the hunt and 100% enjoyed the square. Users were also interested in using such an application for other attractions in Zurich or other cities. Finally when asked about which experience to enhance further 72% users wanted to see more advancements towards the hunt experience.

6   Conclusion and Future Works

In this paper, we have presented our AR system, a mobile AR application which provides users an unique experience by transforming building into a visible character. Our application shows a live character talking to a user when he visits a famous building in a city. Such techniques will have a great potential to enhance a user experience and in our future work, we will explore towards the direction of adding personalized advertisements on the buildings. We aim to also design machine learning models for automatic content creation such as stories, news or jokes where the character can converse or engage with users with up to date information.

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Special Research Session on Sustainable Solutions for Fourth Industrial Revolution (4IR) in Tourism and Hospitality

What Makes Potential Tourists Trust
the Managerial Response of the Hotel? - The
Three-Way Interaction of Ability, Benevolence,
and Integrity

Yerin Yhee[1] , Hyemin Kim[1] , Jungkeun Kim[2] , and Chulmo Koo[1(✉)]

[1] Smart Tourism Education Platform, Kyung Hee University, Seoul, Republic of Korea
{rin95923,hm8005,helmetgu}@khu.ac.kr
[2] Department of Marketing, Auckland University of Technology, Auckland, New Zealand
jungkeun.kim@aut.ac.nz

Abstract. Potential customers are likely to rely on online reviews as e-WOM. While review from negative consumer has an impact on customers' decision-making, the response of hotel to negative review is also perceived as a signal of restoring trust. Although three dimensions of trust (ability, benevolence, and integrity) have significant effects on the overall trust of consumers, it is still an open issue how the three variables interact. To fill this gap, current study investigates a three-way interaction effect of the dimension of trusting belief in managerial responses by experimental analyses. The results suggest that the hotel's ability to handle the issue is the most important consideration for hotel management. Attitude toward hotels is high even if only one of benevolence and integrity is high under conditions of high ability. In contrast, attitude is only high when both other dimensions are high simultaneously. This study has implications for understanding the distinct effect of each dimension of trusting belief in online review systems and providing insights into effective managerial response strategies from the perspective of trust.

Keywords: Negative online reviews · Managerial response · Trusting belief · Ability · Benevolence · Integrity

1 Introduction

Electronic word-of-mouth (e-WOM) has become a major information source for decision-making with the development of the internet [1]. Because of the intangible nature of experience goods [2], potential tourists make inferences about the quality of such goods before consumption [3]. Considering to easy accessibility of potential consumers to online review sites, online reviews have extreme power in tourism-related

decision-making [4]. However, from the perspective of hotels, negative customer experiences or evaluations in online review impact not only the image and reputation but also performance by remaining on sites for a long time [5]. Therefore, negative reviews are related to one of the challenges that hotels have to seek an effective way to manage [6]. Managerial response strategies carry weight in the building of the hotel's trustworthiness to potential consumers [7–10]. While some literature on hotels' managerial responses is emerging in perspectives of service recovery of the visited consumers [9, 11, 12], the tourism literature lacks an understanding of the impact on managerial response as a signal able to restore trust to potential consumers.

The purpose of this paper is to understand how hotel management attenuates the negative effect of unfavorable reviews by rebuilding trust with an managerial response [7, 12]. Although trust can lead to forming trust and a positive attitude toward hotels [13, 14], significant questions remain unanswered pertaining to which is effective in forming trust among trusting belief. Therefore, we investigate a three-way interaction effect of the ability, benevolence, and integrity on the attitude toward the hotels of potential consumers who read the negative online review of the hotels. Through this study, we contribute to identifying what dimensions may help restore trust in the context of online reviews. The results of this study also yield practical implications for industry leaders and hotel managers who must address managing negative online reviews.

2   Theoretical Background and Research Model

Due to information asymmetry, online consumers seek a trust signal to reduce the uncertainty of risk [15]. Since trust occurs in the mutual relationship, consumers perceive the characteristic or attribute of trustees which is defined as trusting belief [16–18]. Given that managerial response shows the intercommunication, it has a strong power over potential consumers' perception, working as a trust signal [9, 12]. Prior research has suggested that trusting beliefs from the managerial response are antecedents of customers' decision making [18, 19]. Trusting belief is a multifaceted concept consisting of three dimensions: ability, benevolence, and integrity. Even though attributes are interrelated to each other [16], it is necessary to judge the dimensions at each level for understanding effective management strategies [20]. Research considering how managerial response should be organized with the perspective of trust re-building is insufficient [21]. Therefore, we identify to examine the influence of three dimensions of trusting belief in managerial response on potential customers' attitudes.

To date, while the ability has distinct effect on trustworthiness capturing the capability of the trustee, benevolence and integrity has been studied as redundant concept and do not have a significant impact on behavior outcome [12]. Therefore, in this study, we are intended to figure out the effect of benevolence and integrity of managerial response on customer intentions respectively. We hypothesized like below with ability moderation;

H1: Ability moderates the effect of benevolence on attitude such that, under high (vs. low) ability, the effect of a stronger (vs. weaker) benevolence is higher on attitude of potential tourists.

H2: Ability moderates the effect of integrity on attitude such that, under high (vs. low) ability, the effect of a stronger (vs. weaker) integrity is higher on attitude of potential tourists.

Although there is research evidence that ability, benevolence, and integrity have significant effects on overall trust [14], it is still an open issue how these three variables interact. When a trustee is perceived to be high on all three dimensions, trust for the trustee should be high [16]. But it is difficult to be sure whether all three attributes must be present at a high level to engender trust or would high levels of one or two of these attributes be sufficient. Therefore, we propose the hypothesis as follows:

H3: The ability in managerial response moderates the two-way interaction between benevolence and integrity in managerial response, such that the moderating effect of integrity differs for high ability and low ability of managerial response.
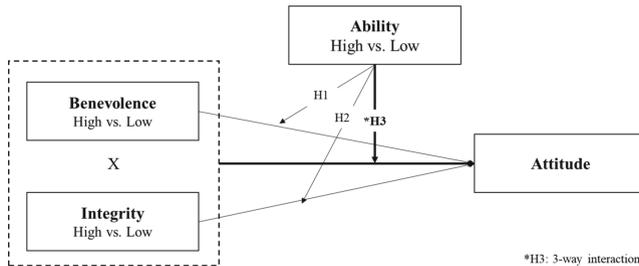
Fig. 1. Research model

Figure 1 illustrates the conceptual model and all hypotheses which were tested in three experimental studies respectively. It is expected that the experiment studies provide strong empirical evidence for causality, showing cause-and-effect relationships because the independent variables are exogenously manipulated [22, 23].

3 Methods and Results

WE conducted three studies to examine the hypotheses with a total participant of 913 online panels (study 1 = 242, study 2 = 254, study 3 = 417). All participants were asked to imagine that they read an online review to book a hotel room for their upcoming trip. Researchers developed a scenario mainly based on prior studies by Sparks et al. [6] and Surachartkumtonkun et al. [24]. Participants were randomly assigned to each experimental condition (Study 1: ability x benevolence/Study 2: ability × integrity/Study 3: ability x benevolence x integrity).

In study 1, we conducted a 2 (benevolence: high vs. low) × 2 (ability: high vs. low) ANOVA on the attitude to test H1. We found a significant interaction effect of two experimental factors on attitude toward hotel (F (1, 240) = 4.497, p = .035, η2 = .019), supporting H1. In the low benevolence condition, participants' attitude toward hotel was higher when level of ability is high (M_high ability = 4.10, SD = 1.85) than level of ability is low (M_low ability = 3.47, SD = 1.68, contrast F (1, 240) = 4.680, p = .032, η2 = .019). Study 2 provided the empirical evidence for testing H2. A 2 (integrity: high vs. low) × 2 (ability: high vs. low) ANOVA was conducted. The findings indicated that only the main effect of ability was significant. In particular, the attitude toward hotel

was higher for the participants in high level ability group (M_high ability = 4.05, SD = 1.76) than for those in low level ability group (M_low ability = 3.49, SD = 1.53; F (1, 252) = 7.424, p = .007, η2 = .029).

Lastly, 2 (benevolence: high vs. low) × 2 (integrity: high vs. low) × 2 (ability: high vs. low) ANOVA on the attitude toward hotel was conducted. The results showed that the three-way interaction term between those dimensions had a significant effect on attitude toward hotel (F (1, 414) = 6.805, p = .009, η2 = .016), supporting H3. In high ability conditions, the difference between high and low integrity was found to be only significant in low benevolence group (p = .003), but not in the high benevolence group (p = .518). In contrast, in the low ability conditions, the difference between high and low integrity was found to be only significant for the participants in high benevolence group (p = .004), but not in the low benevolence group (p = .203).

4   Conclusions

This study explored a three-way interaction among trusting belief variables in predicting attitudes toward hotels in the context of the webcare strategy. The results suggest that under conditions of high ability, attitude toward hotels is high even if only one of benevolence and integrity is high. However, under conditions of low ability, attitude toward the hotel is only high when both benevolence and integrity are high indicating that the two variables act as substitutes for each other. In short, hotels should manage negative online reviews in order for potential tourists to perceive the hotel's ability to handle the issues of complaints through managerial response. Theoretically, these findings expand the role of managerial response in improving the attitude of potential tourists in the perspective of trust and thus enhance scholars' understanding of what dimension is most effective in forming trust among ability, benevolence, and integrity. Practically, the implications are drawn from this research regarding the effect of managerial response on forming a positive attitude toward hotels to better determine strategies to manage negative online reviews. Specifically, we suggest that ability to solve the problem is the most important factor to change the attitude of potential tourists.

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Assessing Turnover Intentions of Algorithmically Managed Hospitality Workers

Mónica Segovia-Perez[1] , Brana Jianu[2(✉)] , and Iis Tussyadiah[2]

[1] University of Rey Juan Carlos, Madrid, Spain
monica.segovia@urjc.es
[2] University of Surrey, Guildford GU2 7XH, UK
{b.jianu,i.tussyadiah}@surrey.ac.uk

Abstract. Employee turnover has been one of the main concerns facing the hospitality industry. This issue seems to be aggravated in artificial intelligence (AI) environment, where AI implementation is associated with pressure, job alienation, and labor replacement, increasing workers' desire to quit their job. To analyze the relationship between AI awareness, job alienation, discrimination, and turnover intention, an online survey was distributed to hospitality employees ($n = 450$). From a series of independent-samples T-tests and regression analyses, this study found employees' turnover intentions are significantly associated with employees' concerns of being replaced by AI, perception of job alienation, and workplace discrimination. Importantly, current algorithmically managed workers tend to feel more powerless and discriminated against, and thus have higher turnover intentions. Recommendations for practice and future research are provided.

Keywords: Algorithmic management · Turnover intentions · AI awareness

1 Introduction

Marking a fundamental shift in workforce management, companies are turning to intelligent algorithmic tools to direct, evaluate, and discipline employees [1]. Although management by algorithm is providing efficient tools for controlling dispersed workforce, the consequences of new algorithmic management strategies for hospitality workers remain a disputed subject. Some positive outcomes of algorithmic work have been evidenced, such as perceived greater work flexibility [2], positive affective experience due to gamification elements [1] and enhanced organizational learning. However, not all socioeconomic categories reap the same benefits [3] - an indication of gendered and racial discrimination. In addition, studies report perceptions of reduced worker autonomy [4], power asymmetries [5], and isolation due to structural atomization of workers [6]. This leads to feelings of powerlessness and helplessness [7], contributing to an increase in turnover intentions.

It is against this backdrop and the traditional problems of hospitality industry turnover and discrimination, that this study for the first time explores the association between

familiarity with algorithmically mediated work, turnover intentions and discrimination. We aim to fill this theoretical knowledge vacuum by asking whether and how conventional hospitality employees' awareness of algorithmic management shapes their organizational outcome and future career choices and in doing so we investigate the relationship between AI awareness and intentions to leave and workplace discrimination. Understanding how employees' perception of these algorithmic methods may affect future work outcomes is important for hospitality organizations as algorithmic management substitutes classical forms of management and transforms the future of work as a whole [8].

2   Theoretical Foundation

The problem of employee turnover and retention in the hospitality industry seems to be aggravated in AI, robotics, or platforms environments [9, 10]. However, there is no known research investigating the association of turnover and discrimination with plat-formic work familiarity. This study aims to contribute theoretical and empirically by interlinking these constructs. In the hotel sector and referring to the repercussions of AI and robotics implementation, Li et al. [10] establish a multilevel AIRA model to capture the feeling of employees about it. They suggest that AI and robotics awareness significantly correlates with the turnover intention. That is, employee's turnover intention increases with insufficient levels of support, feedback, recognition, and reward by the organization, and is linked with the anxiety of employment displacement. Brougham and Haar [11] examined the relationship between STARA (e.g., smart technology, AI, robotics, and algorithms) awareness amongst hospitality employees and the job outcomes. They found a significant positive relationship between AI awareness, fear of job loss, organizational commitment, and wellbeing. In this sense, workers with higher awareness of the negative effects of STARA on their jobs exhibit a higher negative perception and a higher turnover intention. Hence, we propose:

H1. Employees' awareness of algorithmic management has a positive effect on their turnover intention.

In analyzing the impact of algorithmic management on turnover intention, it is important to consider other relevant influencing factors. Prior studies show that worker's desire to quit their present job (turnover intention) is positively associated with the degree to which they feel alienated from their workplace [11] and discriminated against [12]. It has been suggested that the implementation of algorithmic management at work may bring about feelings of alienation and loneliness [6], which will cause employees to drift away from their work and thus intend to find a more suitable job. Moreover, perceived discrimination or unfair treatment as evidenced in prior research on algorithmic management [3] can lead to turnover intention We thus propose:

H2. Employees' job alienation is positively associated with their turnover intention.

H3. Incidents of discrimination at work have a positive effect on employees' turnover intention.

3   Methods

To achieve the study objectives, an online survey was distributed through Amazon Mechanical Turk in August 2022 targeting hospitality employees residing in the United States by restricting participation to those 18 years or older whose primary work was in the hospitality industry. Validated measures were used to assess all constructs in the hypotheses: STARA [11], work alienation [14], discrimination at work [13], and turnover intention [15]. The survey also included questions about work (e.g., types of work contract, line management, salary) and demographic characteristics (e.g., gender, age, education) to identify potential confounding factors on turnover intention. A total of 510 responses were collected. After removing responses with missing data and those who did not pass attention check questions, 450 responses were included in the analysis. A series of independent-samples T-tests and regression analyses were conducted to test the hypotheses and explain the findings.

4   Results and Discussion

Characteristics of Respondents. Most respondents indicated that they work in the food and beverage sector (56%), followed by lodging/accommodation (25%). Almost all respondents (98%) were working full-time and 84% held a permanent position. In terms of line management, 79% managed other staff and 84% reporting directly to a superior. Surprisingly, a large proportion of respondents (82%) indicated that AI management systems have been implemented in their workplace. Respondents were well-balanced in terms of gender, with 49% male and 51% female. About half of them (51%) were between 25–34 years of age, with further 28% between 35–44, and 10% between 45–54. Only 3% were younger than 25. Most respondents had a bachelor's degree (66%) and 25% had a Master's degree.

Hypothesis Testing. Multiple regression analysis was used to test the effects of AI awareness, job alienation, and discrimination on employees' turnover intention. The overall regression was statistically significant ($R^2 = .567$, $F(3, 445) = 196.857$, $p < .001$). AI awareness was found to significantly influence turnover intention ($\beta = .186$, $p < .001$), indicating the more employees perceived that AI would replace them in the workplace, the more inclined they were to leave the organization. Job alienation was also found to be a significant predictor of turnover intention ($\beta = .392$, $p < .001$), signifying how powerlessness can lead employees to quit. Being discriminated against in the workplace also predicted turnover intention significantly ($\beta = .294$, $p < .001$).

   To test if current implementation of algorithmic management at work predicts employees' turnover intention, a dummy variable representing the presence of algorithmic management systems in the workplace ($0 =$ absent, $1 =$ present) was included in the regression model, resulting in significant F Change ($p = .046$). The results seem to indicate that the implementation of algorithmic management reduces employees' intention to quit ($\beta = -.065$, $p = .046$). To confirm these results, especially due to unbalanced proportion of AI implementation, several independent-samples t-tests were conducted (see Table 1). Despite the negative regression coefficient, employees working under the

implementation of algorithmic management on average were worse off in terms of feeling powerless, being discriminated against, and thus demonstrating higher intention to leave, compared to those whose workplace has yet to implement these systems.

Table 1. Mean differences of constructs by algorithmic management implementation

Constructs	AI implementation	Mean	St. Dev.	$t(\text{df} = 448)$	Sig.
AI awareness	No ($n = 80$)	3.35	1.081	-5.856	$< .001$
	Yes ($n = 370$)	3.94	.742		
Job alienation	No ($n = 80$)	2.97	1.144	-4.930	$< .001$
	Yes ($n = 370$)	3.56	.920		
Discrimination	No ($n = 80$)	3.06	.998	-6.296	$< .001$
	Yes ($n = 370$)	3.72	.818		
Turnover intention	No ($n = 80$)	3.44	1.041	-3.485	$< .001$
	Yes ($n = 370$)	3.81	.838		

5   Conclusion and Recommendation

This study sought to explore the relationship between awareness of an implementation of algorithmic management system in the workplace, concerns toward job replacement by AI, work alienation, perception of workplace discrimination, and turnover intention. The research presents new theoretical and empirical insights by showing that employees' turnover intention was significantly associated with potential job replacement by AI, work alienation, and workplace discrimination. A possible link between the adoption of algorithmic management and discrimination inside an organization has been found and further research should investigate this research avenue. Employees who are more aware of workplace implementation of algorithmic management tend to feel more alienated, perceived to be more discriminated against, and have higher turnover intentions. This is in keeping with [10, 11] who show that workers' career happiness tends to decrease as their level of knowledge on AI and its practical implementation increases. Therefore, employers should seek ways to minimize the feelings of powerlessness, helplessness, and alienation amongst their workers to optimize retention in the context of algorithmic management implementation.

Despite the contributions, this study has limitations stemming from its coverage of the sample (i.e., US-based hospitality workers) and the nature of data collection. Future research should apply longitudinal study design to track employees' attitude and behavior to better evaluate the long-term effects of algorithmic management systems in the workplace. Future research should explore direct, indirect, and interaction effects of algorithmic management perceptions and other job outcomes, such as job satisfaction and organizational commitment in different work settings, ensuring that varying levels of knowledge and experiences with AI in the workplace are accounted for in the model.

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Agent-Based Modelling for Sustainable Tourism

Stefanie Wallinger[1]($\boxtimes$) , Lukas Grundner[1] , Ivan Majic[2] ,
and Thomas J. Lampoltshammer[3]

[1] Department of Business and Tourism, FH Salzburg, 5412 Puch/Salzburg, Austria
{stefanie.wallinger,lukas.grunder}@fh-salzburg.ac.at
[2] Institute of Geodesy, Research Group Geoinformation, Graz University of Technology,
Rechbauerstraße 12, 8010 Graz, Austria
majic@tu-graz.at
[3] Department for E-Governance and Administration, University for Continuing Education
Krems, Dr.-Karl-Dorrek-Straße 30, 3500 Krems, Austria
thomas.lampoltshammer@donau-uni.ac.at

Abstract. Agent-based modelling (ABM) is a computer-based system to simulate the interactions, relationships and behavior of individual agents in a defined spatial context. Due to its stochastic and heterogenic nature, the method has the potential to represent the complexity of the tourism system with a broad range of possible applications. In the context of visitor flow management for instance, ABM can function as a possible decision support tool for policy makers to better understand and evaluate the dynamics of future scenarios and proposed policy changes towards a more economically, socially and environmentally resilient tourism development altogether. The following paper discusses the potential and implications of agent-based models in tourism research with a complex system approach in regard to ABM's inherent elements of agents, interactions and environment. It introduces the planned application of ABM in an ongoing project dealing with visitor flows in an urban as well as rural destination context and draws up possible implications for sustainable tourism development.

Keywords: ABM · AI · Visitor flow management · Sustainable tourism

1 Introduction

When planning a trip, adventure, or vacation, humans often wear rose-tinted glasses with certain expectations – from stress-free to perfect weather conditions, unforgettable experiences, or queues with little waiting times [1]. However, perfect expectations and wishes do not always reflect reality. A vacation in a certain destination might be influenced by long waiting hours at a ski resort, unpredictable weather scenarios, dangerous situations [1], or changes due to unforeseen pandemics such as COVID-19 [2]. Although there is a general understanding of how tourism and the environment are related, there is still a lack of knowledge on the details of these relationships [3]. Thus, Amelung et al. [3] propose the need for a more integrative and systemic research approach altogether. One method to explore these relationships is agent-based modelling (ABM), a

method that uses computer-based simulations of interactions between different agents (e.g. individuals, hotels, entertainment facilities, etc.) in a certain system or environment to better understand complex systems and their dynamic behavior [1, 4, 5]. This paper will present the conceptual structure of an ongoing research project on data-driven sustainable tourism and its underlying vision for ABM within it.

2   ABM in Tourism Research

By definition, ABM "is," the set of techniques [in which] relations and descriptions of global variables are replaced by an explicit representation of the microscopic features of the system" [6]. In short, ABM can be used to explore dynamic and systemwide changes triggered by individual actions, choices or changes over a certain period of time [1], making it part of complex system research [5]. Similarly, tourism destinations entail various agents who have dynamic, unpredictable, or nonlinear relationships with each other, which Baggio [7] describes as complex systems. Possibilities for using ABM in tourism research range from understanding tourists' decision-making processes on destination choice [8], reflecting on the industry's impacts on the environment [1, 3], to gaining insights on visitor flows and tourism planning [9].

2.1   Key Features of ABM

Student [1] describes the key features of ABM as agents, ongoing interactions in a spatial setting over time (i.e. the environment), and variable types – labelled rules [10] or regulations [5] elsewhere. Agents are generally "a collection of autonomous decision making entities" [10], with a predefined set of behavioral rules guiding their interaction with other agents and the surrounding environment [1]. Depending on the model, they are able to possess memory and different degrees of rationality, learn from other agents, adjust themselves to influencing events or change their behavior to better suit their environment [1, 10, 11]. The environment of an agent-based model can either be an abstract construct or the representation of real space. According to the complexity of the research question, the modeler decides on the level of details to integrate and sets boundaries of movement (e.g. ways of exiting or entering the system). Interactions shape the mechanism of a model and function as a linkage between agents, the environment, and the system they represent [1]. They are defined by underlying protocols on the dynamics of communication, relationships, movement patterns, and capabilities in how to respond to the environment [11]. Additionally, they might include a factor of randomness to better represent the uncertainties and stochasticity in the real world [1].

2.2   Visitor Flow and ABM

While visitor flow management in urban destinations usually aims for a better distribution of tourists on popular routes and spaces (i.e. points of interest), visitor flow control in a rural setting might seek to generate and utilize spillover effects instead. In both cases ABM presents an intelligent decision support tool that helps destination managers or

city planners to better understand and utilize tourist flows and to ultimately make better decisions on tourism distribution and the planning of new tourist infrastructure.

As ABM studies use extensive computer simulations to detail how different human and natural agents interact with each other at various points in time and space [3], an advantage of ABM is its combination of environmental aspects with different stakeholders or agents [1, 3] and the possibility to identify behavioral patterns that would be difficult to obtain by using traditional research methods [5]. Compared to different data collection and modeling methods (ranging from survey-based methods to differential equations and statistical techniques), another strength of ABM is the possibility to couple this form of modeling with theories such as complex networks or game theory [5]. Within the course of the project presented in this paper, more sophisticated approaches of ABM parametrization from individual tourist data using machine learning (ML) and artificial intelligence (AI) will be developed, thereby addressing a method that has been neglected in the most recent literature review of ABM in tourism studies [5].

3 Data-Driven Tourism for Sustainability (dTS)

Based on historical data, many contemporary ABM approaches are neglecting the power of AI to analyze and detect the behavior of agents (i.e. tourists) in different contexts. The dTS project proposes a new framework to develop a spatial agent-based model and simulation demonstrator that helps to simulate emergent movement patterns of tourists under varying conditions and system status.

3.1 The dTS Project in Short

The dTS project, funded by the Austrian Research Promotion Agency (FFG), seeks to answer the question of how the combination of fair AI and agent-based modelling/simulation can contribute to resilient and sustainable regional tourism in Austria, on the example of visitor flow control. The project combines the interdisciplinary knowhow of three university partners, two technology partners, and two pilot destinations in the region of Land Salzburg, Austria. The two use cases have been selected with the aim of strengthening the entire region, exhausting mobility resources, and working towards carbon neutrality. The involved pilot cases do not only vary on the degree of technological level as far as data availability is concerned, but also differ in the environmental setting of the destination, one being a rural region that offers a national park, ski areas and mountains, and the other being an urban and cultural hotspot.

dTS proposes a scalable and portable model for resilient and sustainable tourism. The result will be the design of a scalable data exchange and simulation platform that is also capable to serve as a data circle for visitor flows. Using fair artificial intelligence and agent-based simulations, the authentic movement and behavioral patterns of the target groups are to be learned and understood and afterward incorporated into a sustainable and gentle mobility concept. This also enables the modelling of "what-if" scenarios in the sense of decision support for the respective administrations. All these developments are done under the paradigm of data privacy, leading to a privacy-by-design philosophy, omnipresent in the chosen approach of the dTS project.

3.2   Agents – Environment – Interactions

Implementation of a spatial ABM to simulate tourist flow is not a trivial task as there are numerous practical questions that arise in the process of establishing a spatial ABM system capable of modelling and simulating the behavior of individual tourists. As a platform for spatial ABM modelling, the project proposes the GAMA platform, already supporting the use of vector and raster spatial datasets as the model environment. This makes it possible to use 2D spatial information about road networks as a medium for the movement of agents and to build footprints as their origins and destinations.

As a source of vector information about streets and buildings, OpenStreetMap (OSM), the most prominent Volunteered Geographic Information dataset with global coverage, is proposed as a free-of-charge solution. However, the non-restrictive mapping and annotation policy of OSM can cause issues regarding data cleanliness and heterogeneity, making it necessary to be clean and homogenize the data before being used in an ABM environment. Here, Ontology Design Patterns will be created and utilized as a semantic basis for the homogenization of different datasets.

Next, the behavior capabilities of agents in the model need to be defined. For tourist flow simulations it is important that agents are capable of multiple modalities of transport, such as walking, cycling, driving in a car, or riding on public transportation, so that their effects on the city's and attractions' congestion levels can be captured. Another important capability is that tourists are able to act as individuals or as groups, because tourists can travel alone, in small groups (i.e. with friends and family) or in large groups such as on organized tours. This will be achieved by applying ML and AI methods that can learn patterns and sequences from tourist movement and visiting data. Furthermore, the project proposes to implement an AI controller and recommendation system that can be trained by reinforcement learning on repeated simulation runs, which will then provide intelligent alternative tourist routes in the city in case of congestion at certain attractions. Here, agents should have bounded rationality, as they may not have access to all relevant information and make decisions based on their fettered access to information (i.e. making non-rational decisions).

4   Conclusion

In order to base decisions on the results of computer-based models, they need to be an adequate representation of the complex reality they are drawn from. Especially the validation of complex systems (i.e. destinations), poses challenges that in many cases cannot be met [6] due to the unpredictability of the system and the lack of independent datasets for comparison [3]. As proposed in the described project, the integration of empirical data, the spatial mapping on OpenStreetMap and the use of artificial intelligence to train agents towards authentic movement and behavioral patterns effectively contributes to solving the problem of validation. Furthermore, improved validation is sought through the active involvement of stakeholders in two pilot regions and the formation of interdisciplinary teams as for instance suggested by Student and Johnson et al. [1, 12].

The application of ABM offers great potential for sustainable tourism development as it enables the respective administrations to better grasp the complexity of the tourism

system in an illustrative and realistic manner. The holistic modelling of "what if" scenarios can help to utilize spillover effects, prevent spatial conflicts, and contribute to an overall better experience of visitors, tourism stakeholders and locals alike.

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Older Adults' Perceptions of Digital Cultural Tourism in 'Super-Aged' Nations: The Case of Finland and Japan

Husna Zainal Abidin[1](✉), Aarni Tuomi[2], and Elina Moreira Kares[2]

[1] Wakayama University, Wakayama 640-8510, Japan
hzabidin@wakayama-u.ac.jp

[2] Haaga-Helia University of Applied Sciences, 00320 Helsinki, Finland
{aarni.tuomi,elina.moreirakares}@haaga-helia.fi

Abstract. Older adults have been recognized as a key tourist segment for cultural tourism. Despite the growing population of older adults, limited research have explored their experiences and needs within digital cultural experiences. Therefore, this research note takes on an exploratory approach in understanding older adults' perceptions towards digital cultural experiences in the context of two 'super-aged' nations: Finland and Japan. The findings illustrate that differences do exist, and that Finnish older adults are found to be more open to technology-use in the context of digital cultural experiences than their Japanese counterparts. Implications for e-tourism research and management are discussed.

Keywords: Cultural tourism · Digital services · Older adults · Digital divide · Hofstede

1 Introduction

Activities related to arts, culture and heritage remain a crucial element within tourism experiences. Current research has identified that particularly for older adults, participating in cultural tourism activities is a major motivator for travel [1]. For 'super-aged' countries, i.e. countries in which more than 20% of the population is aged 65 or older, cultural tourism becomes ever more important. Meanwhile, the cultural tourism field has seen a transformational shift towards more digital experiences such as online-streaming and virtual tours. Despite the growing population of older adults, limited research have explored their needs within digital cultural experiences [2]. Therefore, this study responds to the academic call by Wang [2] and Pesonen et al. [3] for more studies to examine older adults and technology, specifically within tourism. This research note explores the perceptions of older adults towards digital cultural experiences. The research is unique, whereby it focuses on two of the world's 'super-aged' nations i.e., Finland and Japan (the West and the East).

2 Barriers and Drivers of Technology Use Among Older Tourists

The tourism industry has seen a rise of digitalization and the use of information and communication technologies (ICT) in recent decades [4]. This change has impacted the means of interaction between consumers and other tourism stakeholders [4]. From finding information, omnichannel communication, and purchasing and managing bookings have transformed consumers to prosumers, who actively partake in value creation through digital services [5]. The older adult segment, usually seen as the least likely to adopt new technologies [3], are a heterogenous group as travellers, with varying technological expertise and user backgrounds [6]. A study by Thébault et al. [6] revealed that the majority of older adults have altered their information seeking behaviour with the development of ICT, e.g. actively reading peer reviews when making tourism-related purchase decisions.

Besides digital platforms and social media, the rapid progress of technological innovations and their implementation to markets has created novel opportunities for tourism more broadly. Robotics, artificial intelligence, wearable technology, applications of virtual and augmented reality, etc. stretch the boundaries of tourism business further into the digital sphere, offering new possibilities for designing tourism experiences [5, 7]. However, many of these technological innovations are designed for the needs of younger generations [8], despite older adult travellers being recognized as a key target group [6]. The e-tourism industry as a whole need to address this gap between older adult users and the use of new technologies in tourism.

Besides age, tourists' cultural background can affect how they use and perceive new technologies [9, 10]. Culturally similar tourists are more likely to exhibit similar behaviours due to deeply ingrained cognitive processes which have been materialized from everyday lives and societal values [11]. One of the most cited cultural theories is from Hofstede, who proposed six dimensions of (national) culture: power distance, individualism-collectivism, uncertainty avoidance, short vs. long term orientation, masculinity and indulgence [11]. Research exploring the influence of culture on technology adoption, specifically within tourism, remains fairly understudied. A recent study demonstrated how different national cultural orientations influence not only tourists' satisfaction, but also the type of digital application used when traveling [12]. American tourists (low uncertainty avoidance) were identified as more optimistic and demonstrated greater satisfaction with personalized technologies, while South Korean tourists (high uncertainty avoidance) prioritized the informativeness (i.e. quality and credibility) of information to feel satisfied [12]. Additionally, German tourists (high uncertainty avoidance) were reported to prefer technology with consumer-generated content due to the perceived credibility [9]. Despite this, they refrained from actively engaging with such digital channels due to privacy concerns [9]. While the emerging literature on technology adoption in tourism highlights cultural background as a key influencing factor, far less research has specifically explored the demographic of older adult tourists between different countries [13]. As such, further research is needed to better understand this important group of tourists who constitute up to 20% of super-aged countries' population.

3   Methods

An exploratory research approach was adopted as studies examining older adult tourists and digital technologies are fairly limited [2, 19]. Hence, exploratory structured interviews with older adults in both Finland and Japan were conducted to gain familiarity and insights on the topic area. The structured interviews collected data related to participant demographics, lifestyle, and their experiences in using digital cultural services. Participants were purposefully sampled in both countries based on the following criteria: 1) older than 60 years old, 2) has participated in cultural tourism whether on-site or online and 3) lives in urban areas. 10 Finnish and 5 Japanese older adults were interviewed. Interviews were conducted in Finnish, Japanese and English and lasted between 20 to 60 min. Following the interviews, data were analysed based on thematic analysis. This exploratory study was not intended to provide generalizability, but rather, to provide a starting point for understanding the needs and perceptions of the elderly when using technology in two different, 'super-aged' cultural tourism contexts.

4   Results and Discussions

In both Finnish and Japanese groups, all of the participants lived in urban or suburban areas. Both participants in the Japanese and Finnish sample were between 65–74 years old. In line with previous studies [3], older adult tourists can be seen as a diverse user group with the majority (but not all) expressing a desire to use digital cultural experiences. Those who did use technology for digital cultural tourism predominantly used laptops and smartphones. The television played a greater role in digital cultural tourism amongst the Japanese older adults than the Finnish.

   Findings suggest that Finnish older adults are more adept and familiar with technology as their current use of technology include online banking, online services, and theatre live streaming. Meanwhile, older Japanese adults do not fully engage with online services and primarily use basic forms of technology such as online video streaming on the smartphone (e.g. YouTube) and watching documentaries on the television. The difference in technology use may be explained by Hofstede's uncertainty avoidance dimension. Based on Hofstede's [15] theory, Japanese are characterized as being an extremely uncertainty avoidant (92%) society in comparison to the Finnish (59%). All five Japanese respondents preferred not to use technology for digital cultural services. In fact, one of the participants highlighted, *"I'm not used to it. I don't know how it works. Technology is scary."* (J1, female, 70–74) and other participants raised the issue of privacy concerns with regards to technology use (J2, 4; male, 70–74; male, 65–69). Similar to past findings [9], uncertainty avoidant societies regard technology as riskier and therefore, their extreme fear of risk prevents them from actively engaging with new technology. Although the recent COVID-19 pandemic has encouraged older Japanese adults to explore digital cultural content, all Japanese participants indicated that they turned to existing digital behaviours rather than exploring new types of technology such as live-streaming or live-interaction through chat. Meanwhile, older Finnish adults explained that they were more optimistic about learning to use new technology and engaged with technology holistically, including newer forms of digital cultural tourism

services, e.g. virtual museum tours and online lectures by novelists. All ten participants had experience of using digital cultural services, and in fact, all reported having tried new ones in the past year. As put by one participant: *"I can participate in events that would otherwise be out of reach for me. Services are also often available 24/7 and are free to use"* (F7, female, 70–74).

Interestingly, the advancement of technology was seen to contradict the Japanese's personal values and as seen in one quote, *"the more we use technology, the more it consumes us and takes away our social connection and resilience"* (J3, female, 70–74). A vast contrast to current understanding that technology is perceived as a channel for interconnectivity [4]. In the context of older adult tourists in Japan, technology was instead thought to accelerate the feelings of isolation and helplessness. In Finland, the same was visible but to a lesser extent, whereby some older adults expressed the usefulness of technology to stay in touch with friends and relatives and to share experiences on social media (F3, 5, 8; female, 65–69; female 70–74; male, 65–69). As put by one participant: *"Everyone's on the Internet"* (F3, female, 65–69). Additionally, participants explained that the Japanese prefer to experience cultural activities such as visiting museums and exhibitions by themselves or with their partner (J1, 2, 4; female, 70–74; male, 70–74; male, 65–69), suggesting that cultural activities even if complemented with technology, is not commonly seen as a key activity to form social ties amongst older Japanese adults.

5   Conclusion

Older adults form a large portion of the population in 'super-aged' countries such as Finland and Japan. Despite this, they are currently underrepresented and under researched within tourism [2, 7]. This research contributes to the literature on older adults and technology [2] by exploring older adults' perceptions of digital cultural experiences within super-aged nations. The findings highlight the importance of national culture as an influencing factor on the perceptions of digital cultural experiences amongst older adult tourists, whereby the degree of willingness to adopt technology seems to vary between countries. For example, older Japanese adults were found not to perceive technology as a tool for useful interconnectivity and overall displayed a more reserved and to some extent conservative attitude towards ICT, while Finnish older adults were more open to trying new technologies and using technology to stay in touch with friends and relatives.

Our research has implications for tourism practitioners when considering services for the elderly. The types of technology and channels used for digital cultural experiences should be country specific i.e. when developing digital cultural content for older Japanese adults, more focus could be placed in television documentaries and a focus on smartphone and laptop suited content for older Finnish adults. Additionally, extra support could be given to the Japanese elderly to overcome their fear of using technology. Future research should dig deeper into the notion of super-aged nations in tourism, e.g. by exploring differences in what 'old age' is perceived to mean and how it impacts technology acceptance in different tourism consumption contexts. Further, this was a qualitative, exploratory study; future research should employ quantitative methods to determine the generalizability of findings presented here.

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