

Juho Pesonen · Julia Neidhardt *Editors*

Information and Communication Technologies in Tourism 2019

Proceedings of the International
Conference in Nicosia, Cyprus,
January 30–February 1, 2019

 Springer

Information and Communication Technologies in Tourism 2019

Juho Pesonen · Julia Neidhardt
Editors

Information and Communication Technologies in Tourism 2019

Proceedings of the International Conference
in Nicosia, Cyprus, January 30–February 1, 2019

 Springer

Editors

Juho Pesonen
Business School
University of Eastern Finland
Joensuu, Finland

Julia Neidhardt
Faculty of Informatics
TU Wien
Vienna, Austria

ISBN 978-3-030-05939-2 ISBN 978-3-030-05940-8 (eBook)
<https://doi.org/10.1007/978-3-030-05940-8>

Library of Congress Control Number: 2018964094

© Springer Nature Switzerland AG 2019

This work is subject to copyright. All rights are reserved by the Publisher, whether the whole or part of the material is concerned, specifically the rights of translation, reprinting, reuse of illustrations, recitation, broadcasting, reproduction on microfilms or in any other physical way, and transmission or information storage and retrieval, electronic adaptation, computer software, or by similar or dissimilar methodology now known or hereafter developed.

The use of general descriptive names, registered names, trademarks, service marks, etc. in this publication does not imply, even in the absence of a specific statement, that such names are exempt from the relevant protective laws and regulations and therefore free for general use.

The publisher, the authors and the editors are safe to assume that the advice and information in this book are believed to be true and accurate at the date of publication. Neither the publisher nor the authors or the editors give a warranty, express or implied, with respect to the material contained herein or for any errors or omissions that may have been made. The publisher remains neutral with regard to jurisdictional claims in published maps and institutional affiliations.

This Springer imprint is published by the registered company Springer Nature Switzerland AG
The registered company address is: Gewerbestrasse 11, 6330 Cham, Switzerland

Preface

Organized by the International Federation for IT and Travel & Tourism (IFITT), ENTER2019 eTourism Conference takes place in Nicosia, Cyprus, from 30 January to 1 February 2019. The 26th annual international conference features cutting-edge research and industry case studies on the application of information and communication technologies (ICTs) in travel and tourism. The conference theme, “eTourism: Towards a Sustainable Digital Society” was an invitation to discuss the role of ICTs and tourism in the sustainable transformation of our society.

The research track of ENTER2019 received a total of 97 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 with members of the ENTER2019 Scientific Committee assigned as reviewers. As a result, 35 full research papers were accepted for presentation at the conference and are included in these proceedings.

While still maintaining a broad topic of ICT applications in travel and tourism, the papers presented in this volume advance the current knowledge base of social media, digital destination marketing, mobile devices, recommender systems, service robots and automation, tourist experience, and the sharing economy. The papers presented in these proceedings bring new insights into the field and give promising evidence that ICT and tourism will continue to contribute to our society, supporting sustainable development. We hope these proceedings will serve as a valuable source of information on the state of the art in ICT and tourism research.

We greatly appreciate the considerable time put in by all members of the ENTER2019 Scientific Committee who helped us to ensure that the content of the research papers is of high quality. We are indebted to the panel of experts who helped with additional reviews in order to select candidates for the best paper award.

We are also thankful to the ENTER2019 Overall Chairs—George Angelos Papadopoulos and Marianna Sigala, the IFITT President—Iis Tussyadiah, other ENTER2019 organizers, the IFITT Board, and all members of IFITT for their support and for accommodating the many inquiries made while managing the research track.

Finally, we would also like to thank all the authors for their willingness to disseminate their latest research at ENTER2019. This conference would not be possible without their efforts.

Juho Pesonen
Julia Neidhardt

ENTER2019 Scientific Committee

Rami Al-Salman	trivago N.V., Germany
Marina Abad	University of Deusto, Spain
Alisha Ali	Sheffield Hallam University, UK
Aurkene Alzua-Sorzabal	University of Deusto, Spain
Norman Au	Hong Kong Polytechnic University, Hong Kong
Rodolfo Baggio	Bocconi University, Italy
Catalin-Mihai Barbu	University of Duisburg-Essen, Germany
Pierre Benckendorff	University of Queensland, Australia
Adrian M. P. Brasoveanu	MODUL Technology GmbH, Austria
Matthias Braunhofer	Free University of Bozen-Bolzano, Italy
Derek Bridge	University College Cork, Ireland
Claudia Brözel	University of Applied Science for Sustainable Development, Germany
Dimitrios Buhalis	Bournemouth University, UK
Jacques Bulchand-Gidumal	University of Las Palmas de Gran Canaria, Spain
Lorenzo Cantoni	USI—Università della Svizzera italiana, Switzerland
Federica Cena	University of Torino, Italy
Ao Cheng	Kyung Hee University, South Korea
Cynthia Corrêa	University of São Paulo, Brazil
Giacomo Del Chiappa	University of Sassari, Italy
Amra Delić	Vienna University of Technology, Austria
Anneli Douglas	University of Pretoria, South Africa
Mehdi Elahi	Free University of Bozen-Bolzano, Italy
Alexander Felfernig	Graz University of Technology, Austria
Anna Fensel	University of Innsbruck, Austria
Daniel Fesenmaier	Retired
Andrew Frew	Queen Margaret University, UK

Gerhard Friedrich	Alpen-Adria-Universitaet Klagenfurt, Austria
Matthias Fuchs	Mid Sweden University, Sweden
Ander Garcia	Visual Communication Technologies VICOMTech, Spain
Christos Gatzidis	Bournemouth University, UK
Damianos Gavalas	University of the Aegean, Greece
Robert Goecke	Munich University of Applied Sciences, Germany
Maria Rosario González-Rodríguez	University of Seville, Spain
Robert Govers	Independent author, scholar and advisor, Antwerp, Belgium
Ulrike Gretzel	University of Southern California, USA
Vincent Grèzes	University of Applied Sciences Western Switzerland, Switzerland
Wilfried Grossmann	University of Vienna, Austria
Jens Grubert	Coburg University of Applied Sciences and Arts, Germany
Basagaitz Guereño	Universidad de Deusto, Spain
Szilvia Gyimothy	Aalborg University, Denmark
Noor Hazarina Hashim	Universiti Teknologi Malaysia, Malaysia
Inge Hermann	Saxion University of Applied Sciences, the Netherlands
Jesus Herrero	Tecnalia, Spain
Daniel Herzog	Technical University of Munich, Germany
Wolfram Höpken	University of Applied Sciences Ravensburg-Weingarten, Germany
Alessandro Inversini	Ecole hôtelière de Lausanne, HES-SO/University of Applied Sciences Western Switzerland, Switzerland
Dietmar Jannach	AAU Klagenfurt, Austria
Tomasz Janowski	Gdańsk University of Technology, Poland
Timothy Jung	Manchester Metropolitan University, UK
Nadzeja Kalbaska	Università della Svizzera italiana, Switzerland
Myunghwa Kang	University of Nebraska–Lincoln, USA
Stefan Klein	University of Muenster, Germany
Peter Knees	Vienna University of Technology, Austria
Chulmo Koo	Kyung Hee University, South Korea
Jan Krasnodebski	Expedia, Switzerland
Tsvi Kuflik	University of Haifa, Israel
Lidija Lalacic	MODUL University Vienna, Austria
Rob Law	Hong Kong Polytechnic University, Hong Kong
Kyungmin Lee	Kyung Hee University, South Korea
Miranda Lee	University of New Haven, USA
Daniel Leung	Hong Kong Polytechnic University, Hong Kong

Rosanna Leung	I-Shou University, Taiwan
Maria Lexhagen	Mid Sweden University, Sweden
Ching Li	National Taiwan Normal University, Taiwan
Gang Li	Deakin University, Australia
Andreas Liebrich	Hochschule Luzern–Wirtschaft, Switzerland
Enric López C.	University of Barcelona, Spain
Bernd Ludwig	University of Regensburg, Germany
Elena Marchiori	Università della Svizzera italiana, Switzerland
Estela Marine-Roig	University of Lleida, Spain
Lenia Marques	Erasmus University, the Netherlands
Christian Maurer	IMC University of Applied Sciences Krems, Austria
Luiz Mendes-Filho	Federal University of Rio Grande do Norte, Brazil
Luisa Mich	University of Trento, Italy
Elina (Eleni) Michopoulou	University of Derby, UK
Juline Mills	Westfield State University, USA
Roberta Minazzi	University of Insubria, Italy
Valeria Minghetti	CISSET-Ca' Foscari University, Italy
Jean-Claude Morand	CYBERSTRAT, France
Antonio Moreno	Universitat Rovira I Virgili, Spain
Annika Mueller	University of Mainz, Germany
Jamie Murphy	University of Eastern Finland, Finland
Julia Neidhardt	TU Wien, Austria
Barbara Neuhofer	Salzburg University of Applied Sciences, Austria
Thuy Ngoc Nguyen	Free University of Bozen-Bolzano, Italy
Lyndon Nixon	MODUL University Vienna, Austria
Elena Not	Fondazione Bruno Kessler, Italy
Peter O'Connor	ESSEC Business School, France
George Papadopoulos	University of Cyprus, Cyprus
Cody Paris	Middlesex University Dubai, UAE
Sangwon Park	Hong Kong Polytechnic University, Hong Kong
Katja Pasanen	University of Eastern Finland, Finland
Juho Pesonen	University of Eastern Finland, Finland
Ilona Pezenka	FHWien der WKW—University of Applied Sciences for Management & Communication, Austria
Birgit Proell	Johannes Kepler University Linz, Austria
Shanshan Qi	Institute for Tourism Studies, Macau
Mattia Rainoldi	Salzburg University of Applied Sciences, Austria
Gang Ren	Pusan National University, South Korea
Francesco Ricci	Free University of Bozen-Bolzano, Italy
Jia Rong	Victoria University, Australia
Laurens Rook	Delft University of Technology, the Netherlands
Miriam Scaglione	IOT HES-SO Valais, Switzerland

Roland Schegg	HES-SO Valais, Switzerland
Marianna Sigala	University of South Australia, Australia
Brigitte Stangl	University of Surrey, UK
Jason Stienmetz	University of Surrey, UK
Marko Tkalcic	Free University of Bozen-Bolzano, Italy
Pasi Tuominen	Haaga-Helia University of Applied Sciences, Finland
Iis Tussyadiah	University of Surrey, UK
Taehye Um	Kyung Hee University, South Korea
Dan Wang	Hong Kong Polytechnic University, Hong Kong
Sn Wang	Tulip Academy, Turkey
Christian Weismayer	MODUL University Vienna, Austria
Giampaolo Viglia	University of Portsmouth, UK
Vania Vigolo	University of Verona, Italy
Adam Woznica	Expedia, Switzerland
Wolfgang Wörndl	Technical University of Munich, Germany
Zheng Xiang	Virginia Tech, USA
Masahito Yamamoto	Hokkaido University, Japan
Kyung-Hyan Yoo	William Paterson University, USA
Yulan Yuan	Tunghai University, Taiwan
Florian Zach	Virginia Tech, USA
Markus Zanker	Free University of Bozen-Bolzano, Italy
David Zibriczky	Trivago, USA
Irem Önder	MODUL University Vienna, Austria

Contents

Recommender Systems and Decision Making

Clustering Users' POIs Visit Trajectories for Next-POI Recommendation	3
David Massimo and Francesco Ricci	

Characterisation of Traveller Types Using Check-In Data from Location-Based Social Networks	15
Linus W. Dietz, Rinita Roy, and Wolfgang Wörndl	

Utilising Crowd Information of Tourist Spots in an Interactive Tour Recommender System	27
Takashi Aoike, Bach Ho, Tatsunori Hara, Jun Ota, and Yohei Kurata	

Decision Making Based on Bimodal Rating Summary Statistics - An Eye-Tracking Study of Hotels	40
Ludovik Coba, Markus Zanker, and Laurens Rook	

Sharing Economy

Is the Sharing Economy for All? An Answer Based on Neighbourhoods, Types of Hosts, and User Complaints	55
Jacques Bulchand-Gidumal, Santiago Melián-González, and Beatriz González López-Valcárcel	

Drivers of Emotions in Airbnb-Reviews	67
Christian Weismayer and Ilona Pezenka	

UK Residents' Opinions of Peer-to-Peer Accommodation Impact on Quality of Life	80
Jason L. Stienmetz, Anyu Liu, and Iis P. Tussyadiah	

An Analysis of Regional Developments of Airbnb in Switzerland: Insights into Growth Patterns of a P2P Platform 92
 Blaise Larpin, Julien Mabillard, Miriam Scaglione, Pascal Favre, and Roland Schegg

Destination Marketing

The Effects of Virtual Reality on Destination Image Formation 107
 Ashelle McFee, Tanja Mayrhofer, Andrea Baràtovà, Barbara Neuhofer, Mattia Rainoldi, and Roman Egger

Comparing Tablet and Virtual Reality Glasses for Watching Nature Tourism Videos 120
 Katja Pasanen, Juho Pesonen, Jamie Murphy, Johanna Heinonen, and Jenni Mikkonen

“I Want to Go There Too!” Evaluating Social Media Influencer Marketing Effectiveness: A Case Study of Hokkaido’s DMO 132
 Yi Xuan Ong and Naoya Ito

The Impact of Visual Social Media on the Projected Image of a Destination: The Case of Mexico City on Instagram 145
 Denis Bernkopf and Lyndon Nixon

A Framework for Destination Image Analytics 158
 Estela Marine-Roig, Eva Martin-Fuentes, and Berta Ferrer-Rosell

Identification of Competing Destination Brand: The Case of Okinawa Island 172
 Kenshi Nakaima, Elena Marchiori, and Lorenzo Cantoni

Tourist Experience

Exploring a Travel Diary that Promotes Wellbeing – Synergy Between Oral and Visual Narratives of Memorable and Meaningful Experiences 187
 C. K. Bruce Wan

Co-creating “Mindful” Holiday Resort Experience for Guests’ Digital Well-Being 200
 Uglješa Stankov and Viachaslau Filimonau

Blended Tourism Experiencescape: A Conceptualisation of Live-Streaming Tourism 212
 Zhiming Deng, Pierre Benckendorff, and Jie Wang

Service Robots and Service Automation

Understanding Self-service Technology in Hotels in China: Technology Affordances and Constraints 225
 Chun Liu and Kam Hung

Perceived Appropriateness and Intention to Use Service Robots in Tourism 237
 Stanislav Ivanov and Craig Webster

What Should Robots Do? A Comparative Analysis of Industry Professionals, Educators and Tourists 249
 Stanislav Ivanov and Craig Webster

Technology in Tourism Industry

Insights into Advanced Dynamic Pricing Systems at Hotel Booking Platforms 265
 Michael Möhring, Barbara Keller, and Rainer Schmidt

Privacy Protection in Tourism: Where We Are and Where We Should Be Heading For 278
 Iis Tussyadiah, Shujun Li, and Graham Miller

An e-Tourism Adoption Model & Its Implications for Tourism Industry in Nepal 291
 Sanjay Lama, Sojen Pradhan, and Anup Shrestha

Trust in Tourism via Blockchain Technology: Results from a Systematic Review 304
 Davide Calvaresi, Maxine Leis, Alevtina Dubovitskaya, Roland Schegg, and Michael Schumacher

Social Media

What’s Vs. How’s in Online Hotel Reviews: Comparing Information Value of Content and Writing Style with Machine Learning 321
 Seunghun Shin, Qianzhou Du, and Zheng Xiang

An Exploratory Analysis of Travel-Related WeChat Mini Program Usage: Affordance Theory Perspective 333
 Ao Cheng, Gang Ren, Taeho Hong, Kichan Nam, and Chulmo Koo

Do Hotels Talk on Facebook About Themselves or About Their Destinations? 344
 Berta Ferrer-Rosell, Eva Martin-Fuentes, and Estela Marine-Roig

Sustainability and Responsibility

Perceived Impacts of Artificial Intelligence and Responses to Positive Behaviour Change Intervention	359
-------------------------------------------------------------------------------------------------------------------	-----

Iis Tussyadiah and Graham Miller

Towards a Measurement Scale for Digital Social Innovation: A Responsibility-Sustainability Framework	371
-------------------------------------------------------------------------------------------------------------------	-----

Pauline A. Milwood and Wesley S. Roehl

Double Gender Gap in Tourism High-Technology Organisations: Results and Corporate Actions	383
--------------------------------------------------------------------------------------------------------	-----

Cristina Figueroa-Domecq, Jesus Palomo, M^a Dolores Flecha-Barrio, and Mónica Segovia-Pérez

Citizen Engagement and Entrepreneurship: Implications for Sustainable Tourism Development	396
--------------------------------------------------------------------------------------------------------	-----

Marianna Sigala and Dandison Ukpabi

Smartphone Usage and Tourism Applications

Understanding Key Motivations for Using a Hotel Gamified Application	411
-----------------------------------------------------------------------------------	-----

Demos Parapanos and Elina (Eleni) Michopoulou

Antecedents and Outcomes of Smartphone Usage Among Indian Millennial Travellers	423
----------------------------------------------------------------------------------------------	-----

Shashank Gore, Sreejith Balasubramanian, and Cody Morris Paris

Digital Community

Motivations, Mobility and Work Practices; The Conceptual Realities of Digital Nomads	437
---------------------------------------------------------------------------------------------------	-----

Grant Hall, Marianna Sigala, Ruth Rentschler, and Stephen Boyle

Influence of Offline Activities and Customer Value Creation on Online Travel Community Continuance Usage Intention	450
---------------------------------------------------------------------------------------------------------------------------------	-----

Dandison Ukpabi, Heikki Karjaluoto, Sunday Olaleye, and Emmanuel Mogaji

Author Index	461
---------------------------	-----

Recommender Systems and Decision Making



Clustering Users' POIs Visit Trajectories for Next-POI Recommendation

David Massimo^(✉) and Francesco Ricci

Free University of Bolzano-Bozen, Bolzano, Italy
{damassimo,fricci}@unibz.it

Abstract. A novel recommender system that supports tourists in choosing interesting and novel points of interests (POIs) is here presented. It can deal with situations where users' data is scarce and there is no additional information about users apart from their past POIs visits. User behaviour is modelled by first clustering users with similar POIs visit trajectories and then learning a general user behaviour model, which is common to all the users in the same cluster, via Inverse Reinforcement Learning (IRL). Finally, recommendations are generated by exploiting the learnt behavioural models. The analysis of the produced clusters of trajectories and the generated recommendation shows that the proposed approach outperforms a baseline kNN model along several dimensions except precision.

Keywords: Recommender system · Inverse reinforcement learning
Clustering · Topic model · Tourism

1 Introduction

Tourists, when facing travel related decisions, may be overwhelmed by the large abundance of choices, e.g., POIs that could be visited, or may lack sufficient knowledge to make a good choice. Moreover, contextual conditions, such as time and weather constraints as well as user's previous choices, may make the next choice even harder. In order to cope with these problems, Recommender Systems (RSs) have been introduced; they support user decision making by identifying personalised and relevant items [1]. POI recommendations for a target user are generated by comparing the user's profile, which models the user's preferences and is derived from the user's past behaviour (e.g., past POIs visits), with target POIs description (content-based approach) or by leveraging similarities with the profiles of other users (collaborative-filtering method). The dependence of users' preferences on contextual factors have been studied in context-aware RSs (CARSS) [2,3]. Moreover, in order to harness information about the specific order in which users consume items, pattern-discovery [4] have also been proposed.

In order to predict relevant POIs, the first approach exploits the combination of contextual factors with explicit user’s feedback, e.g., POI ratings. The second one extracts visit patterns in the observed user’s POIs visit trajectories in order to predict the next POI that the user will visit. Moreover, in order to generate recommendations, both approaches require many observations (e.g., rating or POIs visit trajectories). Unfortunately, users tend to provide little feedback and user observed data is often sparse, i.e., few POIs in a city are visited.

Here, a recommender system technology is proposed that tackles three major limitations of previously mentioned approaches, that is: (1) they require users’ explicit feedback, (2) they depend on many observed POIs visit trajectories and (3) they often suggest items lacking interest for the user since they match exactly the actual (possibly suboptimal) user’s behaviour. In the approach that is proposed here, first users are clustered on the base of similarities in their observed POIs visit trajectories. Then, a general user behaviour model specific for each cluster is learnt. Finally, next-POI recommendations for users in a cluster are generated from the behavioural model learnt on that cluster. It is worth noting that the proposed technique is aimed at suggesting next POIs visits and not complete itineraries, which are instead built with itinerary planning algorithms.

In this paper, first the proposed POIs visits trajectories clustering approach is described; the generated clusters vary in terms of visit context (e.g., weather and visit time) and POIs characteristics (e.g., POI category). Then, two novel recommendation strategies that leverage the general user behaviour models learnt with Inverse Reinforcement Learning are presented and evaluated. Finally, the recommendation approach is compared to a kNN baseline method for next-item (POI) recommendation [5].

This paper extends [6] by using a much larger database of users’ POIs visit trajectories and by employing a novel behaviour learning algorithm implementation that leverages GPU hardware. It is found that the recommender introduced in this paper allows tourists to obtain a larger estimated reward (utility), by visiting the suggested POIs instead of those actually visited (which are normally used as ground truth for testing a RS).

2 Related Work

Clustering users trajectories (i.e., a sequences of POIs visits in an area) in order to understand users’ behaviour or support their decision-making process has been already addressed in some previous work.

One of the simplest form of clustering is based on users’ demographic data. For instance, a next-POI recommendation approach that generates suggestions for users clustered according to their demographics is described in [4]. The authors leverage user’s check-in and demographic data collected by the Location Based Social Network (LBSN) Foursquare. Check-in data are used to build temporally ordered visit trajectories that are then used by a Recurrent Neural Network to identify common visit patterns. Instead of suggesting a specific next-POI to be visited, the method rather predicts its category. The authors state

that relevant POIs can be then retrieved from a database using the predicted next-POI category according to different strategies (e.g., popularity or price). Here clustering solves the new user problem, but it does not support learning of the user behavioural model, as it is proposed in this paper.

A more sophisticated clustering approach for next-POI recommendation can be found in [7]. There a trip activity RS based on the similarity of users in a LBSN is proposed. The similarities between individuals and the place-based decisions they make are exploited. Given the user's preferences the model finds similar individuals that also value those properties and recommends places based on related preferences of these similar individuals. K-means clustering is applied to check-in times for clustering individual's daily activities into nine user-specific clusters. The next step is to extract prototypical POIs that can be used to represent each cluster or "typical activity". Using this method each user in the dataset is characterised as a temporal series of eighteen activities evenly split over two days (week-day and week-end). Then, recommendations are generated with a user-to-user collaborative style where the eighteen characterising activities of the target user are compared to the characterising activities of a neighbour user. Differently from the here proposed solution, in that approach the information about user context is not leveraged and clusters are used to group activities rather than users.

In [8] the authors aim at finding optimal itinerary recommendation in terms of distance and travel time. Assuming that the user has identified the POIs she wants to visit and the number of days she will spend in the region, a clustering algorithm will distribute the POIs to clusters that correspond to the available days. Then a traveling salesman problem algorithm will finally determine the actual visit order. So, differently from the here proposed approach, in [8] no recommendation technique for novel POIs is proposed and clustering is applied to POIs rather than to trajectories.

GroupTourRec [9] is a system that includes the functionality to form groups of homogeneous people, identifying POIs appropriate to each group and assigning a guide to each group. In [9] clustering is used for forming groups of users to travel together, while here travellers are independent and are clustered together according to their behaviours. Moreover in [9] the POIs to visit are identified by solving an orienteering problem rather than using predictive techniques (Inverse Reinforcement Learning) that are used in this paper.

Similarities to the approach presented here can also be found in [10]. The authors point out that while a plethora of trajectory clustering techniques have been proposed, they often rely on spatiotemporal similarity measures that are not space- and time-invariant. As a result, they cannot detect trajectory clusters where the within-cluster similarity occurs in different regions and time periods. Hence, they revisit the trajectory clustering problem by learning quality low-dimensional representations of the trajectories. Similarly to the approach presented here, they extract a set of behaviour features that capture space- and time-invariant characteristics of the trajectories. Then, with a feature extraction module, they transform each trajectory into a feature sequence to describe

object movements (as we did), but in addition, they further employ a sequence to sequence auto-encoder to learn fixed-length deep representations. But, they did not apply such a deep trajectory model to a recommendation task.

3 Trajectory Clustering and Recommendation

3.1 Sequential Decision Making Model

The tourist POIs visit trajectory generation task is modelled here as a finite Markov Decision Process (MDP). A MDP is a tuple (S, A, T, r, γ) . S is a finite set of states and a state represents the visit to a POI in a specific context (weather, temperature and day). A is a finite set of actions: the decisions to move to one of the available POIs (so they match one-to-one to the POIs). T is a finite set of probabilities, $T(s'|s, a)$, to make a transition from state s to s' when action a is performed. The function $r : S \rightarrow \mathbb{R}$ models the reward (unknown) a user obtains from visiting a state, i.e., a POI in a particular context. Finally, $\gamma \in [0, 1]$ is used to discount future rewards with respect to immediate ones.

A user’s trajectory is a temporally ordered list of states (POI-visits). Given a MDP, an optimal policy $\pi^* : S \rightarrow A$, which maximises the cumulative reward that the decision maker obtains by acting according to it, can be found. The value of taking a specific action a in state s under the policy π , is computed as $Q_\pi(s, a) = \mathbf{E}^{s, a, \pi}[\sum_{k=0}^{\infty} \gamma^k r(s_k)]$. The optimal policy π^* dictates to a user in state s to choose the action that maximizes Q . When the reward function is known, Reinforcement Learning algorithms are used for computing an optimal policy [11].

But, as it was mentioned earlier, in RS applications the reward obtained by a user when visiting a state (i.e., the r function) is usually unknown, because users rarely provide feedback. Therefore, it is interesting to learn a reward function r compatible with the bare observations of the decision maker transitions from state to state; this problem is solved by Inverse Reinforcement Learning (IRL). IRL algorithms derive the user’s action-selection policy from the learned reward function r by assuming that users act in order to maximise the reward. As in [12] it is here assumed that r is a linear function, $r(s) = \phi(s) \cdot \theta$, of the state s feature vector $\phi(s)$ and the user utility vector θ , which models the unknown user preference for the state features. For additional details about the proposed MDP the IRL algorithm (Maximum Likelihood Reinforcement Learning - MLIRL) please refer to [6].

In the application discussed in this paper the vector $\phi(s)$ is binary and represents the presence or absence of the following attributes: weather f_w , where $w \in \{clear, foggy, partly\ cloudy, mostly\ cloudy, rainy, windy\}$; temperature f_t , where $t \in \{freezing, cold, warm, hot\}$; daytime f_d , where $d \in \{morning, afternoon, evening, night\}$; POI category f_c , where $c \in \{church, \dots, palace\}$; historic period f_h , where $h \in \{3^{rd}\ century, \dots, 20^{th}\ century\}$; related person f_r , where $r \in \{Brunellschi, \dots, Vasari\}$. In total there are 151 Boolean features ($F = 151$), 137 representing the POI ($P = 137$) and 14 representing the context ($C = 14$). In particular, there are 13 category, 18

century and 106 related person features. Since actions in A represent POIs and a state vector combines a POI with context features, then $\phi(a)$ denotes also the feature vector part describing the POI.

3.2 POIs Visit Trajectories Clustering

The dataset that is used here to validate the proposed approach contains 1663 geo-localized temporally ordered trajectories of users' POIs visits, recorded via GPS sensors in the historic centre of Florence (Italy). POIs visits in each trajectory are enriched with information like hourly weather summaries (e.g., cloudy or rainy), temperature (e.g., cold) and daytime (e.g., evening). In addition, for each POI, by using expert knowledge, features like category (e.g., monument), historical period (i.e., century) and (one) historical person were added. For the 532 different POIs appearing in the trajectories 13 different POI categories, 18 historical periods and 106 historical persons were identified.

The trajectories/users ratio is 1.43 and the average trajectory length is 11.7 POI-visits. Because of this shortage of user specific preference data, an individual user behaviour model would not be very accurate. Hence, it is proposed to cluster users' trajectories and then to learn a "general" user behavioural model common for all the users/trajectories in a cluster. Users' trajectories are clustered in such a way that clusters are space and time invariant. This is achieved by building a quality low dimensional representation of the trajectories. The additional advantage of this approach is twofold: it minimises the impact of sub-optimal behaviour that could influence some user's trajectory, and it allows to deal with datasets with small numbers of observed interactions per user. Then, by applying IRL on each cluster of trajectories, a cluster specific reward function and behavioural model is learned. The latter is the optimal policy that dictates, for each state, the best action (next-POI visit) that a generic user in the cluster should take in order to maximise her reward.

The proposed clustering technique models each user trajectory as a document obtained by merging all the POI descriptive features (i.e., POI category, historic period and related person) and visit context features (i.e., part of the day, weather and temperature). Then, each cluster is characterised by the features (document terms) of the most frequent POI-visits in the cluster. Clustering the trajectories is implemented with Non Negative Matrix Factorization (NMF) [13]. There are two main benefits of this approach. Firstly, NMF groups trajectories according to a common semantic structure that can explain the resulting clusters. NMF extracts topics, i.e., lists of words, that describe groups of documents. The second benefit is that it allows to assign a user's POIs visit trajectory to more than one cluster.

Five topics/clusters have been determined by conducting a stability analysis on the considered data set, as suggested in [14]. In Table 1 the top-10 terms per cluster and the number of trajectories per cluster are shown. Clusters are named with the first 5 English alphabet letters.

In the following, two cluster examples (i.e., C and E) are compared; they have some similar features but a different number of trajectories. Figure 1 depicts the

Table 1. Top 10 terms in the five topics extracted from the trajectory data set and number of trajectories assigned to each topic (cluster).

#Term	Cluster A	Cluster B	Cluster C	Cluster D	Cluster E
1	morning	hot	cloudy	warm	freezing
2	cold	afternoon	cold	cloudy	cloudy
3	square	century 16	church	century 14	afternoon
4	palace	palace	square	church	century 14
5	century 15	church	century 13	square	palace
6	century 13	square	palace	building	building
7	church	century 19	rain	palace	century 13
8	night	century 13	museo	ponte	church
9	dante	museo	brunelleschi	century 13	foggini
10	century 10	brunelleschi	tadda	century 19	century 19
#Traj.	368	339	341	297	153

clusters' trajectories and 15 most popular POIs. POIs are depicted as circles with diameter proportional to the normalised POI popularity: the more popular the POI is in the cluster the larger the circle is. There is a large number of POIs present in both clusters, but they differ in terms of normalised visit frequency. In fact, in the cluster represented on the right, POI circles are smaller because of a more uniform distribution of the visits among all the POIs in the cluster (i.e., not only the top-15 shown in the figure). The importance of the various streets in the clustered trajectories is determined by identifying the most representative trajectories in the clusters. These are the trajectories whose *tf-idf* vector representation is closer, in cosine similarity, to the cluster centroid, which is the average vector of all the *tf-idf* vector trajectory representations. The street importance is represented as shades of the colour bar on the right part of the figure; it has higher values (darker colour) in proximity to popular POIs and on the main streets connecting them.

At the bottom of Fig. 1 the ranked lists of the most popular POIs in the two clusters are shown. POI names in black typeface are common to the two clusters, whereas coloured names are cluster specific. 11 POIs are common to these two clusters and 9 of them are common to all the clusters. They actually belong to the top-15 attractions according to popular travel portals¹.

Clusters differences in terms of POI features are shown in Fig. 2. This figure shows the probability of various features (POI category, historic period and related person features) in the five considered clusters.

¹ www.planetware.com/tourist-attractions-/florence-i-to-f.html
www.touropia.com/tourist-attractions-in-florence/
www.theculturetrip.com/europe/italy/articles/20-must-visit-attractions-in-florence-italy/.

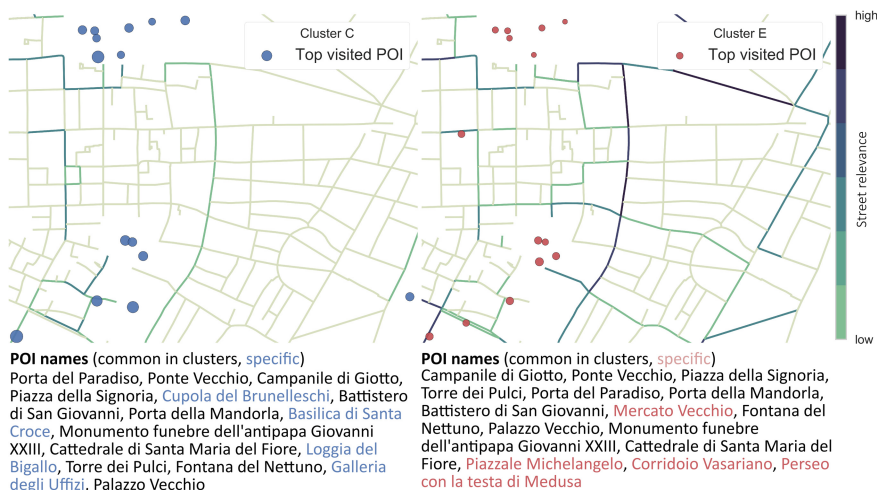


Fig. 1. Top-15 visited POIs and street relevance (heatmap) for two clusters

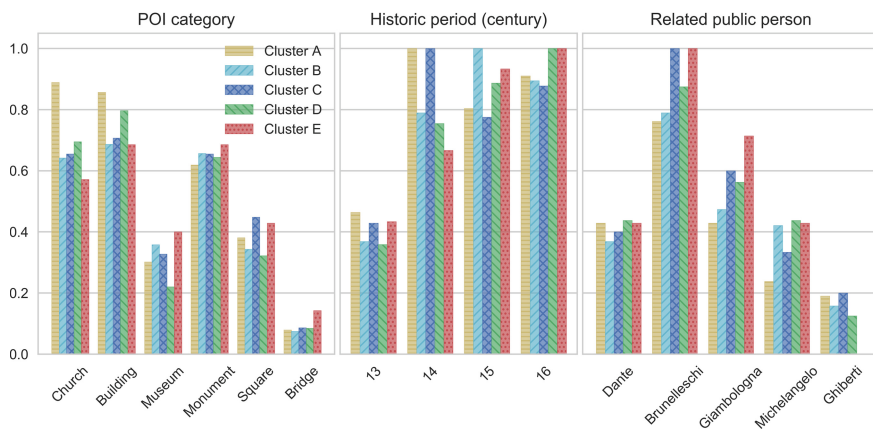


Fig. 2. Extracted POI features distribution per cluster

Overall, one can see that the features variability in the clusters is not high. In fact, POIs are rather similar, i.e., they are mostly cultural POIs. It is reasonable to conjecture that if a more diverse assortment of POIs (e.g., leisure, restaurant, bar, etc.) were available then the clusters may better discriminate alternative groups/types of tourists. Nevertheless, by looking at the specific POI descriptive features, one can notice interesting differences. For instance, POI categories like churches and buildings characterise mostly visits in clusters A and D, whereas to a lower extent trajectories in the other clusters (e.g., cluster E). Instead, cluster E is more representative of visits to bridges, squares and museums. Also POI historic period and POI related person features differentiate the clusters.

For instance, cluster E is characterised by visits to POIs from the 15th and 16th centuries and artists from these times (i.e., Brunelleschi, Michelangelo and Giambologna). Other relations between historic period and related person can be identified in 13th century and Dante (e.g., clusters A and C) as well as 13th century and Ghiberti (e.g., cluster A). Carrying out this analysis with a domain expert, an art historian, could reveal more similarities and differences between the clusters.

In Fig. 3 the probabilities to observe certain context features in the clusters are shown. For instance, one can see that clusters C and E mainly group visits during cloudy days (left). Considering instead the temperature (centre), the clusters capture other nuances of the visits. For instance, cluster A represents visits on cold days, whereas cluster C groups visits on warmer days. Interestingly, focusing on the part of the day (right), there are clusters that represent visits performed at different times. For instance, mornings and afternoons in cluster A, afternoons and evenings in clusters B and over the whole day in cluster D.

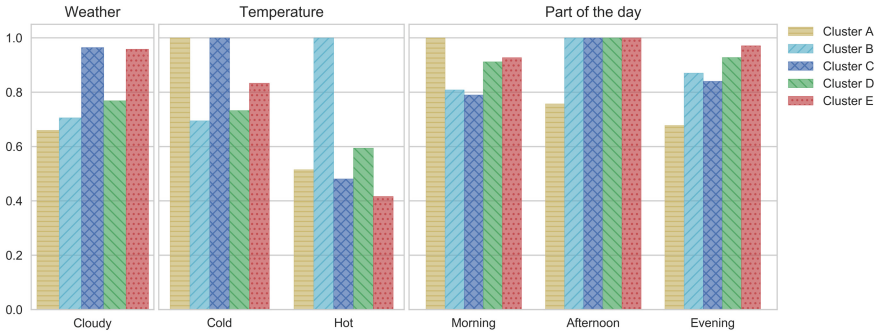


Fig. 3. Extract of context features distribution per cluster.

By means of a χ^2 test of independence, it has been found that the frequency of POI category, historic period, related person and weather depend on the cluster (all significant with $p < 0.04$).

3.3 Next-POI Visit Recommendation

Two recommendation strategies, which exploit the previously discussed clusters and suggest next-POI visit actions, are now described. Given the observed POIs visit trajectory of a user and the general user behavioural model of the cluster she belongs to, these strategies suggest viable next-POI visit actions.

Cluster Behaviour Based Recommendations (CBR). When only few observations of a user’s behaviour are available, e.g., only a single sequence of user’s visit actions, then the general user behaviour of the cluster the user belongs to can be used to identify the optimal action this user should take after the last

visited POI. The optimal action, as it was explained in Sect. 3.1, is that with the highest Q value in the user's current state.

Cluster Behaviour Hybrid Recommendations (CBHR). When more visit actions observations for a user are available, recommendations can also be generated by combining the group generalised user behaviour (as it is used in the previous strategy) with next-POI visit scores computed on the base of a user specific preference model. The user specific preference model is built by observing the frequencies of the descriptive features (e.g., POI category) appearing only in the POIs of the user's observed trajectories. The overall scores for alternative next-POI visits are generated by a linear combination of the user specific POI scores and the cluster specific scores proportional to the Q value of the visits (general model). For instance, if a commuter is understood to like art because she mostly visits museums, and an exhibition is estimated to be an optimal choice for her group, then the system could recommend it to her.

4 Recommender System Evaluation

For each generated cluster, the initial parts of the cluster trajectories (80% of its length) were assigned to the train set and the remaining 20% to the test set. Then, in each cluster, the train set data was used to learn the general user behaviour model for that cluster. In order to compute and evaluate recommendations, the trajectories in the train set were considered observed by the system and were used to generate next action recommendations, while the remaining parts (test set) were used to assess the evaluation metrics (discussed below). The benchmark kNN RS method (see below) does not use clustering, hence it was trained using all the trajectories in the train set (the union of the clusters' train sets) and tested using the union of the test sets.

The proposed recommendation strategies were benchmarked by using several metrics. The *reward* metric measures the average increase of the reward of the recommended actions compared to the observed one (in the test part of the trajectory). It is the difference of the recommended POI-visits Q values and the one in the test. *Dissimilarity* measures how much the recommendations are dissimilar from the observed visit and ranges in $[0, 1]$. *Novelty* estimates how unpopular are the recommended visit actions and ranges in $[0, 1]$. A POI is assumed to be unpopular if its visits count is lower than the median of this variable in the training set. Detailed definitions of these metrics can be found in [6]. *Precision* is the percentage of recommended visits that match the observed one, hence it shows to what extent the system suggests the actions actually performed by the user.

The proposed recommendation strategies were compared with a kNN based approach that does not distinguish between user behaviour learning and recommendation generation. It takes the observed target user trajectory as input and seeks for other user observations (trajectories) in the data (train) that contains the same items (visit actions) found in the target user observation. Then, the next-item (action) recommendation is selected among those contained in the

most similar observations in the (train) data. For further details we refer the reader to [5, 6, 15].

5 Experimental Results

The compared recommenders’ performance for top-5 and top-10 next-POI visit recommendations are shown in Table 2. One can observe that the recommendations of CBR and CBHR allow users to obtain larger rewards, compared to kNN. While, as expected, kNN has the best precision, as it tends to suggest next-POIs that the user would anyway visit. CBHR, instead, excels in novelty: it provides more novel recommendations than CBR and kNN. kNN novelty is very low because it favours POI visit action that are actually visited by the users, hence they are popular. Turning now to the dissimilarity metric, one can note that the three models have similar performance. Finally, the statistical significance ($p < 0.01$) of the performance difference between the proposed approaches and the baseline was assessed by means of the Welch’s t-test: all of them are significant ($p < 1 \times 10^{-6}$), with regard to all the considered performance metrics.

Table 2. Evaluation results

	Top-5			Top-10		
Metric	CBR	CBHR	kNN	CBR	CBHR	kNN
Reward	0.8791	0.7788	0.4204	0.8304	0.7695	0.3863
Precision	0.0834	0.0514	0.1518	0.0751	0.0464	0.1285
Novelty	0.0002	0.1878	0.0000	0.0503	0.2640	0.0000
Dissimilarity	0.8923	0.8706	0.8578	0.8901	0.8694	0.8693

Figure 4 shows a concrete example of the top-3 recommendations generated for a user in cluster A by the considered strategies (CBR, CBHR and kNN). The part used for training comprises the first five POIs (ending with Via della Condotta), whereas the part used for testing comprises the last three POIs (starting with Fontana del Nettuno). By construction, CBR prioritises items that are judged to be relevant for all the users in the cluster. In fact, as one can see in Fig. 2 (discussed in Sect. 3.2), recommended POI features have high probability to be found in the cluster (i.e., 13th century and monument). CBHR hybridise CBR with the user specific preference model, hence, its recommendations have features that are relevant for both the target user and the cluster. In fact, the recommended POIs features (i.e., 14th century, Brunelleschi and square) fall among the top-6 features in the user’s user preference model, while also being relevant for the cluster (as it can be seen in Fig. 2). The kNN recommendations shown here illustrate the peculiarity of this method: it suggests POIs that are predicted to be in the test part of the trajectory (i.e., Fontana del Nettuno). Moreover, it recommends POIs that are very popular (top-20) in the training set.

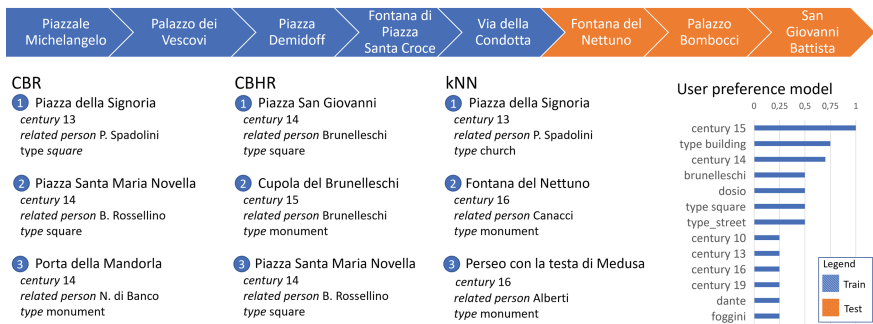


Fig. 4. Observed user trajectory (top); top-3 POI visit actions recommendations generated by CBR, CBHR and kNN techniques; user preference model (right)

6 Conclusion

A new recommender system technique for tourists behaviour learning and next-POI recommendations has been presented. The proposed approach first clusters users' POIs visit trajectories by harnessing space and time invariant features such as POI descriptive content (e.g., POI category and historic period) as well as the context of the visit (e.g., weather). These clusters, in comparison to other state of the art clustering approaches in tourism, are more specific and are computed relying on behavioural data rather than set a priori, e.g., by classifying users in prototypical tourist types. Then, the proposed method learns cluster specific behaviour and preference models by applying Inverse Reinforcement Learning.

The produced clusters have been analysed and the performance of two novel recommendation strategies built on top of the learnt behavioural model have been compared to a kNN based recommender. The learnt behavioural model explains (clustered) users' preferences by identifying the relative contribution to the reward given by the various features that describe the POIs and the visit context. Recommendations of next-POI visits maximises the reward the user gains while discovering relevant, novel and non-popular POIs. In comparison, the here studied kNN baseline has better precision, but inferior reward and novelty.

Further research should examine more closely how the proposed method can exploit spatial features (e.g., streets width and density) of the POI-visit trajectories. It is conjectured that these features may influence user's decision-making and therefore must be considered in the user behaviour model and the generated recommendations.

Acknowledgement. The research described in this paper was developed in the project Suggesto Market Space, funded by the Autonomous Province of Trento, in collaboration with Ectrl Solutions and Fondazione Bruno Kessler.

References

1. Ricci F, Rokach L, Shapira B (2015) Recommender systems: introduction and challenges. In: Ricci F, Rokach L, Shapira B (eds) Recommender systems handbook. Springer, Boston, MA, pp 1–34. https://doi.org/10.1007/978-1-4899-7637-6_1
2. Braunhofer M, Elahi M, Ricci F, Schievenin T (2013) Context-aware points of interest suggestion with dynamic weather data management. In: Xiang Z, Tussyadiah I (eds) Information and communication technologies in tourism 2014. Springer, Cham, pp 87–100. https://doi.org/10.1007/978-3-319-03973-2_7
3. Trattner C, Oberegger A, Marinho L, Parra D (2018) Investigating the utility of the weather context for point of interest recommendations. *Inf Technol Tour* 19(1):117–150
4. Palumbo E, Rizzo G, Baralis E (2017) Predicting your next stop-over from location-based social network data with recurrent neural networks. In: RecSys 2017, 2nd ACM international workshop on recommenders in tourism (RecTour 2017), CEUR Proceedings, vol 1906, pp 1–8
5. Jannach D, Lerche L (2017) Leveraging multi-dimensional user models for personalized next-track music recommendation. In: Proceedings of the symposium on applied computing - SAC 2017, pp 1635–1642
6. Massimo D, Ricci F (2018) Harnessing a generalised user behaviour model for next-POI recommendation
7. McKenzie G, Janowicz K (2014) Activities in a new city: itinerary recommendation based on user similarity
8. Rani S, Kholidah KN, Huda SN (2018) A development of travel itinerary planning application using traveling salesman problem and k-means clustering approach. In: ICSCA
9. Lim KL, Chan J, Leckie C, Karunasekera S (2016) Towards next generation touring: personalized group tours. In: ICAPS
10. Yao D, Zhang C, Zhu Z, Huang J, Bi J (2017) Trajectory clustering via deep representation learning. In: 2017 international joint conference on neural networks (IJCNN), pp 3880–3887
11. Sutton RS, Barto AG (2014, in progress) Reinforcement learning: an introduction, 2nd edn. The MIT Press
12. Ng A, Russell S (2000) Algorithms for inverse reinforcement learning. In: Proceedings of the 17th international conference on machine learning - ICML 2000, pp 663–670
13. Lee DD, Seung HS (1999) Learning the parts of objects by non-negative matrix factorization. *Nature* 401(6755):788–791
14. Greene D, O’Callaghan D, Cunningham P (2014) How many topics? Stability analysis for topic models. In: Calders T, Esposito F, Hüllermeier E, Meo R (eds) Machine learning and knowledge discovery in databases. ECML PKDD 2014. Lecture Notes in Computer Science, vol 8724. Springer, Heidelberg. https://doi.org/10.1007/978-3-662-44848-9_32
15. Hariri N, Mobasher B, Burke R (2012) Context-aware music recommendation based on latent topic sequential patterns. In: Proceedings of the 6th ACM conference on Recommender systems - RecSys 2012, p 131



Characterisation of Traveller Types Using Check-In Data from Location-Based Social Networks

Linus W. Dietz^(✉), Rinita Roy, and Wolfgang Wörndl

Technical University of Munich, Department of Informatics, Garching, Germany
{linus.dietz,rinita.roy}@tum.de, woerndl@in.tum.de

Abstract. Characterising types of travellers can serve as a foundation for tourism recommender systems. This paper presents an approach to identify traveller types by analysing check-in data from location-based social networks. 33 million Foursquare check-ins from 266,909 users are segmented into 23,340 foreign trips based on traveller mobility patterns. Hierarchical clustering was then applied to identify distinct groups of trips by features such as travel duration, number of countries visited, radius of gyration, and the distance from home. The results revealed four clusters of trips, which manifest a novel grouping of people's travel behaviour.

Keywords: Data mining · Cluster analysis
Human mobility patterns · Tourism · Recommender systems

1 Introduction

Travelling is a highly emotional and personal endeavour that is of great importance to a person's education, personal well-being, and social status. Choosing a destination and planning a trip, however, are complex tasks with many unpredictable factors, such as expected costs, the quality of experience, and the risks involved. Traditionally, travel agencies assisted users in the selection and booking of vacations, but most travellers now use online information sources, and 75% of millennials prefer to travel on their own itinerary, rather than in a packaged tour [1]. This shift in consumer behaviour gives rise to destination recommender systems that support prospective travellers in making informed decisions about where to vacation based on their personal preferences [2]. Such recommender systems should provide a pleasant user experience. Therefore, it is a challenge to effectively elicit the user's preferences in a way that is appealing to them.

Destination recommender systems often use course-grain methods for eliciting user preferences, such as by binary indications of the user's interest in activities [3]. Other systems leverage more sophisticated models of tourists' behavioural patterns, such as the *Seven Factor Model* [4], to provide high-quality,

personalised recommendations [5]. This paper proposes an alternative model for traveller characterisation by analysing their mobility patterns derived from location-based social network (LBSN) data. An analysis of tourist itineraries reveals travel mobility patterns that may offer insights about the general characteristics of different types of travellers. But what kind of travellers are there? Literature offers several theories about tourist types, but none of these are backed by actual observation. To develop a clearer view of how tourists might be grouped, an analysis of the check-in data of Foursquare users over an 18 month span was performed. The check-in streams of individual users were first segmented into trips, using solely the spatio-temporal information derived from the mobility patterns within the check-in data. Cluster analysis, an unsupervised learning method, found four distinct, coherent groups of trips, each corresponding to one type of travel.

This article makes three contributions: 1. a method for characterising trips from LBSN check-in data, 2. the selection of appropriate features for clustering, and 3. the interpretation of the resulting types of trips indicated by each cluster. To the best of our knowledge, this is the first characterisation of trips and travellers that is backed with check-in data. These novel insights will be of use to the travel and tourism industry, with practical applications in preference elicitation and user modelling for tourist recommender systems. Note that the approach can also be applied with data from sources other than LBSN data like raw GPS trajectories [6]. Our focus is nevertheless on LBSN data, since the granularity is fine enough for destination recommendation and it is more readily available.

The structure of this paper is the following. After an overview of the literature in Sect. 2, the methods with a focus on the feature selection process for clustering are described in Sect. 3. Then, Sect. 4 interprets the resulting groups of trips. Section 5 draws conclusions and raises issues for future research.

2 Related Work

The goal of this research is to find distinct trip types to augment the personalisation of destination recommender systems. This section discusses the literature on tourist recommender systems, previous attempts to characterise travellers, and the analysis of human mobility.

2.1 Tourist Recommender Systems

Recommender systems for tourism are a well-established tool because of the substantial complexities of planning an independent trip and the huge economic importance of the travel and tourism industry. The most significant tourist recommender systems currently on the market recommend hotels, restaurants, and flights. The academic community is more concerned with destination recommendations at different levels, i.e., single attractions, tourist packages, and composite trips [7]. Since these items are often not as well defined as hotels or restaurants, collaborative filtering methods are not commonly used. Instead, content-based and knowledge-based recommendation techniques are often employed [8].

To facilitate the content-based paradigm, user needs are mapped onto item attributes. This is usually done using common categorisation, which allows the calculation of a similarity measure that is used to rank the recommended items. This categorisation problem is non-trivial, since it requires reliable information about both the user and the candidate items. Another option is to characterise users based on their past trips [9] or to define a more elaborate mapping between classes of users and destinations [5].

2.2 Tourist Roles

Tourists are assigned to various roles in literature. In 1963, Bhatia [10] characterised travel into two basic types – for leisure or business. Cohen [11] labelled tourists with four different social roles: “organised mass tourist”, “individual mass tourist”, “explorer”, and “drifter.” Pearce [12] used fuzzy set theory to define 15 different travel roles. McKercher [13] classified tourists based on the importance of cultural motives when deciding which destination to visit and the depth of cultural experience gathered by the tourist. Yiannakis and Gibson [14] observed which roles – they identify 17 – are enacted by people when they travel associated with different psychological needs.

With such diversity of tourist categorisations in the literature, the best grouping of tourist preferences and needs to improve destination recommendation is unclear. More importantly, none of the existing categorisations has been validated with observational data [4], so it is unclear if the categories apply to real travellers. To address this challenge, Neidhardt et al. [4] developed the *Seven Factor Model* of tourist behavioural patterns based on the *Big Five Factor Model* [15] from psychology and a factor analysis of the 17 tourist roles proposed by Gibson and Yiannakis [14,16]. With a destination recommender system in mind, they elicited user preferences through an image classification task, where the users should pick the most appealing travel-related photos from a collection. The classification of these pictures along the *Seven Factors* has been previously determined using a questionnaire. Thus, the user’s selection of images constitutes a personalised mixture of taste model, enabling content-based recommendation of points of interest, which were rated by experts along the *Seven Factors* in the design stage. Continuing this line of research, Sertkan et al. [5] used unsupervised learning to cluster 561 tourist destinations from a rich commercial data set based on 18 motivational and seven geographical attributes. Using an expert mapping of the *Seven Factors* to these destinations, they could distil associations between destination attributes and the *Seven Factor Model* that indicate travel behaviours. Although it is scientifically sound, the *Seven Factor Model* relies heavily on expert knowledge, which is a drawback if this information is not available or hard to obtain. We also feel that these behavioural patterns can be meaningful when people talk about tourism, but haven’t found any evidence on how they relate to the actual travel behaviour in the field. On the basis of these considerations, a different approach to determine behavioural patterns of tourists by analysing the mobility patterns of travellers was developed.

2.3 Human Mobility Analysis

The analysis of human mobility gives insights into various aspects of everyday life. Traditionally, data sources like mobile phone communication records [17], Wi-Fi usage [18], and raw GPS trajectories [19] have been used to analyse human mobility. Given the availability of LBSN data, which enriches a pure location trace with further information, such as user posted content and social network, much research has been done analysing mobility using data from Twitter, Foursquare, and other platforms [20].

One research objective is the predictability of human mobility. Song et al. found that individual mobility patterns follow reproducible scaling laws [21] and described the limits of the extent to which human mobility can be predicted [22]. More recently, Ouyang et al. [23] have analysed mobility data to predict travel trajectories using a deep learning framework.

The correlation of locations with a social activity that can be studied with LBSN data promises interesting insights into social behaviour. Noulas et al. [24] used Twitter and Foursquare data to explore the relationship between location data and user activities. Cheng et al. [25] found recurring daily and weekly patterns of activity, and Wang et al. [26] found a positive pairwise correlation between social connectedness, i.e., the strength of interactions, and mobility.

LBSN mobility data have been used to improve recommender systems [27]. Zheng et al. [28] studied spatial co-occurrences that can also be used to identify similar users and generate implicit ratings for collaborative filtering algorithms. Hawelka et al. [29] found similar patterns among tourists globally and compared results with worldwide tourism statistics and commonly used human mobility models. Bao et al. [30] matched the travellers in a foreign city to local experts based on their respective home behaviours to improve the accuracy of a point of interest recommender. Finally, Hsieh et al. [31] used past LBSN data to recommend itineraries within cities from the popularity of destinations, the best time of day to visit, the transit time between venues, and the best order to visit the places.

Recently, Dietz et al. have proposed a metric-based approach that extracts foreign trips from LBSN data [6]. There they analyse tourist mobility patterns with the goal of investigating the popularity and co-occurrences of tourist destinations in composite trips. The following approach extends this approach to mine trips and then apply clustering algorithms to identify distinct groups of trips and travellers.

3 From Check-Ins to Human Mobility Patterns

LBSN data, i.e., geo-tagged posts, give an incomplete view of a user's mobility, since a user's location is only recorded when she decides to share it. However, given the prevalent use of LBSNs on mobile devices, users often leave a nearly continuous spatio-temporal trace behind them. Combining these location data into a trajectory, they can be used to characterise the mobility of a user with innate metrics.

3.1 Mining Trips from LBSN Data

If a user tweets using a mobile device and decides to enable the “Tweet with location” feature, her location will be recorded automatically with every sent tweet. Similarly, if a user checks in at Foursquare venues, her presence at the specific venue at a specific time is recorded. Since the main interest is in user behaviour when travelling abroad, the user’s home country is determined using the “Plurality” strategy, i.e., the country with the highest number of check-ins [32]. This allows the check-in stream to be segmented into periods at home and periods of travelling abroad. A trip is defined as consecutive check-ins abroad before returning home. To filter out typical business trips, all trips that are shorter than a week are omitted. Furthermore, trips where the user has not checked-in often enough are excluded by requiring a minimum check-in density of 0.2, which means that, on average, the user must have checked-in at least once in five days [6]. Applying this methodology, 23,340 trips from a dataset of 266,909 Foursquare users covering the period from April 2012 to September 2013 [33] are mined.

3.2 Choosing Features for Clustering

The trips are initially characterised by several features derived from the check-in stream.

1. **Travel duration:** the number of days between the first and the last check-in of the trip
2. **Countries visited:** the number of countries visited
3. **Check-in frequency:** the number of check-ins made during the trip divided by the travel duration. Note that this is different from the check-in density mentioned above, which only counts the days with a check-in
4. **Check-in duration:** the mean time between two consecutive check-ins
5. **Check-in distance:** the mean distance between two consecutive check-ins
6. **Radius of gyration:** the mean distance between the mean location of the trip and all check-in locations
7. **Displacement:** the distance between the user’s home location and the mean position for the places visited during the trips
8. **Check-in time:** the average time of day of the check-ins, signifying the time of activity
9. **Day length:** the mean duration of sunlight at the location of the trip
10. **Activities:** the types of venues checked into according to Foursquare’s categorisation¹.

Since the goal is to capture the underlying phenomena driving travel behaviour, the check-in frequencies and the check-in duration are excluded from the cluster analysis, as these metrics capture the quality of the data, instead of providing insights on the underlying movement of the traveller. Although information about activities could potentially give interesting insights into what the

¹ See <https://developer.foursquare.com/docs/api/venues/categories>.

tourists do during their trips, they are also excluded because these features are very particular to the check-in behaviour of Foursquare users and will not be available in other data sources. Thus, seven candidate features remain, as listed in Table 1. Besides the day length, the check-in time and the mean displacement all follow an exponential distribution with a long tail, which limits the interpretability of the mean and median values.

Table 1. Feature statistic for 23,340 trips

Feature	Mean	Median	Maximum	St. Dev.
Travel duration	16.44	10.00	429.00	21.27
Countries visited	1.61	1.00	24.00	1.13
Check-in distance	394.87	25.44	18203.37	1081.23
Radius of gyration	721.91	65.27	13762.70	1540.85
Displacement	5002.42	3708.58	19933.28	4308.79
Check-in time	14.84	14.99	23.58	2.65
Day length	12.71	12.62	18.84	2.00

Before applying the clustering algorithm, a correlation analysis of the remaining candidate features is performed. As shown in Fig. 1, there is a strong positive correlation between the radius of gyration and the check-in distance, with a coefficient of 0.74. Therefore, the latter is excluded, as the radius of gyration is less dependent on the check-in behaviour of the user. The other notable correlation of 0.52 is between the radius of gyration and the number of countries visited. However, in this case, both features are kept, since a medium correlation is the ideal situation for a clustering algorithm to find structure in the data. Day length and the check-in time are barely correlated ($\leq \pm 0.11$) to the other features. Therefore, these features are also excluded, as they will not improve the segregation in the clustering algorithm. Thus, the correlation analysis results in four remaining features: travel duration, countries visited, displacement, and the radius of gyration.

4 Clustering Results

Cluster analysis is the task of finding groups of data objects, where each group comprises similar objects, whereas the groups themselves are dissimilar to each other. This technique can uncover a structure within unlabelled data and is therefore categorised as unsupervised machine learning [34]. Since the features of the trips are all numeric, there is no restriction in using mainstream clustering algorithms, such as k-means, k-medoids, or hierarchical clustering. To avoid bias due to different ranges of the feature values, they are normalised using min-max scaling. Further, the distance metric in all experiments is the Euclidean distance in the four-dimensional feature space.

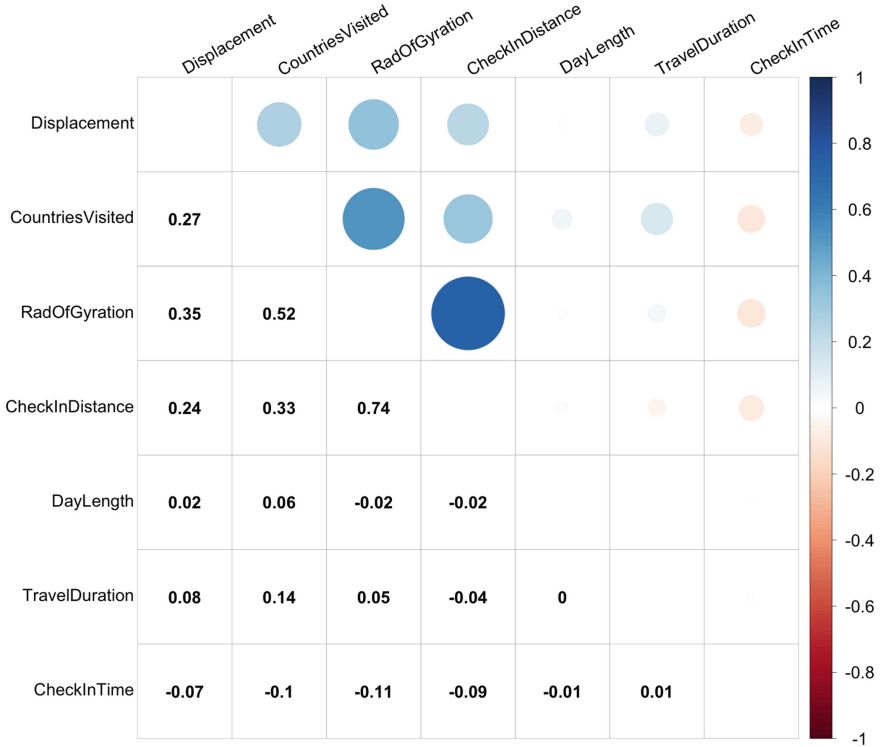


Fig. 1. Correlation analysis of candidate features

The suitable number of clusters was determined in preliminary tests. By varying the number of expected clusters between two and eight, the quality of the determined clusters is evaluated in terms of the within-cluster sums of squares and the average silhouette [35]. The silhouette width measures how well a data object fits into its labelled cluster as opposed to all other clusters. Therefore, it is a robust and easy to interpret method that gives a broad overview of the overall solution quality, as well as information about each data object. In our analysis, the general tendency for all algorithms was that three to five clusters returned reasonable groupings with clusters of mean silhouette width around 0.4–0.5.

Closer analysis reveals that hierarchical clustering achieves the highest average silhouette widths, followed by k-means and k-medoids. Thus, the hierarchical clustering algorithm is employed to find the optimal number of clusters. As shown in Fig. 2a, the average silhouette of the hierarchical clustering is in the area of slightly above 0.5 for two to four clusters and plummets below 0.4 at five clusters or more. On this basis, four clusters are the final solution. The evaluation using within-cluster sums of squares also supports this result, although the evidence for four clusters is not as clear. A quick glance at the silhouette plots of the four clusters in Fig. 2b shows that they are mostly in the positive area, with few

trips per cluster falling into the negative area. This confirms a reasonably good clustering result.

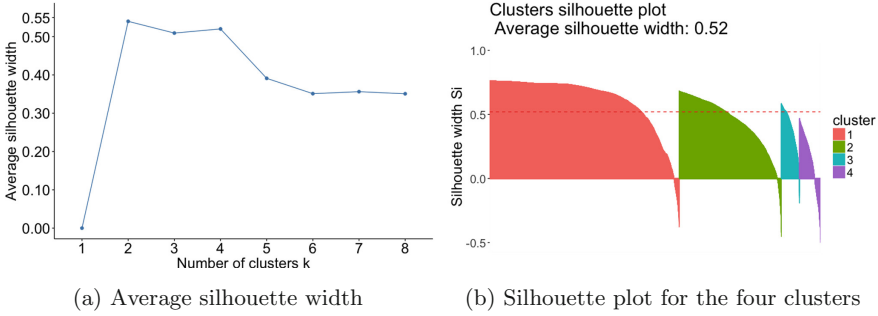


Fig. 2. Choosing the best number of clusters

The four clusters each represent a distinct type of trip. As expected, the numbers of trips per cluster are not uniformly distributed, with 57% of the trips residing in the first cluster, 31% in the second, 5% in the third, and 6% in the fourth cluster. Furthermore, the duration of travel was relatively equal among the clusters, with a mean value between two and three weeks. This was also somewhat expected as this feature showed relatively low correlations (less than 0.14) in the correlation plot of Fig. 1. This feature was used nonetheless because the duration of travel is important to consider even if it has a rather low correlation with other features.

Table 2 illustrates the mean values of the features per cluster. Recalling the existing research on tourist roles from Sect. 2, this constitutes a novel characterisation of trip types that can be generalised to travellers. To offer a preliminary interpretation of the clusters, their characteristics are described using a trip taken from near the centre of the cluster.

Table 2. Mean values and standard deviations of features per determined cluster

Feature	Vacationers	Explorers	Voyagers	Globetrotters
Trips	13373	7213	1277	1477
Silhouette width	0.62	0.44	0.39	0.15
Travel duration	15.96/20.97	16.68/23.23	18.73/17.65	17.60/16.04
Countries visited	1.36/0.72	1.66/1.09	1.87/1.25	3.30/2.22
Radius of gyration	310/733.15	418/586.50	1535/1725.77	5230/2348.73
Displacement	1798/1508	8450/1851.82	14594/1555.88	8887/2878.50

The first two groups, “*Vacationers*” and “*Explorers*”, contain trips to one or two neighbouring countries. The mean radius of gyration is very low, i.e., 310

and 418 km, respectively. The notable feature that distinguishes these trips is that the vacations are nearer to the traveller’s home, whereas the explorer trips visit another continent. This can be seen in the *Explorers’* mean displacement of 8450 km, which is about the distance from Cyprus to Montréal, Canada. The trip of a *Vacationer*, visualised in Fig. 3a, was a seven day trip by a tourist from Turkey covering Barcelona, Spain, and Milan, Italy, before flying out from Turin airport. Conversely, an *Explorer’s* trip was an eight-day round trip by a Russian tourist to New York City, USA, and the Great Lakes area, visiting Cleveland, Chicago, and Detroit on the way. The overall mean displacement was large, but the radius of gyration was relatively small, as the whole trip took place within the north-east of the United States of America (see Fig. 3b).

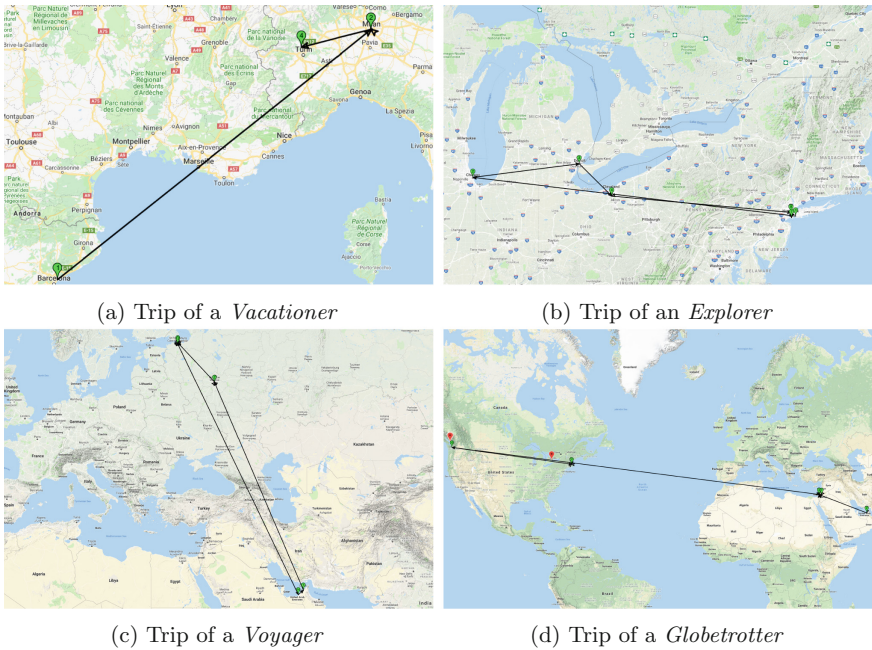


Fig. 3. Characteristic trips for each cluster. The numbered green markers show consecutive check-ins of the trip. The red markers show check-ins within the user’s detected home country.

“*Voyagers*”, the third cluster, includes extremely distant trips, covering slightly less than two countries on average. The displacement from home is, on average, as far as the distance between Cyprus and Melbourne, Australia. Also, the travellers move slightly more at their destinations with a radius of gyration of about 1500 km. The exemplary trip is that of an Australian, who travelled to Russia with stopovers in the United Arab Emirates. The trip lasted ten days, of which at least five were spent in Russia for visiting major attractions within the inner cities of Moscow and St. Petersburg. Figure 3c visualises this itinerary.

Finally, “*Globetrotters*” are also long trips to a different continent, but not as far from home as those of the previous cluster. This cluster stands out because, with a mean value of 5230 km, the radius of gyration spans a very large area. Since these trips also cover an average of 3.3 countries, they are truly global trips. Our exemplary traveller from Vancouver, Canada, went on vacation for 20 days, covering four countries. Flying in to the Near East via the United Arab Emirates, she continued her trip after three days to visit Israel and Jordan for one week before arriving to Seattle the day after. However, the trip seemingly continues four days later with several check-ins at Harvard University, Boston, USA. In this case, this trip should have been split into two distinct trips from the Foursquare data with a short break at home. Since there were only four days between these trips and no further check-ins at home, the algorithm missed this segmentation. Figure 3d shows the trip itinerary.

5 Conclusions and Future Work

This article has described a solution for finding tourist types using LBSN data. The approach extracted foreign trips from raw check-in data and characterised them via features that capture the mobility patterns of the trip. With the design of a global destination recommender system in mind, these features have been used to discard trips that are not of interest. To filter out typical business travellers, this includes those that are shorter than seven days, and trips with insufficient data quality, for example, because the check-ins are not occurring frequently enough. A cluster analysis of the remaining trips was performed to find several distinct trip types. Comparing several clustering algorithms, the best results were achieved with hierarchical clustering at a cut-off of four clusters. Evaluating the resulting clusters using the silhouette method, a reasonably good segregation of trips was found that were then interpreted using metrics and visualisations of characteristic trips.

This method can be used to characterise prospective travellers from data about their past trips. Thus, the method can be applied for preference elicitation and user modelling within the context of recommenders in tourism. Moreover, the analysis requires no user interaction, which is good for the user experience, and it is also computationally cheap. However, it requires access to the user’s check-in history. This can be achieved by an app permission by which the user grants access to their timeline on a LBSN that they have been using, e.g., through a third-party Facebook or Twitter application. Obtaining the data in such a way, a classifier trained with this paper’s approach can be used to classify the current user, thus, be a foundation for providing personalised recommendations.

In the future, the presented approach can be extended by including data stemming from a variety of sources. We think that it would be worthwhile to compare mobility patterns and the resulting traveller types from different LBSNs in combination with fine-grained GPS data. Since cluster analysis strongly depends on the input data, deriving further features could be interesting, for example, trying to infer the season of travel using the length of day feature. However, the

cluster analysis showed that this feature is not useful for discriminating trips, since it is not well correlated with other features. Extending the input data with actual climate data from the check-in locations and dates, however, could prove fruitful. To further diversify the traveller types, one could also try to infer the cost of a trip from third party sources. Finally, the effects of the presented approach should be studied in an actual recommender systems in a user study.

References

1. Airbnb. Airbnb and the rise of millennial travel. <https://www.airbnbcitizen.com/airbnb-millennials-study-travel-more-important-than-saving-for-a-home>, November 2016
2. Dietz LW (2018) Data-driven destination recommender systems. In: Proceedings of the 26th conference on user modeling, adaptation and personalization, UMAP '18, New York, NY, USA, July 2018. ACM
3. Herzog D, Wörndl, W (2014) A travel recommender system for combining multiple travel regions to a composite trip. *CBRecSys@RecSys*, vol 1245, pp 42–48, Foster City, CA, USA
4. Neidhardt J, Seyfang L, Schuster R, Werthner H (2014) A picture-based approach to recommender systems. *J Inf Technol Tour* 15(1):49–69
5. Sertkan M, Neidhardt J, Werthner H (2017) Mapping of tourism destinations to travel behavioural patterns. In: Stangl B, Pesonen J (eds) *Information and communication technologies in tourism*, CH, December 2017. Springer, Cham, pp 422–434
6. Dietz LW, Herzog D, Wörndl W (2018) Deriving tourist mobility patterns from check-in data. In: Proceedings of the WSDM 2018 workshop on learning from user interactions, Los Angeles, CA, USA, February 2018
7. Borràs J, Moreno A, Valls A (2014) Intelligent tourism recommender systems. *Expert Syst Appl* 41(16):7370–7389
8. Burke R, Ramezani M (2011) *Matching recommendation technologies and domains*. Springer, Boston, pp 367–386
9. Dietz LW, Weimert A (2018) *Recommending crowdsourced trips*. Vancouver, Canada
10. Bhatia AK (1963) *International tourism management*. Sterling Publishers
11. Cohen E (1972) Towards a sociology of international tourism. *Soc Res* 39(1):164–182
12. Pearce PL (1982) *The social psychology of tourist behavior*. International Series in Experimental Social Psychology
13. McKercher B (2002) Towards a classification of cultural tourists. *Int J Tour Res* 4(1):29–38
14. Yiannakis A, Gibson H (1992) Roles tourists play. *Ann Tour Res* 19(2):287–303
15. McCrae RR, John OP (1992) An introduction to the five-factor model and its applications. *J Pers* 60(2):175–215
16. Gibson H, Yiannakis A (2002) Tourist roles: needs and the lifecourse. *Ann Tour Res* 29(2):358–383
17. González MC, Hidalgo CA, Barabási A-L (2008) Understanding individual human mobility patterns. *Nature* 453(7196):779–782
18. Zhang Y, Wang L, Zhang YQ, Li X (2012) Towards a temporal network analysis of interactive WiFi users. *Europhysics Lett* 98(6)

19. Zheng Y, Zhang L, Xie X, Ma WY (2009) Mining interesting locations and travel sequences from GPS trajectories. In: Proceedings of the 18th international world wide web conference, WWW'09, New York, NY, USA, April 2009. ACM
20. Hess A, Hummel KA, Gansterer WN, Haring G (2015) Data-driven human mobility modeling. *ACM Comput Surv* 48(3):1–39
21. Song C, Koren T, Wang P, Barabási AL (2010) Modeling the scaling properties of human mobility. *Nat Phys* 6(10): 818–823
22. Song C, Zehui Q, Blumm N, Barabási A-L (2010) Limits of predictability in human mobility. *Science* 327(5968):1018–1021
23. Ouyang X, Zhang C, Zhou P, Jiang H (2016) Deepspace: an online deep learning framework for mobile big data to understand human mobility patterns. *CoRR*,abs/1610.07009
24. Noulas A, Scellato S, Mascolo C, Pontil M (2011) An empirical study of geographic user activity patterns in Foursquare. *Media. AAAI*
25. Cheng Z, Caverlee J, Lee K, Sui DZ (2011) Exploring millions of footprints in location sharing services. *Media. AAAI*
26. Wang D, Pedreschi D, Song C, Giannotti F, Barabási AL (2011) Human mobility, social ties, and link prediction. In: Proceedings of the 17th ACM SIGKDD international conference on knowledge discovery and data mining, KDD'11, New York, NY, USA, August 2011. ACM
27. Jie Bao Y, Zheng DW, Mokbel M (2015) Recommendations in location-based social networks. *GeoInformatica* 19(3):525–565
28. Zheng Y, Xie X (2011) Learning travel recommendations from user-generated GPS traces. *ACM Trans Intell Syst Technol* 2(1):1–29
29. Hawelka B, Sitko I, Beinat E, Sobolevsky S, Kazakopoulos P, Ratti C (2014) Geo-located twitter as proxy for global mobility patterns. *Cartogr Geogr Inf Sci* 41(3):260–271
30. Bao J, Zheng Y, Mokbel MF (2012) Location-based and preference-aware recommendation using sparse geo-social networking data. In: Proceedings of the 20th international conference on advances in geographic information systems, SIGSPATIAL'12, New York, NY, USA, November 2012. ACM, pp 199–208
31. Hsieh HP, Li CT, Lin SD (2012) Exploiting large-scale check-in data to recommend time-sensitive routes. In: Proceedings of the ACM SIGKDD international workshop on urban computing, UrbComp '12, New York, NY, USA, August 2012. ACM, pp 55–62
32. Kariryaa A, Johnson I, Schöning J, Hecht B (2018) Defining and predicting the localness of volunteered geographic information using ground truth data. In: Proceedings of the 2018 CHI conference on human factors in computing system, CHI'18, April 2018. ACM, p 265
33. Yang D, Zhang D, Bingqing Q (2016) Participatory cultural mapping based on collective behavior data in location-based social networks. *ACM Trans Intell Syst Technol* 7(3):1–23
34. Jain AK, Dubes RC (1988) Algorithms for clustering data. Prentice-Hall, Upper Saddle River
35. Rousseeuw PJ (1987) Silhouettes: a graphical aid to the interpretation and validation of cluster analysis. *Comput Appl Math* 20:53–65



Utilising Crowd Information of Tourist Spots in an Interactive Tour Recommender System

Takashi Aoike¹(✉), Bach Ho¹, Tatsunori Hara¹, Jun Ota¹,
and Yohei Kurata²

¹ Research into Artifacts, Center for Engineering (RACE),
The University of Tokyo, Tokyo, Japan
aoike@race.u-tokyo.ac.jp

² Department of Tourism Science, Graduate School of Urban Environmental
Sciences, Tokyo Metropolitan University, Tokyo, Japan
ykurata@tmu.ac.jp

Abstract. Although the congestion of tourist spots has a huge effect on tourist experiences, few studies have discussed crowd information in the research field of recommender systems for tour planning. This study developed a recommender system that utilises crowd information interactively to support tour planning. The study created a bar graph about relative crowdedness in a day based on the idea that the measures required for a crowd vary depending on each tourist. This research conducted user experiments to examine how tourists are conscious of crowds. The proposed system can provide alternative plans in 70% of cases when tourists wish to visit a spot when it is not crowded. Furthermore, the results imply the importance of focusing on differences in tourists with regard to a sightseeing spot. The sightseeing experiences of tourists may be enhanced by conducting expectation management for sightseeing using ICT.

Keywords: Recommender system · Service design
Crowding data · FIT

1 Introduction

Strides in information and communication technology (ICT) have helped to enrich tourism experiences. Tourists can prepare their tour plans in detail using ICT. However, at a practical level, tourists may still be unable to tour as planned and to have a good experience because of congestion in many popular tourist spots. For example, Kyoto in Japan is one of the world's most famous destinations for people to enjoy Japanese traditional culture, such as through visiting shrines and temples. However, Kyoto faces a serious problem on a daily basis: public transportation facilities do not function efficiently owing to the rapid increase in inbound tourists [1]. Meanwhile, congestion of tourist spots does not always have a negative influence. Moderate congestion can enhance tourism experience and satisfaction [2, 3]. Since ICT has made detailed planning possible, information on congestion in planning has increasingly affected on-site tourism experience. Crowding data are increasingly relevant to a tour recommender system.

However, in studies on tour recommender systems, little attention has been paid to offering support for tour planning with respect to congestion [4]. Tourists become aware of congestion through unverified methods. Indeed, few tourists denote their preference for each crowded situation and are conscious of congestion at the beginning of their planning. Therefore, an interactive tour recommender system that repeats the proposed tour plans and considers the needs of tourists for avoiding congestion is required.

This study aimed to develop a tour recommender system that interactively and iteratively utilises crowd information. The concept that providers and tourists co-create value together has become popular, gradually replacing the practice of one-sided provision by providers [5]. In the service design, incorporating the concept of co-creation involving tourists in the tour planning and in the actual sightseeing affects the tourism experience. This study clarifies the awareness of tourists of the congestion issue through the co-creation of tour planning, thereby contributing to the development of service design research for tour planning using ICT.

2 Literature Review

2.1 Tour Recommender System

Many studies on personalised travel plan support have been conducted [6]. Based on tourists' restrictions and the attractiveness of points of interest (POIs), these studies formulate sightseeing plans [7–9]. For example, Gavalas [8] allows a user to arbitrarily set the start/arrival point. In general, the Orienteering Problem (OP) [10] is used to derive sightseeing plans [11]. Alghamdi [12] extends the OP and takes into consideration the time spent at each location.

Tour recommender systems are classified on the basis of various views. One of these classifications is whether the process of recommendation is one-shot or interactive. In one-shot recommendation schemes [13, 14], users input their profiles (e.g. age, sex, and job) and then a system creates user models based on their profiles. Then, the system recommends tour plans to match the preferences estimated from the user models. Users can directly input their characteristics [15]. In an interactive recommendation system [16], users are able to revise their preferences during interaction with the recommender and are recommended tour plans after browsing some of the system's initial suggestions.

Another classification is from the viewpoint of function, such as recommender systems that prepare destination/tourist 'packs' and suggest attractions, trip planners, and social aspects [17–19]. Tour recommender systems have also been traditionally classified into content-based, collaborative, and demographic systems [20–22] according to the analysis of user information and filtering of list items. Collaborative systems make recommendations based on groups of users with similar preferences [23]. Demographic-based systems rely on the demographic data of the user (e.g. age, country of origin, and level of studies). In this case, generated recommendations are not based on the user's interests and preferences but on his/her personal characteristics [24].

Meanwhile, content-based systems calculate the degree of similarity between users and items to be recommended. For example, the City Trip Planner [4] recommends a plan suitable for tourists based on conditions input by users, such as travelling time, departure and arrival place, and degree of interest in the sightseeing categories. The CT-Planner (Collaborative Tour Planner; <http://ctplanner.jp/>) [25] also recommends plans based on the conditions requested by users. It is an interactive recommender system. Therefore, the planning process on the CT-Planner is completed by reflecting the repeated feedback from the user.

2.2 Crowding Research

Karanikolaou [26] conducted an analysis to understand human crowd behaviour developed in ‘human-centred participatory sensing’. Congestion in sightseeing has been studied from the viewpoint of route allocation of tourist buses, considering the influence of traffic congestion for tourist buses [27, 28]. Uchida [29] generated a set of tour schedules where the sum of all users’ utility considering congestion is the highest, using simulation-based optimisation. In a study of the role of crowdedness in urban tourism in Florence, Popp [30] indicated that tourists’ perception of crowds is strongly influenced by their tourism experience. Crowding may work positively for sightseeing experiences, unless the threshold for negative crowding is exceeded. In other words, perceived crowdedness depends not only on individual tourists but also on the purpose of a trip for the same tourist.

Therefore, a tour planning system that deals with crowd information requires the following specifications.

- Crowding should not be dealt with at a general level in the tour recommendation; it depends on the tourist and context.
- An interactive process is necessary to obtain tourists’ preferences for each crowded situation.
- The obtained preference should be interactively incorporated into the tour recommendation in a content-based manner.

3 Proposed System

3.1 Reference System

This research used CT-Planner [25] as an interactive and content-based tour recommender system. The CT-Planner estimates the value of individual POIs for each user, and then calculates the most efficient plan under given constraints that maximises the sum of the estimated values of the POIs to be visited in the tour. The calculation of the most efficient plan under the given time and start/goal constraints is formalised as a selective travelling salesman problem [31], which is an NP-hard combinatorial optimisation problem. Thus, a genetic algorithm is adopted to derive semi-optimal solutions within a short time. This system combines optimisation techniques with manual modification by users so that users can clarify their requirements and create personalised tour plans interactively.

3.2 Modelling of Tourists' Perception of Crowds

This study sought to shed light on crowd perception. Figure 1 shows a graph for a given spot, with the horizontal axis representing the time zone, and the vertical axis representing the number of people. Tourists have varying definitions for crowd volume as being ‘the border of uncomfortable by congestion (congestion line)’ and ‘the border of enjoyable than this is (bustling line)’ for each sightseeing spot. The number of people between these two standards is the appropriate crowdedness, whereas the time zone corresponding to the limited crowdedness is the desirable visiting time.

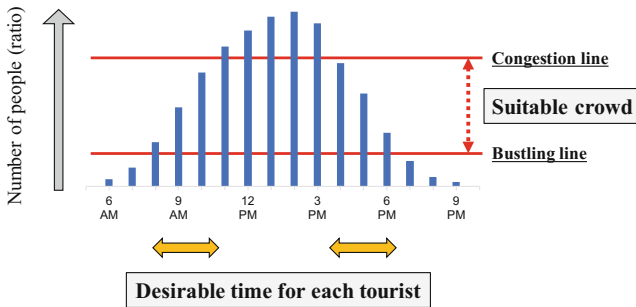


Fig. 1. Model of tourists' perception of crowd

3.3 Crowd Data

This study used Google's ‘popular times’ as a data source for crowd information. Google provides this information based on anonymous data aggregated from users who have Google location history enabled on devices such as smartphones. Since ‘popular times’ information is based on data averaged over a few weeks and is a graph relative to the peak hour for each spot [32], a comparison between different spots using absolute values is impossible. However, as the avoidance of the crowded spots themselves is not the objective of computer-aided planning, Google data are enough to obtain the relative population on one day in each spot. The degree of crowdedness is smoothed by averaging over several weeks, including data on large crowds, such as crowds during festivals and events, where the staying time is longer than usual. In addition, when tourists themselves participate in festivals and events, the staying time also changes considerably.

Queueing time is not considered in this study. Queueing time is determined not only from the number of visitors but also from supply volume, such as the number of employees. Therefore, objective data on queueing time of the day cannot be obtained for most spots.

3.4 Proposed Process to Incorporate Crowd Information into Planning

This study enhanced the CT-Planner by adding congestion information. The proposed system provides crowd information to the interactive process of the CT-Planner in an interactive and stepwise manner, and accounts for incorporating tourists' crowd perception into the planning (Fig. 2). In this process, while grasping the preference of a tourist for coping with crowdedness at a specific visiting spot, the system incorporates the feedback from the tourist and creates a new revised plan. The steps of the procedure are elaborated as follows.

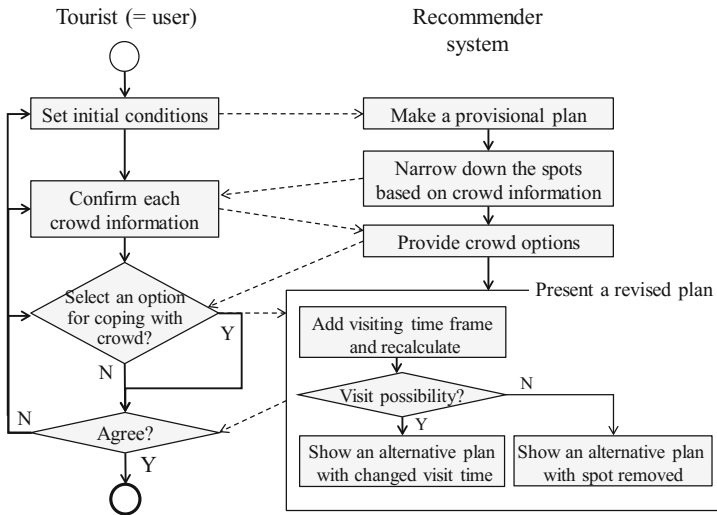


Fig. 2. Interactive process of the proposed system

- (1) Making a provisional plan based on initial travel conditions
The system first prepares a provisional plan based on the tourism preferences of users (tourists). This step is carried out in the same manner as in the conventional CT-Planner. Apart from the travel duration and required tour characteristics, the starting time and day of the plan are specified in this step.
- (2) Narrowing down spots to show crowd information to the tourist
In the recommendation mechanism of the CT-Planner, the match degree between each spot ($P = \{p_1, p_2, \dots\}$) and tourist is calculated as the expected utility of the spot. Accordingly, this step checks the crowdedness of spots to be visited at the scheduled time in the provisional itinerary, limited to the top 30% of spots ($P^c \subseteq P$) with high expected utility. This limit helps the user easily focus their attention.
- (3) Confirming crowd information and providing crowd option
The user may check the crowd information of the limited spots ($p_i^c \subseteq P^c$); the system presents daily crowd graphs. Multiple options to cope with the crowdedness of p_i^c are listed for the tourist to choose from, as follows. These options

draw out the perception of the tourist to the crowd of p_i^c . The determination of whether the spot p_i^c is crowded is explained in detail in Sect. 3.5.

- (A) Want to visit if not crowded
 - (B) Want to visit regardless of crowd
- (4) Selection for coping with the crowdedness and re-computation of the revised plan
When (A) is selected by the user, optimisation calculation is performed by the system after adding a constraint of possible visiting time frame to p_i^c for avoiding congestion. If a semi-optimal visit plan during the limited time period can be devised, the plan will be presented to the user as an alternative plan. Otherwise, another plan that excludes visiting the spot will be presented to the user. In both cases, the system will inform the user on how the itinerary has changed.

3.5 Setting the Visiting Time Frame

This section describes the programming for incorporating crowd information into the proposed process. To set a provisional congestion line, as shown in Fig. 1, the system focused on the evaluation score of ‘quiet/lively’ of each spot on the CT-Planner. This parameter indicates whether the spot has a lively charm or is tranquil, which is ranked by experts in five grades from -2 to 2 . A score of -2 indicates that ‘it attracts tourists by having a calm atmosphere’, whereas a score of 2 indicates that ‘it attracts tourists by being bustling’. Crowdedness becomes problematic in spots where quietness is deemed attractive, but not in spots with a lively charm.

This study attempted to determine a congestion line. Spots with an evaluation score of -2 to 0 (i.e. quietness as attractiveness) was set to 60% of the peak for a congestion line. A spot with an evaluation score of $1-2$ was set to a peak line of 70%. These values were set to ensure an appropriate visiting time frame. If the congestion line is lowered too much, for example to 50%, the visiting time frame will be of 1–2 h and the ratio of an alternative plan with the changed visit time will be very low in the planning. On the other hand, if the congestion line is set high, most spots will not be considered congested and the crowd information will not be presented. During actual planning by tourists, the congestion line is not directly shown to the tourists in order not to attract their consciousness too much. As described in Sect. 3.2, the line is only used to narrow down the possible spots for the awareness of tourists. The visiting time frame to avoid congestion is utilised in the proposed calculation.

The method of recalculation adds a visiting time frame. The CT-Planner algorithm calculates plans so that all the staying time falls within the business hours. We create virtual business hours to be used in the planner. When ‘(A) want to visit if not crowded’ is selected, the system changes the business hours of the target spot, according to the end of the visiting time frame and the staying time there. The recalculation is as follows.

- (A) The end of the visiting time frame is the same as the closing time of the spot.
Let the visiting time frame be virtual business hours of the spot.
- (B) The end of the visiting time frame is different from the closing time of the spot.

Let ‘the end of the visiting time frame + expected time of stay/2’ be virtual business hours of the spot. If there are multiple visiting time frames (as in the two-peak

crowd graph), A and B are combined. If congestion avoidance is done in 50% or more of the staying time, the utility would be satisfied. Taking the case of Table 1, the plan will be derived only when visiting by 11 am in the 10:00–12:00 visiting time frame. Thus, the visiting time frame would be substantially narrowed.

Table 1. Case of changing business hours (crowded between 10 am and 12 am)

Case	Staying time	Regular business hours	Visiting time frame for adequate crowdedness	Virtual business hours in computation
1	60 min.	10:00 to 18:00	15:00 to 18:00	15:00 to 18:00
2			11:00 to 13:00	11:00 to 13:30
3			10:00 to 12:00 or 17:00 to 18:00	10:00 to 12:30 or 17:00 to 18:00

4 Implementation

The study implemented the proposed method on CT-Planner. As shown in Fig. 3, a humanoid icon is displayed above the sightseeing spot name. When this icon is clicked, a window as shown in Fig. 4(a) is displayed, and the crowd graph and choices are displayed. When options are selected, a visiting time frame is added and the plan is recalculated; then the window displays whether the visit is possible or not and the difference in the new plan, as shown in Fig. 4(b), (c).

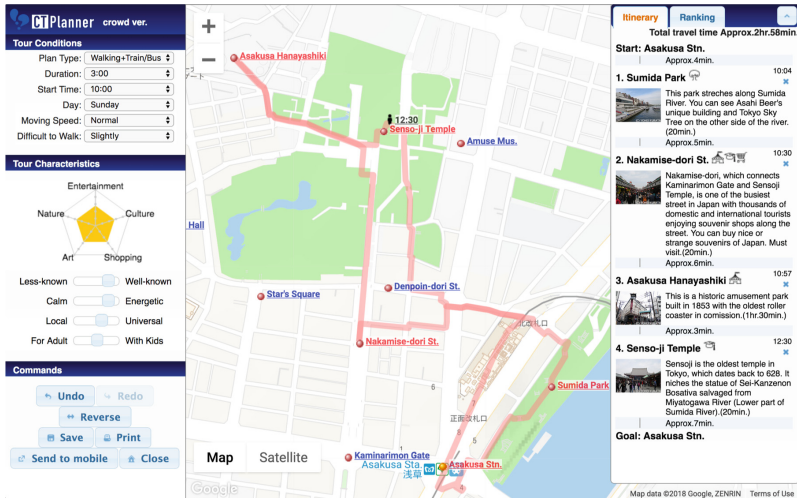


Fig. 3. Notification of crowd information in the current plan

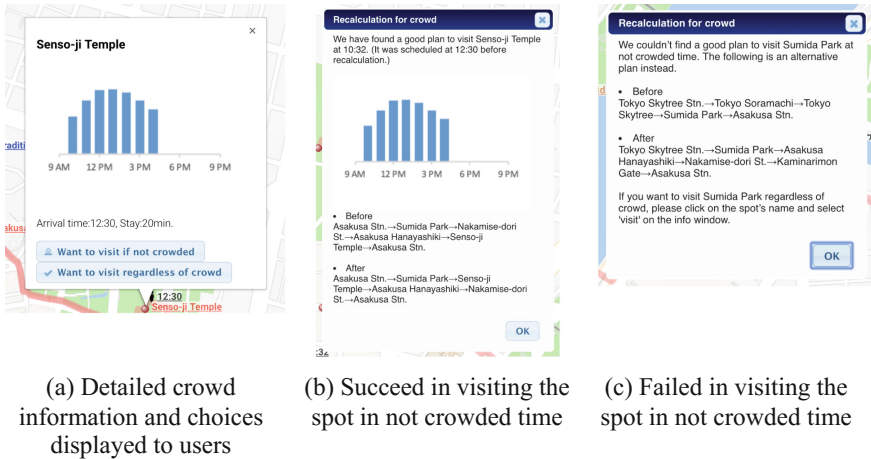


Fig. 4. Example results of recalculation to avoid crowds at a spot

5 Verification

To verify the effectiveness of the proposed method and the influence of the presentation of crowd information on users, the study examined data preparation and conducted a user experiment.

5.1 Availability of Crowd Data

This study investigated how much and what kind of crowd data can be collected via Google’s ‘popular times’ described in Sect. 3.3. Analysis of crowd data for 32 destinations and 1,007 spots registered in CT-Planner showed that 48% of spots had crowd data for 31 destinations (excluding one region of the isolated island).

In addition, the shape of the obtained crowd graphs could be classified into ‘one-peak’ and ‘two-peaks’ types. The average ratio of the two-peaks type graphs in each destination was $27 \pm 16\%$. Therefore, more one-peak type graphs were obtained compared with the two-peak type. The average and standard deviation of peak time in one-peak type graphs were analysed in each destination. The earliest average peak time was 13:00 and the latest was 15:20. Thus, according to users’ selection, the developed system may work well to help them avoid congestion and create alternative plans by controlling for visiting time.

5.2 User Experiment

This study conducted a comparative experiment between the original CT-Planner explained in Sect. 3.1 [18] and the proposed CT-Planner. The participants were eight tourists aged from 20 to 50 years. The target destinations were Osaka and Asakusa for the following reasons: they are popular cities that attract many tourists; and tourists can go around on a one-day tour because the tourist spots are closely located. The participants

were divided into four groups to counterbalance the usage order of destination and system. In the experiment, each participant was asked to plan a six-hour tour for each destination. That is, four times of planning were carried out in total per participant.

The experiment was conducted to verify the user's perception of the crowd information as aided by the interactive planning support. The participants were told that Osaka and Asakusa are very likely to be crowded on Sunday. Operation data by each participant user on the tool were recorded for investigating the relationship between the user's selection, motivation for selection, and satisfaction of planning through a questionnaire survey and a retrospective interview. In the questionnaire, we asked users which system they wanted to use in the future. We conducted a retrospective interview on their planning process comprising the following three questions:

- The reason to change the intention to visit by presenting crowd information
- Thinking about choosing options
- Impression on a crowd graph

5.3 Experiment Results

User's Choices on Crowded Situations

Among spots of which the user confirmed the crowd information, the proportion of choosing among options for dealing with crowd requests was 90%. Among them, 58% chose 'want to visit if not crowded' and 42% chose 'want to visit regardless of crowd'. Therefore, as this study supposed, users do not always want to avoid crowds. According to the interview results, four participants tended to accept the congestion at popular spots.

Retrospective Interview

We listed representative answers to three questions. Regarding the change of intention to visit by presenting crowd information, a user answered: *'I came to want to go there if not crowded'*.

When users who used the choices A and B in a certain spot were asked about the impact on their thinking process, a user answered: *'My congestion acceptance was broadened when I was aware of crowdedness in advance'*. In addition, four users answered similar contents: *'I do not care much even if a famous spot is crowded'*.

As for the fact that the crowd graph was presented, a user answered: *'Unlike subjective information such as word of mouth, objective data like this are useful'*.

Generated Alternative Plans and Completed Plans

Next, the study examined how the crowd information affected the subsequent planning by users based on operation data. The spots where the user confirmed the crowd information remained in 70% of final plans. These tourist spots are thought as being of high interest for tourists, and the proposed CT-Planner could deal with crowd information effectively. The proposed CT-Planner provided alternative plans according to users' visit time for 70% of the cases. The number of spots in the completed plans was 6.6 ± 1.2 , whereas the number of spots for which users checked crowd information was 2.4 ± 1.1 .

Satisfaction of Users

Six of the eight participants answered in the questionnaire that they would like to use the proposed CT-Planner in the future. User satisfaction tended to be higher for the proposed CT-Planner incorporating crowd information. Seven of the eight participants indicated that crowd information makes their planning effective.

6 Discussion

6.1 Availability of Crowd Data

The crowd graph can be obtained for 48% of tourist spots; this proportion accounts for sightseeing spots where congestion can be a problem. Sightseeing spots which crowd graph could not be obtained can be classified as less intensive spots. Both classifications are not invalid; they can be used for planning that considers tourist crowds. In addition, the shape of the crowd graph can be classified into having either one or two peaks. In the case of two peaks, the visit time frame can be set as in the one peak cases. Measures include suggesting the time between peaks as a vacant time. The peak of each spot and the time period with the highest tendency of being crowded can be ascertained from the average visiting time and standard deviation, leading to users' grasp of the degree of concentration of tourists. The peak for spots with a small standard deviation indicates a higher concentration of people. These findings are useful for considering the variance in the number of visitors. In the absence of big data on tourists, it is possible to gather data with the cooperation of local residents. Crowd graph can be created based on experiences; fluctuations in the number of visitors of each spot can be included, because 'crowd' is a relative number.

6.2 User Experiment

From the participants' user selection and interview results, we found that 90% of users' selections reveal the option to deal with crowds at spots for which they have confirmed crowd information. That is, tourists do not always want to avoid congestion even when they click humanoid icons and confirm the crowd information. From the interview results, half of the users allowed for congestion in their planning for visiting popular spots. Therefore, it is important to consider the perception of crowd for each tourist rather than strict congestion avoidance. According to Bosque [33], positive emotions are likely to occur when tourists' expectations are high; the higher the frequency of positive emotions during the travel experience, the higher the satisfaction level. Therefore, from the viewpoint of expectation management, it is possible to increase the satisfaction of tourists during sightseeing by indicating crowd information interactively and helping them prepare for possible congestions. From the interview results, in terms of crowd information, objective data may be more reliable than subjective data such as word of mouth. Moreover, crowd information other than visit time is also important.

User has not confirmed the crowd information at random from the results of the relationship between the number of spots that clicked icon and the number of spots included in the completed plan. Therefore, the number of spots with indicated crowd

information must be narrowed down. Moreover, since the proposed CT-Planner provided alternative plans for 70% of the cases when tourists wanted to visit a spot if it was not crowded, the tentatively set congestion line was appropriate to ensure a visiting time frame. In future work, more appropriate congestion lines could be set through social implementation. We will also conduct experiments when the congestion line is visualised and the user can freely adjust it. Moreover, analysing the accumulated data through social implementation [34] will lead to the understanding of the relevance of tourists' selection to crowd information and spot characteristics.

7 Conclusion

Although congestion affects tourist experiences, it has not been sufficiently discussed in the research field of recommender systems. This study developed a recommender system that indicates crowd information interactively to support sightseeing planning, based on the idea that the measures required for crowds vary depending on each tourist. To create a crowd graph from big data and reflect it in planning, the appropriate crowd level was defined per spot. Verification of the proposed system showed it can provide alternative plans in 70% of the cases when tourists want to visit a spot if it is not crowded. Furthermore, the results of the user experiment suggested the importance of focusing on the differences of each tourist in sightseeing spots rather than implementing uniform measures, such as based on the name recognition of sightseeing spots. In other words, it is important to enhance the sightseeing experiences of tourists by conducting expectation management for sightseeing using ICT.

Acknowledgements. The authors are grateful to Fujitsu Laboratories Ltd. for assistance with the experiment.

References

1. Kasahara, S., Iiyama, M., Minoh, M.: Regional data distribution using tourism service portfolio. In *Information and Communication Engineers*, Technical Report of IEICE, pp. 1–6 (2017)
2. Mowen A, Vogelsong H, Grafe A (2003) Perceived crowding and its relationship to crowd management practices at park and recreation events. *Event Manag* 8(2):63–72
3. Wickham T, Kerstetter D (2000) The relationship between place attachment and crowding in an event setting. *Event Manag* 6(3):167–174
4. Vansteenwegen P, Souffriau W, Vanden Berghe G, Van Oudheusden D (2011) The city trip planner: an expert system for tourists. *Expert Syst Appl* 38(6):6540–6546
5. Navío-Marco J, Ruiz-Gómez LR, Sevilla-Sevilla C (2018) Progress in information technology and tourism management: 30 years on and 20 years after the internet—revisiting Buhalis & Law's landmark study about eTourism progress. *Tour Manag* 69:460–470
6. Gavalas D, Konstantopoulos C, Mastakas K, Pantziou G (2014) A survey on algorithmic approaches for solving tourist trip design problems. *J Heuristics* 20(3):291–328
7. Lim, K.H.: Personalized tour recommendation using location-based social media. Ph.D. Thesis (2017)

8. Gavalas D, Kasapakis V, Konstantopoulos C, Pantziou G, Vathis N, Zaroliagis C (2015) The eCOMPASS multimodal tourist tour planner. *Expert Syst Appl* 42(21):7303–7316
9. Gavalas D, Kasapakis V, Konstantopoulos C, Pantziou G, Vathis N (2017) Scenic route planning for tourists. *Pers Ubiquitous Comput* 21(1):137–155
10. Golden BL, Levy L, Vohra R (1987) The orienteering problem. *Nav Res Logist* 34(3):307–318
11. Gunawan A, Lau HC, Vansteenwegen P (2016) Orienteering problem: a survey of recent variants, solution approaches and applications. *Eur J Oper Res* 255(2):315–332
12. Alghamdi, H., Zhu, S., El Saddik, A.: E-tourism: mobile dynamic trip planner. In: 2016 IEEE International Symposium on Multimedia (ISM), pp. 185–188. IEEE (2016)
13. Ricci, F., Arslan, B., Mirzadeh, N., Venturini, A.: ITR: a case-based travel advisory system. *Lecture Notes in Computer Science*, vol. 2416, pp. 613–627 (2002)
14. Lee, J., Kang, E., Park, G.: Design and implementation of a tour planning system for telematics users. In: ICCSA 2007, pp. 179–189. Springer, Heidelberg (2007)
15. Maruyama A, Shibata N, Murata Y, Yasumoto K, Ito M (2004) A personal tourism navigation system to support traveling multiple destinations with time restrictions. *Adv Inf Netw Appl* 2004(2):18–21
16. Roy, S., Das, G., Amer-Yahia, S., Yu, C.: Interactive itinerary planning. In: IEEE 27th international conference, pp. 15–26 (2011)
17. Borrás J, Moreno A, Valls A (2014) Intelligent tourism recommender systems: a survey. *Expert Syst Appl* 41(16):7370–7389
18. Pessemier, T., Dhondt, J., Vanhecke, K., Martens, L.: TravelWithFriends: a hybrid group recommender system for travel destinations. In: Proceedings of workshop on tourism recommender systems, RecSys15, pp. 51–60 (2015)
19. Yang WS, Hwang SY (2013) iTravel: a recommender system in mobile peer-to-peer environment. *J Syst Softw* 86(1):12–20
20. Burke R (2002) Hybrid recommender systems: survey and experiments. *User Model User-Adapt Interact* 12(4):331–370
21. Manouselis N, Costopoulou C (2007) Analysis and classification of multicriteria recommender systems. *World Wide Web* 10(4):415–441
22. Montaner M, López B, de la Rosa JL (2003) A taxonomy of recommender agents on the internet. *Artif Intell* 19(3):285–330
23. Sebastia, L., Yuste, D., Garcia, I., Garrido, A., Onaindia, E.: A highly interactive recommender system for multi-day trips. In: Proceedings of workshop on tourism recommender systems, RecSys15, pp. 1–10 (2015)
24. Wang W, Zeng G, Tang D (2011) Bayesian intelligent semantic mashup for tourism. *Concurr Comput Pract Exp* 23:850–862
25. Kurata, Y., Hara, T.: CT-planner4: toward a more user-friendly interactive day-tour planner. In: Information and Communication Technologies in Tourism 2014, pp. 73–86. Springer International Publishing (2013)
26. Karanikolaou, S., Boutsis, I., Kalogeraki, V.: Understanding event attendance through analysis of human crowd behavior in social networks. In: Proceedings of the 8th ACM International Conference on Distributed Event-Based Systems, pp. 322–325. ACM (2014)
27. Zhang, L., Wang, Y.P., Sun, J., Yu, B.: The sightseeing bus schedule optimization under park and ride systems in tourist attractions. *Ann Oper Res* 1–19 (2016). <https://doi.org/10.1007/s10479-016-2364-4>
28. Hasuike T, Katagiri H, Tsubaki H, Tsuda H (2013) Tour planning for sightseeing with time-dependent satisfactions of activities and traveling times. *Am J Oper Res* 3(3):369–379

29. Kuriyama H, Murata Y, Shibata N, Yasumoto K (2010) Simultaneous multi-user scheduled cyclic scheduling method considering congestion situation in cities and tourist spots. *Inf Process Soc Jpn Trans Inf Process Soc Jpn* 51(3):885–898
30. Popp M (2012) Positive and negative urban tourist crowding: Florence, Italy. *Tour Geogr* 14 (1):50–72
31. Laporte G, Martello S (1990) The selective travelling salesman problem. *Discrete Appl Math* 26(2):193–207
32. Google My Business Help. Popular times, wait times, and visit duration. <https://support.google.com/business/answer/6263531?hl=en>. Accessed 10 Sep 2018
33. Bosque IR, Martin HS (2008) Tourist satisfaction:a cognitive-affective model. *Ann Tourism Res* 35:551–573
34. Kurata, Y., Shinagawa, Y., Hara, T.: CT-Planner5: a computer-aided tour planning service which profits both tourists and destinations. In: *Proceedings of the workshop on tourism recommender systems in 9th ACM conference on recommender systems (RecSys 2015)*, 35–42 (2015)



Decision Making Based on Bimodal Rating Summary Statistics - An Eye-Tracking Study of Hotels

Ludovik Coba¹(✉), Markus Zanker¹, and Laurens Rook²

¹ Free University of Bozen - Bolzano, Piazza Domenicani, 3, Bolzano, Italy
{lucoba,mzanker}@unibz.com

² TU Delft, Jaffalaan 5, Delft, The Netherlands
L.Rook@tudelft.nl

Abstract. Rating-based summary statistics have become ubiquitous, and of key relevance to compare offers on booking platforms. Largely left unexplored, however, is the issue to what extent the descriptives of rating distributions influence the decision making of online consumers. In this work a conjoint experiment was eye-tracked to explore how different attributes of these rating summarisations, such as the mean rating value, the bimodality of the ratings distribution as well as the overall number of ratings impact users' decision making. Furthermore, participants' maximising behavioural tendencies were analysed. Depending on their scores on *Decision Difficulty*, participants were guided by different patterns in their assessment of the characteristics of rating summarisations, and in the intensity of their exploration of different choice options.

Keywords: e-Tourism · Rating summaries · Conjoint analysis
Explanations · Recommender systems

1 Introduction

This research targets the first layer of the framework classifying current research challenges at the intersection of IT and tourism [1], namely the interaction of individuals with web platforms such as online travel agencies (OTAs). Travel planning via OTAs represents a big, but saturated, market [2]. Thus, research on evaluating and comparing the information offers on tourism platforms has a long tradition, and surveys like [3] demonstrate the maturity of this sub-field of e-Tourism research. With the transformation of the traditional web into a participatory and social one, electronic Word-of-Mouth (eWOM) has quickly been recognised as strong influencer of online decision making [4], and as an important determinant of business performance [5]. Consequently, the analysis of the contents of online review platforms [6] and research analysing how different aspects

of online reviews influence decisions like [7] are widespread. The present work, however, focuses on a very particular and, so far, largely unexplored aspect, namely how the statistical characteristics of rating summarisations influence users' decision making. The study participants had to rank different tourism offers (i.e., hotels) that, in their perception, only differed in their rating summarisations – that is, in the total number of ratings, the mean rating value, and the bimodality of the rating distribution on a discrete scale. The actual content of reviews or descriptions of the accommodation services et cetera were not shown. A rank-based conjoint experiment was conducted, supplemented with eye-tracking in order to measure the focus of participants' attention, and to understand how they value the displayed differences in their decision making process.

In addition, since decision making strategies vary from person to person [8], it was hypothesised that users high on dispositional maximisation would behave differently from those low on dispositional maximising (so-called satisficers) in such an experiment. This study shows that these two groups trade-off the characteristics of the aggregated rating distributions in different ways and behave – under the lens of the eye-tracker – according to the initial hypothesis grounded in decision making theory.

After shortly referring to related work on decision making strategies and conjoint studies in the context of recommendations in Sect. 2, a detailed description of the conjoint and eye-tracking methodologies is provided in Sect. 3. Section 4 presents obtained results, and Sect. 5, discusses and outlines the implications of this work.

2 Related Work

Constructing consumers' decision making process has been a focal point for many years [9, 10]. The literature on recommender systems acknowledges that the decision making strategies differ from person to person. For example, people employing a non-compensatory strategy, like the *Satisficing* principle, would differ in the extent to which they search for “the best possible item”, and/or settle for “a good enough alternative given the circumstances” [8, 11–13].

The Satisficing principle stems from the seminal work by Herbert Simon [11], which describes the satisficing nature of human decision making. Simon argued that, in a “rational” model, a person would explore a set of multi-attribute items until she finds an item that exceeds some minimum acceptance level. This strategy falls into the category of non-compensatory approaches. In contrast, in a compensatory approach, a consumer would make a trade-off between high values on one characteristic and low values on another when determining the overall utility [9].

Barry Schwartz and colleagues [12] developed a self-reporting scale to assess personal differences in people's maximising behaviour. People scoring high on the maximisation scale manifest a tendency towards determining the best choices for themselves, while people scoring low on this scale, so-called satisficers, settle

sooner for a “good enough” alternative, and, opposed to maximisers, are less likely to experience regret and low choice satisfaction after making a decision.

In the field of recommender systems, relatively few studies consider the maximising decision making process. Bart Knijnenburg and his colleagues [8], in a between-subjects experiment, controlled the interfaces to provoke different decision making strategies. However, contrary to Schwartz’s theory, they observed that maximisers were more rather than less satisfied with their choices. Jugovac et al. [13] even reported null effects in the presence of recommendations.

Conjoint analysis is a widely appreciated methodological tool from marketing and consumer research, which is particularly applicable to the study of user preferences and trade-offs in the decision making process [14]. In the field of recommender systems and online decision support, Zanker and Schoberegger [15] employed a ranking-based conjoint experiment to understand the persuasive power of different explanation styles over users’ preferences that also included a product category from the field of tourism and hospitality.

In his inspiring work, John Payne investigated conjunctive models by explicitly collecting respondents’ verbal commands [9]. Latent preferences of the user can be captured with conjoint experiments [14]. Glaholt et al. [16] and Orquin and Loose [17] suggested that eye movement and gazes reflect the screening and evaluation of choices.

By complementing conjoint analysis with eye-tracking, the authors shed more light on how information is actually processed, and observe how the study participants build their decisions.

3 Methodology

The authors conducted a within-subjects study to better understand the differences in the decision making strategies between maximisers and satisficers. The analysis was based on the Rank-Based Conjoint (RBC) methodology, supported by an eye-tracking device. In conjoint designs, items (a.k.a., *profiles*, see example in Fig. 1) are modelled by sets of categorical or quantitative *attributes*, which have different *levels*, cf. [18]. The RBC experiment is designed such that participants rank items from the most to the least preferred one. This design feature nicely matches real-world settings, where users are confronted with lists of tourism services [19].

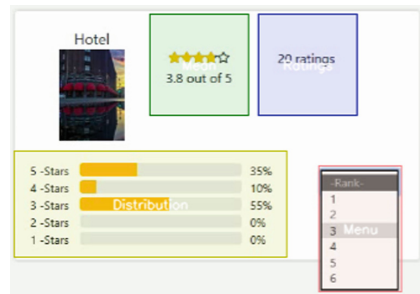


Fig. 1. Profile snapshot.

3.1 Attribute Selection and Study Design

Earlier study results [20,21] showed that the mean rating value is actually the most important predictor, and that the number of ratings has only a mediocre influence on the user’s choices. However, the latter is only true if the number of ratings is perceived as relatively high (i.e. in the three digits and above), while, when the number of ratings are in the double digits, users tend to put more weight on this aspect when making choices. Thus, users are willing to trade in a slightly lower mean rating value for a higher number of overall ratings, which obviously makes the mean rating value appear more reliable. Only minor or no effects were observed, when the research was extended to additional characteristics of rating distributions, such as the variance or skewness [22]. However, Hu et al. [23] observed that rating distributions actually exhibit an asymmetric bimodal (J-shaped) distribution. This J-shaped distribution can be explained by the *purchasing bias* (i.e., one tends to buy what one likes) and an *under-reporting bias* (i.e., polarised opinions are more likely to be reported). Thus, the mean rating value has been considered as a biased measure for product quality [24]. Therefore, it was hypothesised that even though an item might have a high overall score, an additional “minor” peak on low rating values would actually discourage users to choose such an item. The range of these “peaks” was measured using the bimodality coefficient, as recommended by [25]. The bimodality coefficient is computed as:

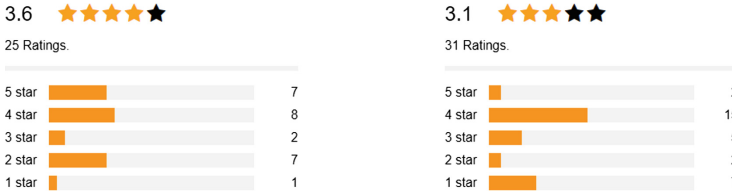


Fig. 2. Items drawn from the TripAdvisor dataset (bimodality coefficients > 0.7).

$$BC = \frac{m_3^2 + 1}{m_4 + 3 \frac{(n-1)^2}{(n-2)(n-3)}} \quad (1)$$

where m_3 is skewness, m_4 kurtosis and n the sample size of the distribution. The bimodality coefficient varies from 0 to 1, in which a low value indicates an unimodal bell-shaped distribution. The value of 0.55 is considered a threshold, where a bimodal distribution is recognised as such. Values above this threshold clearly exhibit a bimodal distribution (see examples in Fig. 2).

Rating summarisations are typically depicted as frequency distributions on the class of discrete ratings values (such as one to five stars). This study focused on three distinct attributes: *number of ratings*, *mean rating*, and *bimodality*.

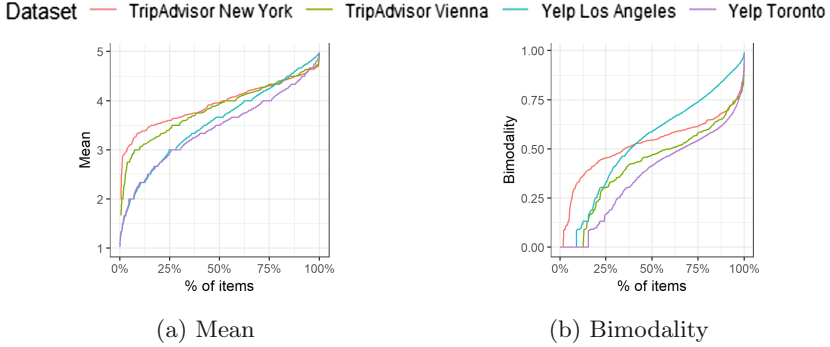


Fig. 3. Statistical descriptives of datasets.

These three attributes were used to develop the stimuli (i.e., the profiles/items) of rating summaries, and kept variance and skewness constant.

In order to validate the plausibility of the selected levels for the three attributes, they were aligned with real data from the tourism and hospitality domain crawled from TripAdvisor [26, 27] and a public dataset from Yelp¹.

Comparison of the mean rating values (Fig. 3a) among the four datasets, as expected, revealed that ratings tend to be skewed towards higher rating values. Likewise, as hypothesised, the bimodality coefficient (Fig. 3b) is nicely spread within all datasets – i.e., the J-shaped rating distributions occur in tourism data.

The number of ratings was set at 20 and 80, since it was observed in an earlier study that participants clearly notice the difference between these levels [20]. Mean rating values from 3.6 to 4.0 are representative for many rated items on Tripadvisor (see Fig. 3a). The bimodality coefficient was varied from 0.3, which means there is no noticeable second peak present, to 0.7 which clearly indicates the unanimity of reviewers. Table 1 summarises the selected levels for the three attributes of rating summarisations in the study. Based

on the identified attribute levels, a *full-factorial design* [14] was built that included all possible combinations of attributes and levels – that is, a design, which consisted of 3 attributes (2 levels \times 3 levels \times 3 levels), and resulted in 18 different profiles that were put to test. Importantly, all items represented statistically feasible level combinations. The profiles were blocked into three subsets in order to lower the cognitive load for respondents to feasible levels. In other words, they had to rank 3×6 alternatives.

Table 1. Attributes and levels.

Attribute	Level	Value
A1: Number of ratings	L1	20
	L2	80
A2: Mean rating	L1	3.6
	L2	3.8
	L3	4
A3: Bimodality	L1	0.3
	L2	0.5
	L3	0.7

¹ <https://www.yelp.com/dataset/challenge>.

3.2 Metrics and Analysis

Conjoint analysis. One basic assumption is the *additive utility model*. It assumes that the different attributes and characteristics of an item/profile contribute, independently of each other, to the overall utility. Individual utilities were estimated for each item characteristic [14], i.e., the respondent’s preferences could be modelled via a utility function $u(\mathbf{x}_i)$, Formula 2, representing the overall utility, which a respondent assigns to an item.

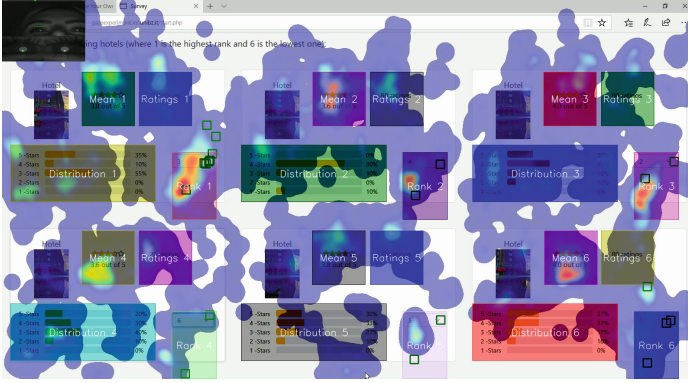


Fig. 4. Screenshot of one task that also highlights the Areas of Interest.

$$u(\mathbf{x}_i) = \mathbf{x}_i\boldsymbol{\beta} + \epsilon \quad (2)$$

where \mathbf{x}_i is a vector characterising a profile i , $\boldsymbol{\beta}$ constitutes the vector with the preference values for each attribute level, and ϵ is the residual error. The utility $u(\mathbf{x}_i)$ of an item \mathbf{x}_i is the sum of the partial utilities for each attribute.

Eye-tracking: Areas of Interests. Areas of Interest (AOIs) [28] are regions defined in the stimulus in order to extract data specifically for those areas. Three AOIs were observed per item (see Fig. 1) specifying the three attributes. The dwell or *gaze* refers to a focal visit of an AOI, from entry to exit, while a gaze cluster constitutes a *fixation*. It would be considered a hit on an AOI, if the participant locked his gaze into a specific area, spending the minimum time that it takes to cognitively process the information therein [28]. A transition is the movement of the gaze from one AOI to another, while a *revisit* is the transition back to an AOI already visited. Fixation time was observed, since maximisers supposedly spend more time assessing their choices than satisficers [12]. As is explained in Sect. 4, sample sizes were small (below 25 per group of maximisers and satisficers). In order to present the best estimate of the average task time, therefore, the geometrical mean and the log-transformation of the confidence interval was used [29]. In addition, revisits indicate how decision makers examine alternatives, the amount of information searched, and the comparisons performed in order to complete the task [9].

Decision Difficulty. Several scales exist to assess individual differences in maximising versus satisficing behavioural tendencies, ranging from the 13-item Maximisation Scale [30] to several shorter forms. In the present study, the shortened 6-item scale proposed by [31] was used. It comprises the following items: “When I am in the car listening to the radio, I often check other stations to see if something better is playing, even if I am relatively satisfied with what I’m listening to”, “No matter how satisfied I am with my job, it’s only right for me to be on the lookout for better opportunities”, “I often find it difficult to shop for a gift for a friend”, “Booking a hotel is really difficult. I’m always struggling to pick the best one”², “No matter what I do, I have the highest standards for myself”, and “I never settle for second best”. Each item was measured on a 7-point scale ranging from 1 (*completely disagree*) to 7 (*completely agree*). The sum of these six items yielded an overall maximisation score [30,31]. The overall scale as well as each of the three sub-scales individually are reliable with Cronbach’s α within the ranges outlined by [31]. Schwartz et al. [30] proposed to use the appropriate sub-scales, depending on the purpose of the analysis. Here the participants had no possibility to include other solutions or tourism offers that they could search for, but were instructed to rank exactly six items that only differed based on their rating summaries. The analysis was thus focused on the decision difficulty sub-scale that distinguishes maximisers, who frequently experience difficulties when making decisions, due to their attitude to always go for the best choices. Satisficers, in contrast, seem to settle quicker for a solution. It was therefore hypothesised that participants experiencing more decision difficulty would need longer, as they would compare the differences between the different offers more intensely.

3.3 Study Procedure

Participants volunteered to take part in a controlled lab experiment on a preconfigured terminal. The stimuli were presented on a 22” display, and the gazes were recorded with a static remote eye-tracking system utilising a 150Hz research-grade machine-vision camera. Participants (having given informed consent to have their data used for research purposes) were asked to fill in the shortened Maximisation Scale described above. Next, the experiment was started from a remote console, where participants were asked to consider the following tourism-inspired decision making and ranking task:

You need to rank hotels on a booking platform for your holiday stay. All hotels are equally preferable for you with respect to cost, location, facilities, services, etc. Other users’ ratings of this hotel are aggregated and summarised by their number of ratings, the mean of their ratings and their distribution over the different rating values. Given the above, which of the hotels below would you prefer, when you were to solely consider the ratings for the displayed accommodations?

² Note, that the original, outdated, phrase *Renting a video[.]* in the scale of [31] in the present research was replaced with *Booking a hotel[.]*.

Following this introduction, the participant went through 3 consecutive ranking tasks. In each task the respondents had to rank 6 items out of 18 from the full factorial combinations of the attribute levels. Each task was created such that attributes levels were equally distributed and balanced between tasks to allow proper measurement of main effects. A screenshot of a task is presented in Fig. 4³. Presented profiles were item-agnostic, thus users could base their choice solely on the three study variables (i.e., number of ratings, mean, and bimodality). The order of the six displayed items (i.e., the profiles) on a single screen was randomised for each respondent. Additional feedback (on which characteristics of rating summaries guided decisions most) and demographic information were included in a post-questionnaire.

4 Results

In June 2018, 42 participants took part in the eye-tracking experiment. Table 2 presents the demographics of the participants in the sample. Based on the participants' scores on the *Decision Difficulty* sub-scale, a median split of the sample was performed to contrast the decisions of the two groups. Table 3 shows that participants experiencing more decision difficulty (i.e. above median) had a tendency to strongly rely on the higher mean ($\beta = 1.35, p < .001$); they would less likely select an alternative with a higher number of ratings ($\beta = 0.76, p < .001$) rather than a slightly lower mean. In contrast, respondents that scored low on *Decision Difficulty* seemed almost equally likely to choose the high mean or the high number of ratings alternative – that is, they could more confidently trade-in different attribute levels of these two characteristics of rating summary statistics against each other in their decision making strategies. However, in contrast to the initial hypothesis, the bimodality of distributions did not noticeably influence the decisions for both groups – i.e., having the choice between a mean rating

Table 2. Participants' demographic details.

Personal feature	Category				Total
Gender	Male	Female	No answer		
#	24	18	0		42
%	57.1%	42.9%	0%		100%
Age	18–4	25–30	31–40	40+	
#	30	7	4	1	42
%	71.4%	16.7%	9.5%	2.4%	100%
Country	Italy	Albania	Germany	Other	
#	16	8	8	10	42
%	38.1%	21.4%	19.0%	23.8%	100%

³ The implementation of the platform is downloadable at: <https://github.com/ludovikoba/rankBasedConjoint.git>.

value of 4.0 or 3.8, where the rating distribution with a mean of 4.0 would also show a stronger J-shape, participants would still confidently go for the higher mean, although there were more low rating values present. Furthermore, results presented in Table 3 are perfectly in line with the observation made in a previous study with a sample of 200 respondents [22]. Figure 5 shows the geometrical mean of the fixation times on the items ordered by the ranking positions they received from the respective participant, and grouped according to the median split on *Decision Difficulty*. Note that the time was computed only for the first ranking task in order to account for the learning effect.

Table 3. Parameter estimates for all respondents, and grouped by the median split on the decision difficulty sub-scale.

Attribute	Level	Estimate (β)			
		Below median		Above median	
# ratings	80	0.90 (0.09)	***	0.76 (0.11)	***
	20	–		–	
Mean	4	1.11 (0.12)	***	1.35 (0.14)	***
	3.8	–0.04 (0.09)		0.05 (0.14)	
	3.6	–		–	
Bim.	0.7	–0.08 (0.12)		0.26 (0.14)	
	0.5	–0.02 (0.12)		0.07 (0.14)	
	0.3	–		–	

Note *** $p < 0.001$; ** $p < 0.01$; * $p < 0.05$. Dashes (–) are the baseline levels. The estimated coefficients are the change in odds of choosing a particular mode rather than the baseline category. The values in parentheses are estimated standard errors.

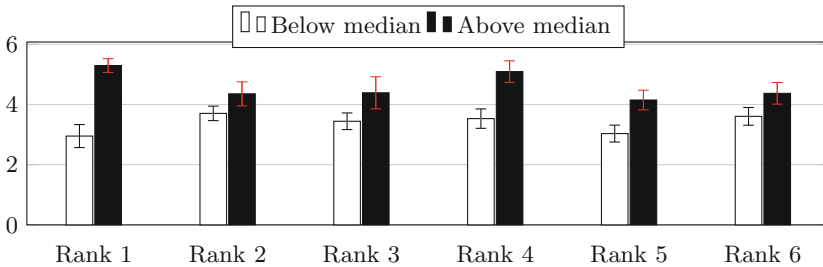


Fig. 5. Geometrical mean of the time spent on item (confidence level of 95%), median split on decision difficulty sub-scale.

As hypothesised, results suggest that respondents experiencing more difficulties in making decisions also spent more time in inspecting alternatives.

Payne [9] suggested that maximisers would compare the different alternatives more frequently before making a decision. Consequently, Fig. 6 shows the mean number of revisits – i.e., how frequently the participant’s gazes switched between an AOI of one item and the AOI of another item, forth and back – grouped by median split and ordered based on the actual rank assigned by the participant. Thus, although the confidence levels are large due to sample sizes, Fig. 6 supports the hypothesis.

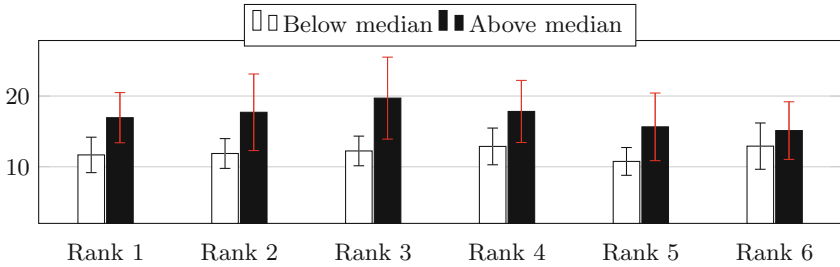


Fig. 6. Mean number of revisits per item, median split on the decision difficulty sub-scale.

5 Discussion and Conclusions

This paper presented a study that eye-tracked a rank-based conjoint (RBC) experiment. The purpose was to explore how different configurations of rating summary statistics, which take the total number of ratings, the mean rating value and the bimodality of the distribution into account, steer users’ decision making under a *ceteris paribus* assumption. While the authors in an earlier study observed a trade-off between the number of ratings and the mean rating value, the results of the present study indicate that the bimodality of distributions has only a minor effect on user choices. Furthermore, participants’ behaviour was investigated under the lens of different decision styles, with a specific focus on decision difficulty as a result of a maximising behaviour. A detailed analysis of users’ gazes showed that maximisers, and in particular those high on the decision difficulty sub-dimension underlying maximisation, spent more time comparing the different alternatives, but still primarily relied on high mean rating values. In contrast, their counterparts with less decision difficulty were more free to weigh in against each other different characteristics of rating distributions, and needed less time to decide. This outcome is remarkable, since one would expect a predominant reliance on higher mean rating values to be a simplistic decision heuristic. Nevertheless, the detailed analysis of gazes disclosed that these participants had actually spent more gaze time and compared more by jumping back and forth. A limitation of this study is that the estimated effects are based on the median split of a sample of 42 participants. Although this sample size is

clearly commensurate for eye-tracking studies, it should also be acknowledged that it reduced the power of the conjoint analysis.

The practical implications of the present work lie in the area of personalisation and ranking algorithms. Clearly, the differences of users, when assessing and evaluating alternative offers on a booking platform, must be taken into account. Needless to say, future work will include further developments in order to tune recommendation algorithms according to users' presumed decision making styles.

Acknowledgement. The authors would like to acknowledge Gabriela Boyadjyska for supporting the eye-tracking experimentation as part of her thesis project.

References

1. Werthner H, Alzua-Sorzabal A, Cantoni L, Dickinger A, Gretzel U, Jannach D, Neidhardt J, Pröll B, Ricci F, Scaglione M, Stangl B, Stock O, Zanker M (2015) Future research issues in it and tourism. *Inf Technol Tour* 15(1):1–15
2. Xiang Z, Magnini VP, Fesenmaier DR (2015) Information technology and consumer behavior in travel and tourism: insights from travel planning using the internet. *J Retail Consum Serv* 22:244–249
3. Law R, Qi S, Buhalis D (2010) Progress in tourism management: a review of website evaluation in tourism research. *Tour Manag* 31(3):297–313
4. Gretzel U, Yoo KH (2008) Use and impact of online travel reviews. In: O'Connor P, Höpken W, Gretzel U (eds) *Information and communication technologies in tourism 2008*, pp 35–46, Vienna, Springer Vienna
5. Xie KL, Zhang Z, Zhang Z (2014) The business value of online consumer reviews and management response to hotel performance. *Int J Hosp Manag* 43:1–12
6. Xiang Z, Qianzhou D, Ma Y, Fan W (2017) A comparative analysis of major online review platforms: implications for social media analytics in hospitality and tourism. *Tour Manag* 58:51–65
7. Xie H (Jimmy), Miao L, Kuo P-J, Lee B-Y (2011) Consumers responses to ambivalent online hotel reviews: the role of perceived source credibility and pre-decisional disposition. *Int J Hosp Manag* 30(1):178–183
8. Knijnenburg BP, Willemsen MC (2011) Each to His Own: how different users call for different interaction methods in recommender systems. In: *Proceedings of the 5th ACM conference on recommender systems - RecSys '11*, pp 141–148
9. Payne JW (1976) Task complexity and contingent processing in decision making: An information search and protocol analysis. *Organ Behav Hum Perform* 16(2):366–387
10. Bettman JR, Luce MF, Payne JW (1998) Processes, constructive consumer choice, source. *J Consum Res* 25(3):187–217
11. Simon HA (1955) A behavioral model of rational choice. *Q J Econ* 69(1):99–118
12. Schwartz B, Ward A, Lyubomirsky S, Monterosso J, White K, Lehman DR (2002) Maximizing versus satisficing: happiness is a matter of choice. *J Personal Soc Psychol* 83(5):1178–1197
13. Jugovac M, Nunes I, Jannach D (2018) Investigating the decision-making behavior of maximizers and satisficers in the presence of recommendations. In: *26th conference on user modeling, adaptation and personalization (UMAP'18)*

14. Zwerina K, Huber J, Kuhfeld WW (1966) A general method for constructing efficient choice designs. Durham, NC: Fuqua School of Business, Duke University, 39–59
15. Zanker M, Schoberegger M (2014) An empirical study on the persuasiveness of fact-based explanations for recommender systems. *CEUR Workshop Proc* 1253:33–36
16. Glaholt MG, Reingold EM (1985) Eye movement monitoring as a process tracing methodology in decision making research 4(2):125–146 (1985)
17. Orquin JL, Loose SM (2013) Attention and choice: a review on eye movements in decision making. *Acta Psychologica* 144(1), 190–206:9
18. Rao VR (2008) Developments in conjoint analysis. In: *Handbook of marketing decision models*, pp 23–53. Springer
19. Chung J, Rao VR (2012) A general consumer preference model for experience products: application to internet recommendation services. *J Market Res* 49(3):289–305
20. Coba L, Zanker M, Rook L, Symeonidis P (2018) Exploring users' perception of collaborative explanation styles. In: 2018 IEEE 20th conference on business informatics (CBI), pp 70–78
21. Coba L, Zanker M, Rook L, Symeonidis P (2018) Exploring users' perception of rating summary statistics. In: *Proceedings of the 26th conference on user modeling, adaptation and personalization, UMAP 18*, 353–354. ACM, New York, NY, USA (2018)
22. Coba L, Zanker M, Rook L, Symeonidis P (2018) Decision making of maximizers and satisficers based on collaborative explanations. *arXiv preprint [arXiv:1805.11537](https://arxiv.org/abs/1805.11537)*
23. Hu N, Zhang J, Pavlou PA (2009) Overcoming the J-shaped distribution of product reviews. *Commun ACM* 52(10):144
24. de Langhe B, Fernbach PM, Lichtenstein DR (2016) Navigating by the stars: investigating the actual and perceived validity of online user ratings. *J Consum Res* 42(6):817–833
25. Pfister R, Schwarz KA, Janczyk M, Dale R, Freeman JB (2013) Good things peak in pairs: a note on the bimodality coefficient. *Front Psychol* 4:700
26. Fuchs M, Zanker M (2012) Multi-criteria ratings for recommender systems: an empirical analysis in the tourism domain. In: *Lecture notes in business information processing*, vol 123 LNBIP, pp 100–111
27. Jannach D, Zanker M, Fuchs M (2014) Leveraging multi-criteria customer feedback for satisfaction analysis and improved recommendations. *Inf Technol Tour* 14(2):119–149
28. Holmqvist K, Nyström M, Andersson R, Dewhurst R, Jarodzka H, Van De Weijer J (2011) *Eye tracking*. Oxford University Press, A comprehensive guide to methods and measures
29. Sauro J, Lewis JR (2010) Average task times in usability tests. In: *Proceedings of the 28th international conference on Human factors in computing systems - CHI '10*, p 2347, New York, New York, USA, 2010. ACM Press
30. Schwartz B, Ward A, Monterosso J, Lyubomirsky S, White K, Lehman DR (2002) Maximizing versus satisficing: happiness is a matter of choice. *J Perso Soc Psychol* 83(5):1178
31. Nenkov GY, Morrin M, Ward A, Schwartz B, Hulland J (2008) A short form of the maximization scale: factor structure, reliability and validity studies. *Judgm Decis Mak* 3(5):371–388

Sharing Economy



Is the Sharing Economy for All? An Answer Based on Neighbourhoods, Types of Hosts, and User Complaints

Jacques Bulchand-Gidumal^(✉), Santiago Melián-González,
and Beatriz González López-Valcárcel

University Institute for Tourism and Sustainable Economic Development
(TIDES) University of Las Palmas de Gran Canaria, Las Palmas, Spain
{jacques.bulchand, santiago.melian,
beatriz.lopezvalcarcel}@ulpgc.es

Abstract. Sharing/platform economy takes place when users offer products and services through online platforms. In the case of tourism, the terms *collaborative tourism* and *sharing (peer-to-peer) accommodations* are commonly used. Since providing services through online platforms can be done by anyone without specific qualifications, it has been stated that the sharing economy is accessible to everyone who has goods to share or spare time available. Although this is true from a generic perspective, not all available offers receive the same attention from consumers. This research uses a dataset with all the properties offered in Spain on Airbnb to analyse differences in prices, demand, and guest satisfaction. It considers factors including neighbourhoods, and on whether the host is an amateur or a professional. The research also analyses the contents of user complaints. Results show that the platform economy is less egalitarian than some discourses about this economy suggest.

Keywords: Sharing economy · Collaborative economy · Platform economy
Airbnb · Peer-to-peer accommodation

1 Introduction

Several terms including sharing economy, collaborative economy, platform economy, and access economy, among others are currently used to describe a phenomenon that started approximately in the early 2010s. The basic principle of this phenomenon is that individuals offer products and services to other consumers and to firms using online platforms. Bulchand-Gidumal and Melián-González [1] state that to really be part of the sharing economy, individuals must have a high degree of independence when deciding what products or services to offer, what prices to set, and what characteristics to offer.

In the case of tourism, the use of these initiatives has been named *collaborative tourism*; in the case of lodging, *peer-to-peer accommodation* and *sharing accommodation*. The latter terms are used in this paper. Sharing accommodation takes place when individuals offer short-term lodging to tourists using platforms such as Airbnb, Homeaway, and CouchSurfing, among others. In all of these cases, individuals decide

what to offer and when to offer it, set the price (if there is a price), and choose the amenities or complementary services that they will offer with their properties.

Much research has been conducted on sharing economy. This research has generally focused on the reasons for participating in the sharing economy [2], the global problems of this type of economy [3], the type of work that is generated [4], and whether sharing is a better option from a sustainability perspective [5], among other topics. Research has also looked more specifically at the case of sharing accommodation, as will be explained later in the literature review.

A common claim made by those who support the sharing economy is that it empowers individuals [6]. From the point of view of those making the offers, this refers to the ease with which anyone can be a supplier of products and services. Specifically, sharing accommodation has been used as an example of this possibility. Nevertheless, this assumption has not been addressed enough by current research. As a result, it could seem that sharing accommodation is not subject to the same market rules that are considered relevant for the success of traditional accommodation options (i.e., hotels, apartments).

This study deals with the issue of the possibility of anyone becoming a supplier of sharing accommodations, by analysing three different perspectives. First, the relationship between the average income in neighbourhoods where listings are placed and three key variables that measure hospitality success: price, user satisfaction, and demand. Second, the attributes of amateurs in comparison with professional hosts. Third, the main complaints that guests mention regarding their hosts.

2 Theory

2.1 Collaborative Tourism and Sharing Accommodation

Collaborative tourism refers to the tourist dimension of the sharing economy [7]. Like the tourism industry, collaborative tourism involves different types of activities. Examples of these activities include experiences such as gastronomy, guided tours, leisure activities, car-pooling and car sharing, and accommodation. Along with transport, accommodation accounts for the greatest portion of both sharing economy and collaborative tourism. Therefore, sharing accommodation and platforms such as Airbnb, are well known and do not require a great explanation. As a typical sharing economy platform based on Internet technology, Airbnb allows individuals to temporarily rent their properties to consumers. Thus, Airbnb and other digital platforms behave as a digital marketplace that facilitates agreements between two independent parties [1].

According to Airbnb's data, the platform provides more than five million listings in over 81,000 cities and 191 countries [8]. In short, it has become very popular among travellers. The success of sharing accommodation draws on a number of factors including Internet technology, consumer cost-savings, household amenities available, and the potential for more authentic local experiences [9–11].

Much research has been conducted using data from Airbnb. Studies have addressed topics including motivations for using the sharing economy [12], the role of electronic

Word of Mouth (eWOM) and authenticity in the intention to repurchase [13], price determinants [14], the impact of sharing accommodation on the hotel industry [15], and race discrimination against hosts [16].

Most of the research in the sharing economy has analysed the consumer point of view. In this sense, one topic that is currently under researched is the factors that can facilitate or prevent the success of sharing accommodation from the provider's side. Wang and Nicolau [14] have analyzed the relevance of different variables in the price of Airbnb properties. They studied property distance from the city center, some properties' amenities and the host's status (i.e., host vs. superhost). Their results showed that the farther properties are from the city center, the lower their price. Real beds, bathrooms, bedrooms, free parking, and free WiFi also influence listing prices. Additionally, being an Airbnb superhost positively impacts prices. According to these findings, it is not easy for some property owners to be successful within the sharing accommodation. In other words, an owner whose property is located far from the city center, without real beds, and without free parking, will have to set lower prices which will lead to less income.

In addition to the variables identified by Wang and Nicolau [14], there are two other factors that could affect demand guest satisfaction, and the price that owners can charge for their listings. The first of the aforementioned factors is the area in which the listing is placed, which has been shown to influence client satisfaction [17–20]. The second factor is the type of host, that is, the extent to which the host can be considered a professional of the hospitality or alternatively an amateur. Regarding the type of host, extant research has considered the superhost status on Airbnb. This is a status that Airbnb awards to those hosts who meet certain criteria: a certain number of bookings, no cancellations from the host side, good ratings, and fast response times. However, more research of the role of the host has been demanded [19].

In this sense, hosts can also be classified by the number of units they offer. Some hosts offer only one property, which could be their own house that they rent out when they are not there because they are travelling; others offer their second homes, which are available most of the year; and others may rent out units purchased specifically to use as rentals to earn some additional income. Other hosts offer several properties, that is, two or more units combining one or more of the previously mentioned cases. Additionally, there are professional hosts. These hosts manage properties for others by taking care of check-in, check-out, cleaning, bookings, and maintenance of the unit, usually in exchange for a percentage of the total income. Professional hosts may also be simply owners of a significant amount of properties.

The number of properties that a host runs can influence variables that are relevant for sharing accommodation guests. For example, the more properties a host manages, the less time available for guest encounters which, in turn, could impact guest satisfaction. This is, hosts that manage more properties could provide less authentic experiences, which has also been proven to be a determinant of guest satisfaction, and one of the key factors behind the use of peer-to-peer accommodations [11, 21]. In this sense, research has shown that while guests value room attributes in the case of hotels, in the case of peer-to-peer accommodation it is the relationship with the host what is valued the most [22].

Regarding the neighbourhoods in which the units are placed, and to the researchers' knowledge, there are no studies available. Some studies do indicate that guest frequently highlight the neighbourhood in where the unit is located in their comments [20]. The present study examines whether the income level of the neighbourhood in which a property is located influences the price of the property, the demand for the property, and guest satisfaction. It is assumed that a higher income level could positively impact these variables because it is associated with both better properties and settings.

2.2 Research Questions

Based on the findings of the literature review in the previous section, three research questions are presented:

1. Are neighbourhoods equivalent in the sharing accommodation (i.e., are prices, demand, and satisfaction with units independent of the neighbourhood)?

Research has already shown the relevance of location, understood as distance to public transport or to the city centre, to the listings' prices in sharing accommodation. This research analyses if other variables, such as average neighbourhood income, are also relevant to units' prices as well as to their demand and guest satisfaction. This will allow understanding if there are restrictions to the areas in which guests are interested, thus limiting the possibility of anyone participating in the sharing economy.

2. Are there differences between types of hosts (amateurs vs. professionals) with respect to demand, guest satisfaction, and pricing?
3. What are the main guest complaints in the sharing accommodation in relation to the host?

As previously commented, the role of the hosts has been shown to be capital in sharing accommodation. These two research questions will allow diving in further depth into this issue. On the one hand, the impact of the type of host on the performance indicators will be analysed. On the other, guest complaints. This analysis could reveal a demand for very specific host behaviours and attributes that maybe not everybody will be able to provide in the service encounters that take place in sharing accommodation.

3 Methodology

In January 2018, data from all the available listings on the Airbnb platform in Spain were automatically downloaded. In order to analyse properties that were active, only those properties with at least one guest review are considered. Some properties were eliminated because they had errors in their prices. Once the faulty ads were removed, the initial sample was composed of 98,075 listings. These listings included entire apartments and houses (74,722), private rooms (22,819), and shared rooms (534). In order to analyse a homogenous sample, only entire properties with a maximum capacity of six guests were studied. Thus, all the listings in which six or less guests can

stay are considered. This last restriction was imposed because calculating the price per person in larger properties was challenging. Table 1 outlines the sample data.

Table 1. Sample data

Source	Airbnb
Country	Spain
Selection criteria	All entire properties with at least one guest review and a capacity of 6 people or less
Date of data collection	January 2018
Data collection	Automated
Entire apartments and houses	47,373
Average maximum capacity	4.15
Average daily rate	78.93 euros
Average price per person	19.82 euros
Average rating	4.75
Properties offered by each host	3.22
Properties by size (maximum capacity)	1 or 2 guests – 7,420 (15.66%) 3 or 4 guests – 23,621 (49.86%) 5 or 6 guests – 16,332 (34.48%)

In the sample, the average property rate per night was 78.93 euros (std: 43.28) and the average client rating was 4.75 (std: 0.27) on a scale from one to five. The guest satisfaction rating scale consists of five stars with the following values: 1; 1.5; 2; 2.5; 3; 3.5; 4; 4.5 and 5. Apart from the general satisfaction with the unit, a specific measure of guest satisfaction with the location of the unit was also used.

The researchers calculated the number of properties that each host was offering and then classified the hosts as amateurs (those renting just one unit, accounting for 57.47% of all the properties), semi-amateurs (those renting two or three units, accounting for 23.75% of properties), semi-professionals (those renting more than three units but less than 10, accounting for 12.55% of properties), and professionals (those renting 10 or more units, accounting for 6.23% of properties). Previous research [23] had reported a much higher amount of amateurs (single-listing hosts), but it is believed that it was due to the sample used in that research and to the market dynamics.

Regarding the neighbourhoods, data from the Spanish Tax Agency was overlaid to the sample. This data is aggregated at the zip-code level and includes information such as the average income within the zip-code. Based on this information, the quartiles were used to divide the sample in four groups: low-income neighbourhoods, median-to-low-income neighbourhoods, medium-to-high-income neighbourhoods, and high-income neighbourhoods.

Airbnb does not provide the number of bookings that each unit has had. However, there is a proxy measure that can be used to determine the number of bookings: the number of reviews that the property has received. It is true that this measure can present

some problems. For example, long bookings only generate one review and not all users review. Nevertheless, it is believed that reviews can be used as a good estimate when determining the demand a property has.

Finally, to analyse guest complaints content and identify items causing dissatisfaction, a random procedure by which 1,000 comments were downloaded which had global ratings of less than 4 was implemented. In other words, comments with global ratings of 3, 2, or 1 stars were downloaded. The constraint that the comments had to be in Spanish or English in order to allow processing by the researchers was implemented.

Considering a comment with a three-star rating as negative on a scale from 1 to 5 can be questionable. However, the reality is that, at least currently, most ratings on platforms such as Airbnb are very high [24]. This research confirms this phenomenon, as the average property rating was 4.75. As will be explained later, all comments were rated 4 or 5 for most properties, and 3-star ratings usually included comments that described negative experiences. Comments with a rating of 1 or 2 were very rare.

Content analysis was applied to the downloaded comments. After analysing these, two independent researchers independently proposed categories for the guests' complaints. After a discussion, both reached consensus about the final categories. Subsequently, the same researchers independently classified the downloaded comments into the categories with a 94% agreement level.

In summary, the independent variables included were the income average of the neighbourhoods and the type of host. Dependent variables were price, guest satisfaction, and demand. Finally, the control variables taken into consideration were the capacity (maximum number of guests allowed in the property) and the starting year in Airbnb (2009 to 2017). The data were analysed using one-way ANOVA. Calculations were made with STATA v14.

4 Results

The following sections present the results of the three analyses that were completed: at the neighbourhood level, at the host type level, and at the guest satisfaction level.

4.1 Results by Neighbourhoods

The first research question sought to establish whether there are differences in property prices, demand, and guest satisfaction between neighbourhoods, depending on the average income of the area. As previously noted, the neighbourhoods were divided in four groups based on the quartiles of average income in the neighbourhood.

First, the analysis found that there were differences in average price per person across the different neighbourhood groups. While the average price per person in the low-income neighbourhoods was 19.27 euros, it was 20.79 in the higher-income ones. In other words, there was a difference of 1.52 euros per-person. It must be considered that, for a one-week rental for four people, this per-person difference can amount to more than 40 euros. Thus, properties in the higher-income group charge 8% more than similar units in the lower-income one. In order to confirm that these differences were statistically significant, an ANOVA test was run, which found that the differences were

significant ($p < 0.001$ using Bartlett's test of equal variances). In the Bonferroni tests, all the pairs were significant except for two: medium-to-low vs. medium-to-high-income neighbourhoods, and medium-to-low vs. low-income neighbourhoods. In these two cases, no significant differences were found.

Second, guest satisfaction was analysed in relation to neighbourhoods. In global guest satisfaction, some differences between groups were found, but these differences were not consistent across all the cases. Thus, the researchers decided to use guest satisfaction in relation to the location instead of overall satisfaction. With regard to location, satisfaction increases consistently from lower-income neighbourhoods (4.72) to higher-income ones (4.78). According to an ANOVA test, these differences were statistically significant globally and across all group pairs ($p < 0.001$ using Bartlett's test of equal variances, and Bonferroni test for pairs comparison).

Lastly, regarding the demand for each unit, the number of reviews that a unit receives depends heavily on the year in which the property was added to the Airbnb platform. This relationship is negative: the later the unit was added to the site, the less reviews it has received. Thus, in this case, the ANOVA was performed by year. The results can be found in Table 2.

Table 2. Average number of ratings per unit by neighbourhood and by year

Neighbourhood type ^a						
Year	1	2	3	4	Units	F
2009	–	–	–	–	1	–
2010	33.2	20.6	67.6	53.3	42	0.79 ^{ns}
2011	19.0	41.5	61.0	94.3	280	14.52 ^{***}
2012	26.7	38.3	59.0	86.3	1,170	48.12 ^{***}
2013	24.0	35.4	48.4	73.8	2,493	95.06 ^{***}
2014	19.5	30.3	37.2	58.8	4,997	171.52 ^{***}
2015	15.0	21.2	31.2	43.4	8,143	278.32 ^{***}
2016	11.0	15.7	23.1	29.5	11,108	318.44 ^{***}
2017	5.9	8.0	10.9	13.9	19,139	376.27 ^{***}
Total					42,373	

Notes

ns: not significant

***: $p < 0.001$

^aNeighbourhood types: 1 – Low income;

2 – Medium-to-low; 3 – Medium-to-high; 4 – High

As Table 2 shows, properties in higher-income neighbourhoods systematically get more reviews, and thus have greater demand than properties in lower-income areas. That is, the higher the neighbourhood income, the more reviews the property has received.

4.2 Results by Type of Host

Regarding the type of host, they were classified in four types: amateurs, semi-amateurs, semi-professionals, and professionals. The objective was to establish whether there were differences in guest satisfaction, prices, or demand depending on the type of host.

Regarding prices, it was found that as hosts manage more properties, prices rise (19.34, 20.07, 20.91, 21.04 euros per person per night per host group, respectively). That is, on average, professional hosts tend to charge 9% more than amateurs do. Of course, this price increase could be the result of a number of characteristics of the properties, including the amenities they offer, or other variables, unrelated to the hosts. For this variable, the differences are globally significant ($p < 0.001$ using Bartlett’s test of equal variances). The same is true pairwise, except for the difference between the semi-professional and the professional hosts. In this case, the price difference was found to be non-significant.

Results regarding guest satisfaction indicate that as hosts rent more properties, user satisfaction goes down (4.77, 4.74, 4.71, 4.67). Globally, these differences are significant ($p < 0.001$ using Bartlett’s test of equal variances). Pairwise, all the differences between groups are significant.

The results for the demand for each unit depending on the type of host can be found in Table 3. This analysis is divided by year.

Table 3. Average number of ratings per unit by type of host and by year

Type of host ^a						
Year	1	2	3	4	Units	F
2009	–	–	–	–	1	–
2010	53.64	34.31	26.33	–	42	0.79 ^{ns}
2011	46.80	43.47	91.48	46.77	280	4.67 ^{**}
2012	50.58	56.21	63.53	34.78	1,170	3.47 [*]
2013	46.48	49.44	54.49	26.38	2,493	8.40 ^{***}
2014	34.08	37.68	43.24	29.57	4,997	9.08 ^{***}
2015	25.35	30.32	30.78	21.98	8,143	16.52 ^{***}
2016	18.68	21.73	21.14	16.58	11,108	14.26 ^{***}
2017	9.49	10.84	10.47	8.26	19,139	20.66 ^{***}
Total					42,373	

Notes

ns: not significant

***: $p < 0.001$; **: $p < 0.005$; *: $p < 0.05$

^aType of host: 1 – Amateur; 2 – Semi-amateur; 3 – Semi-professional; 4 – Professional

The results of this analysis show statistically-significant differences. However, these differences occur between hosts that rent less than 10 units (type of hosts 1, 2, and 3) and hosts that rent 10 or more units (type of host 4). The latter systematically receive fewer reviews than those managed by hosts that rent out less than 10 properties.

4.3 Content Analysis of Reviews

1,000 comments in which the global rating given by the guest was 3, 2 or 1 stars were downloaded. As noted in Sect. 3, comments with this sort of low rating are not frequent within the Airbnb platform. For this analysis, information for more than 5,000 properties had to be retrieved in order to find these 1,000 negative comments. This pool came from the total reviews in Spanish and English, which exceeded 100,000. In other words, negative comments rated 3, 2, or 1 stars accounted for less than 1% of the reviews.

Out of these 1,000 comments, 16.3% (163) did not mention any specific negative aspects. Most of these reviews were 3-star ratings. Furthermore, in some cases, the user made an error by giving 1-star rating, mistakenly understanding that that was very good evaluation. The remaining ratings account for 83.7% (837) of the sample. These are comments that provided a low rating and negative accompanying comments.

27.4% (229) of these 837 comments mentioned factors that were not under the control of the host, including: problems finding parking, bad weather at the destination, and problems in the building where the unit was located, among other things.

The rest of the cases (72.6% of the 837 comments, that is 608 comments) involved issues that could be solved by hosts, with two main trends: the accuracy of the description of the unit, and the need for the host to take a bit more care of the property, in what many guests specifically named as TLC (Tender Loving Care).

Problems with the description of the unit were mentioned in 46.6% of the 837 cases (390 comments). These included issues such as missing equipment, extra charges that were not made clear, and issues related to the specific location of the unit, among other things.

TLC or similar issues were mentioned in 26.4% (221) of the comments. Comments in this category included issues such as equipment and areas of the unit that were not well maintained, missing curtains or blinds, and units that were clean in the better-seen areas but not so much in other areas (cupboards, under the beds, etc.).

The research also wanted to establish whether this type of complaints could be different regarding the type of host. It was found that although 58.9% of units are rented by hosts that only rent out one unit (defined as amateurs), the total number of complaints for these properties was only 47.0%. In the specific case of accuracy problems, this number goes down to 42.3%, while in the case of TLC, it is to 49.3%.

From the analysis of the comments, in 8.7% (73) of the cases a specific negative comment was made regarding the outsourcing of the management of the property: delays in the check-in process due to simultaneous arrivals at different properties, little information provided, and inflexibility of checkout times, among other things. Other comments that appear frequently were related to communication problems (9.9%, 83 comments) and not having met personally the host (8.6%, 72). In all these three types of problems, non-amateur hosts accounted for a higher percentage than the amount of units these hosts were renting out.

5 Conclusions

The main objective of this research was to determine whether the sharing economy, and its associated benefits, is really something that everyone can access easily. To this end, data downloaded from Airbnb was used, studying all of the units currently available for rental in the whole of Spain.

The results yielded important findings. First, based on the comparison of average prices, user satisfaction, and number of reviews between neighbourhoods, it is possible to conclude that although anyone can offer products and services in the sharing economy, guests usually prefer certain characteristics. In the case of accommodation units, listings placed in areas with higher income are preferred to those in areas with lower income. These properties in areas with high income have a greater demand, guests are more satisfied with the rentals, and are willing to pay higher prices. Areas with higher income are usually nicer, with better services, and close to the main points of interest of a city or a destination, among other things. Previous research [18, 20] had already found that users prefer listings close to public transport, tourist attractions, and to the city centre. The findings of this research coincide and add to this knowledge, since it is not only those attributes that matter, but also the average income of the neighbourhood.

Second, the analysis showed that users prefer to be housed by amateur hosts than by professional ones. These results exposed that user satisfaction declines as hosts rent out more units. This result coincides with previous research that had already highlighted the key role of the host in peer-to-peer accommodations [22] and how multi-listing hosts generate less user satisfaction [23]. Especially interesting is the finding that professional hosts tend to charge more than amateurs do, when all other factors are equal. This finding coincides with previous research in the area [25]. Thus, it seems as if professional hosts use some type of revenue management strategy that amateurs do not. This constant monitoring and adjusting of prices yield as a result a higher average price. However, this finding will require additional research in the future in order to be confirmed.

Finally, results show that amateurs receive fewer complaints, especially in the case of complaints involving the accuracy of the description of the space (i.e., differences between what was announced and what was received by the guests). These results allow advising property owners that if they are considering outsourcing the management of their properties to a professional company, they should be especially careful with how the property is described and how the unit is maintained. Of course, this point is also valid for owners taking care of their own properties; however, it seems more relevant in cases where a professional is taking care of the property or when owners run a high amount of listings. Anyhow, these results show that in peer-to-peer accommodations guests prefer authentic experiences to professional and standard services.

Based on these findings, the primary conclusion is that sharing accommodation is becoming one more option for users, competing directly with traditional accommodation options. For some time, there was a novelty effect by which some of the problems of these accommodations may have been masked, but this effect has now passed. Thus, guests are now demanding a similar quality from sharing economy

services as they have in the past from other traditional services (e.g., hotels, taxis, restaurants, etc.). In this same vein, it seems as if the sharing economy is not as egalitarian as it was initially believed. Users look for rentals in specific areas of a city, specific amenities, and good and reliable service, even when this service is delivered by an amateur. Thus, although anyone can upload their listing to a platform such as Airbnb, some units will be more successful than others depending on their location. However, a real effort from the host in trying to make guests have a great experience could help overcome a slightly worse location.

6 Limitations

This article has certain limitations. First, when the hosts were classified based on the number of properties that they rent, the Airbnb host code was used. However, it is possible that one host rents properties using more than one host code. For example, if an individual created his/her profile in Airbnb and then decided to outsource the management to a professional company, they would appear as an amateur host even when the property is being run by a professional service. Additionally, the data set only included units from Spain. It is possible that a host offers properties in other countries as well.

Second, the number of ratings was used as a proxy for the interest in the property, since data on occupancy rates was not available. However, as is always the case with proxies, this strategy can yield certain mistakes. If some properties are rented for longer periods than others are, that can lead to incorrect interpretations of the data. If, for some reason, there is a greater trend to rate some properties than others, that can also lead to incorrect interpretations. However, the fact that such a large sample was used (more than 40,000 properties in all in the analysis) can lead to expect that most of these possible negative effects will be diluted by the sample size.

Third, since the data is quantitative and based on the information of the listings that Airbnb provides, other aspects such as the relationship between Airbnb and the hosts, specifically the guidance that Airbnb provides the hosts in relation to pricing, descriptions, pictures, and so on were not analysed.

Finally—and probably most importantly—the analysis was focused on the global issue of the sharing economy. However, only data from one platform was used, and thus, from one type of activity. Although some of the results are likely generalizable, further tests should be conducted on other types of services and in other sectors within the sharing economy.

References

1. Bulchand-Gidumal J, Melián-González S (2018) *La revolución de la economía colaborativa*. Editorial LID, Madrid
2. Hamari J, Sjöklint M, Ukkonen A (2016) The sharing economy: why people participate in collaborative consumption. *J Assoc Inf Sci Tech* 67(9):2047–2059
3. Malhotra A, van Alstyne M (2014) The dark side of the sharing economy... and how to lighten it. *Commun ACM* 57(11):24–27

4. Codagnone C, Martens B (2018) Scoping the sharing economy: origins, definitions, impact and regulatory issues. https://papers.ssrn.com/sol3/papers.cfm?abstract_id=2783662. Accessed 12 July 2018
5. Heinrichs H (2013) Sharing economy: a potential new pathway to sustainability. *GAIA* 22 (4):228–231
6. Schor JB, Attwood-Charles W (2017) The “sharing” economy: labor, inequality, and social connection on for-profit platforms. *Sociol Compass* 11(8):e12493
7. Dredge D, Gyimóthy S (eds) (2017) Collaborative economy and tourism: perspectives, politics, policies and prospects. Springer
8. Airbnb (2018) Fast facts. <https://press.airbnb.com/fast-facts/>. Accessed 12 July 2018
9. Guttentag D (2015) Airbnb: disruptive innovation and the rise of an informal tourism accommodation sector. *Curr Issues Tour* 18(12):1192–1217
10. Gutiérrez J, García-Palomares JC, Romanillos G, Salas-Olmedo MH (2017) The eruption of Airbnb in tourist cities: comparing spatial patterns of hotels and peer-to-peer accommodation in Barcelona. *Tour Manag* 62:278–291
11. Lalicic L, Weismayer C (2017) The role of authenticity in Airbnb experiences. In: Schegg R, Stangl B (eds) *Information and communication technologies in tourism 2017*. Springer International Publisher, pp 781–794
12. Möhlmann M (2015) Collaborative consumption: determinants of satisfaction and the likelihood of using a sharing economy option again. *J Consum Behav* 14(3):193–207
13. Liang LJ, Choi HC, Joppe M (2018) Understanding repurchase intention of Airbnb consumers: perceived authenticity, electronic word-of-mouth, and price sensitivity. *J Travel Tour Mark* 35(1):73–89
14. Wang D, Nicolau JL (2017) Price determinants of sharing economy based accommodation rental: a study of listings from 33 cities on Airbnb. *com. Int J Hosp Manag* 62:120–131
15. Zervas G, Proserpio D, Byers JW (2017) The rise of the sharing economy: estimating the impact of Airbnb on the hotel industry. *J Mark Res* 54(5):687–705
16. Edelman BG, Luca M (2014) Digital discrimination: the case of Airbnb.com. <https://ssrn.com/abstract=2377353>. Accessed 12 July 2018
17. Bulchand-Gidumal J, Melián-González S, Lopez-Valcarcel BG (2013) A social media analysis of the contribution of destinations to client satisfaction with hotels. *Int J Hosp Manag* 35:44–47
18. Qiu RT, Fan DX, Liu A (2018) Exploring the booking determinants of the airbnb properties: an example of the listings of London. In: *Information and Communication Technologies in Tourism 2018*. Springer International Published, pp 44–51
19. Cheng M, Jin X (2019) What do Airbnb users care about? An analysis of online review comments. *Int J Hosp Manag* 76:58–70
20. Tussyadiah IP, Zach F (2017) Identifying salient attributes of peer-to-peer accommodation experience. *J Travel Tour Mark* 34(5):636–652
21. Tussyadiah IP, Pesonen J (2018) Drivers and barriers of peer-to-peer accommodation stay—an exploratory study with American and Finnish travellers. *Curr Issues Tour* 21(6):703–720
22. Belarmino A, Whalen E, Koh Y, Bowen JT (2017) Comparing guests’ key attributes of peer-to-peer accommodations and hotels: mixed-methods approach. *Curr Issues Tour* 1–7
23. Xie K, Mao Z (2017) The impacts of quality and quantity attributes of Airbnb hosts on listing performance. *Int J Contemp Hosp Manag* 29(9):2240–2260
24. Zervas G, Proserpio D, Byers J (2015) A first look at online reputation on Airbnb, where every stay is above average. <https://ssrn.com/abstract=2554500> or <http://dx.doi.org/10.2139/ssrn.2554500>. Accessed 12 July 2018
25. Kwok L, Xie KL (2018) Pricing strategies on Airbnb: are multi-unit hosts revenue pros? *Int J Hosp Manag* (in press)



Drivers of Emotions in Airbnb-Reviews

Christian Weismayer¹(✉) and Ilona Pezenka²

¹ Department of Sustainability, Governance, and Methods,
MODUL University Vienna, Vienna, Austria
christian.weismayer@modul.ac.at

² Department of Communication, FH Wien University of Applied Sciences
of WKW, Vienna, Austria
ilona.pezenka@fh-wien.ac.at

Abstract. The sharing economy rapidly led to changes within the travel accommodation service industry over the last decade. Because of these changes, reviews are becoming more and more important. Reviews are particularly useful for peer-to-peer (P2P) platforms, as they reflect past experience from other customers and, in most cases, they are the only source of information available. Since customers take these reviews into consideration in their travel planning, understanding the composition of customer experience and feelings in the rating process is essential. Literature shows that there are different consequences of emotionality expressed in reviews. Thus, this paper explores the relationship between different lodging aspects and their roles in the formation of emotional content in reviews. This is achieved by exploring emotional expressions in reviews to reveal which criteria evoke which kind of emotions. In this way, a more precise customer sentiment understanding is derived. The findings provide a new angle on investigating customer behaviour.

Keywords: Verbal emotion recognition · Peer-to-peer (P2P)
Sharing economy · Review

1 Introduction

Recent developments in Internet technology have facilitated the exchange of nearly everything (cars, clothes, accommodation...) by using online market platforms. Despite its current hype, most sharing or collaborative consumption concepts are not new phenomena. The term “sharing economy” first appeared in 2008 and was defined by Lessig [1] as “...the collaborative consumption made by the activities of sharing, exchanging, and rental of resources without owning the good.” Since then numerous definitions have been proposed. One of the most often cited definitions was developed by Botsman [2]. She describes the sharing economy as “an economic model based on sharing underutilized assets from spaces to skills to stuff for monetary or non-monetary benefits.”

Airbnb, along with other companies like Drivy or BlaBlaCar, is part of this so-called sharing economy. Airbnb is a commission-based web-platform for room sharers and travellers. It was founded in 2008 in San Francisco and offers accommodation in more than 81,000 cities in 191 countries [3]. Airbnb provides over 5 million worldwide

listings and records a total of 300 million guest arrivals [4]. Thus, Airbnb has become a challenge for nearly all providers of tourism services. Literature points out that the success of Airbnb is explained by three main factors or attributes: idealistic motives, the authenticity of the accommodation experience and the economic benefits [5–7]. As people participating in the sharing economy are apparently seeking special experiences, conventional indicators of experience quality used in the hospitality industry are not suited for accommodation offered in the sharing economy. Furthermore, trust and reputation are especially important factors for peer-to-peer based transactions [8, 9]. Thus, the business model of companies of the sharing economy heavily relies on peer evaluations in terms of online reviews. Previous studies have shown that these online reviews are significant predictors of booking behaviour [10]. Moreover, findings from prior research suggest that emotional cues in reviews have significant impact on product evaluations and judgements [e.g., 11, 12] as well as on review helpfulness [13].

Despite the apparent importance of online reviews in the sharing economy, little is known about the critical factors in customers' experience influencing the content of such reviews. There is hardly any scholarly work examining the criteria on which Airbnb customer evaluations rely on. Thus, this study uses Airbnb reviews and examines the relationship between different lodging aspects and their roles in the formation of emotional content in reviews. The main purpose of this study is to identify the impact of lodging experience aspects on the affective quality of the reviews. The NRC Emotion Lexicon (EmoLex) is used to assess the emotions (expressed through different words in reviews) associated with the lodging aspects by means of verbal emotion recognition.

2 Literature Review

2.1 Reviews and the Role of Trust in the Sharing Economy

Word of mouth (WOM) has been investigated since the late 1960ies and emerged to be among the most important sources in the consumer decision-making process [14–16]. The rise of Web 2.0 enabled customers to spread information and opinions efficiently across the globe at any time. Thus, eWOM has a greater scope and impact than traditional WOM [17, 18]. Litvin, Goldsmoth, and Pan [19] state that compared to traditional WOM, eWOM creates virtual relationships, communities, and even new types of reality. The authors define eWOM as “all informal communications directed at consumers through Internet-based technology related to the usage or characteristics of particular goods and services, or their sellers” [19].

Previous studies illustrate the significance of eWOM in the travel context [10, 20–22]. Since tourism products are intangible, customers perceive them as risky [23]. Consumers cannot evaluate these so-called experience goods prior to purchase. Consequently, they strive to gather information from various sources. Reviews are particularly useful for peer-to-peer platforms, as they reflect past experience from others. In most cases, they are the only source of information available.

Reviews are not only an important source of information, but also function as a trust-building tool. Literature shows that trust, in terms of distrust among strangers and

privacy concerns, is a significant barrier to collaborative consumption, and thus, a crucial factor for peer-to-peer services [9, 24]. Möhlmann [25] found that the likelihood of using peer-to-peer platforms (Airbnb, Car2Go) is mainly influenced by factors such as trust, utility, economic considerations, and familiarity. The importance of trust has also been confirmed by a study of Ert, Fleischer, and Magen [26]. The authors revealed that the hosts' trustworthiness (operationalized by the means of photos and reviews) affects the consumer's choice as well as the price of the listings. Therefore, platform operators have implemented trust-building mechanisms, and reputation systems [9]. These reputation systems help users to reduce uncertainty by providing indicators of trustworthiness of users and tourism service providers. Teubner, Hawlitschek and Dann [9] investigated how reputation actually translates into tangible economic value and found that hosts' average rating scores, a longer duration of platform membership, and more apartment photos contribute to higher rental prices. In this context, Dolnicar [27] refers to the importance of the peer-to-peer curriculum vitae (P2P-CV), a network track record. According to Hrobath, Leisch, and Dolnicar [28] the property's P2P-CV also affects the price of the listing.

Although, peer-to-peer platforms have established extensive reputation systems in terms of online review options, it is questionable if these mechanisms are reliable indicators of trust and satisfaction. As such, Zervas, Proserpio, and Byers [29] found that nearly 95% of Airbnb listings have an average rating of either 4.5 or 5 stars. There are almost no listings scoring less than 3.5 stars. Compared to TripAdvisor, with a lower average rating of 3.8 and more variance across reviews, Airbnb ratings are extremely high. This phenomenon can be partly explained by the bilateral reviewing system provided by Airbnb. Thus, if hosts provide a positive feedback they expect to be positively judged in return [30, 31].

2.2 Emotions in EWOM

Emotions are essential in online conversations and affect the way people share information online [32]. They are important triggers to catch the attention of listeners and readers. Emotional expressions are of particular importance in eWOM since users act more or less anonymously and therefore online communication is considered more unrestrained [33].

Hennig-Thurau et al. [34] propose a framework for eWOM communication with five types of social interaction utility. One of these types, the homeostase utility, suggests that customer reviews are emotion sharing mechanisms with great importance for the compensation of emotional imbalance caused by disappointments in terms of unmet product expectations [34]. Literature from the area of psychology claim that consumer's desire for catharsis is a major motivator to express negative personal experiences [35]. In contrast, empirical studies in the field of tourism argue that venting negative feelings is not an important motive for writing reviews [e.g., 36]. However, these empirical studies are based on self-reported online questionnaires. Therefore, motives such as the simple pleasure to share travel expertise and experiences [19], altruism in terms of helping other vacationers or travel service providers [36–38] are reported.

Considering the number of studies exploring motives of sharing eWOM, little research has been conducted to explore emotional expressions in online reviews. Kim and Gupta [11] found that negative emotions have stronger effects than positive emotions. Both, positive and negative emotional expressions increase the informative value of the reviews and influence consumers' product evaluations when similar emotional expressions are present in multiple reviews. In contrast, if positive or negative emotional expressions appear only in single reviews they do not influence consumers' product evaluations significantly. Consumers tend to assign negative emotions in single reviews to the reviewer's irrational dispositions whereas positive emotions in single reviews are generally attributed to the product [11].

According to the study by Berger and Milkman [32] positive content is more viral than negative content. However, the authors conclude that virality is partially driven by psychological arousal. Content that evokes emotions such as awe (high-arousal positive) or anger and anxiety (high-arousal negative), is more viral than low-arousal emotions (e.g., sadness).

Ullah, Amblee, Kim, and Lee [39] applied natural language processing techniques to analyse 15,849 product reviews derived from Amazon.com. They found that more extreme reviews (in terms of the star rating) have a greater proportion of emotional content than less extreme reviews for search as well as for experience products. However, there is a greater proportion of positive emotional content at the positive end of the scale than negative emotional content on the negative end of the scale. Based on these findings the authors conclude that consumers are more likely to write product reviews when their experiences were very positive.

Ludwig et al. [12] employed text mining to extract changes in affective content of customer book reviews on Amazon.com. The authors found that affective word cues in online reviews serve as predictors for retail success. According to their findings, "the influence of positive affective content on conversion rates is asymmetrical, such that greater increases in positive affective content in customer reviews have a smaller effect on subsequent increases in conversion rate."

As prior research found that emotional content in reviews affects product evaluations and judgements [11, 12] and the virality of online content [32] significantly, the paper at hand contributes to the existing literature on online reviews by making use of a lexicon-based verbal emotion recognition technique to answer the following research question:

Which Airbnb lodging and service aspects evoke which emotions in reviews?

3 Methodology

The lexicon-based verbal emotion recognition technique was fully programmed in R [40]. It is based on two different sources of data described in detail in the following paragraphs. On the one hand, Airbnb reviews and ratings are processed. On the other hand, an emotion lexicon is used to search for emotional content in the reviews.

Airbnb data were gathered from the independent and non-commercial "Inside Airbnb" Website. The platform offers Airbnb listings' information as well as online

reviews and ratings for 76 different cities. The first Airbnb dataset contains the raw text of 248,455 Airbnb reviews including an identification number of the Airbnb accommodation the review was written about [41]. The second Airbnb dataset contains 10,337 Airbnb listings [42]. In addition to the identification number, the reviewers' evaluations of several lodging and service aspects, namely accuracy, cleanliness, checkin, communication, location, and value, all measured on a scale ranging from 1 (negative) to 10 (positive), were processed.

The NRC Emotion Lexicon (EmoLex), developed by Mohammad and Turney [43, 44], is then used to identify the emotions expressed in the reviews. The EmoLex is based on the concept of basic emotions [45–50] (see [51] for a detailed review). Mohammad and Turney decided to use Plutchik's eight basic emotions: sadness and joy, fear and anger, trust and disgust, and anticipation and surprise. The underlying assumption is that any expressed emotion can be related or subsumed by one of the eight basic emotions.

Mohammad and Turney [43, 44] let respondents assign 14,182 terms to one or several of these eight emotions using a crowdsourcing solution, namely Amazon's Mechanical Turk (Mturk), in order to characterise these emotions. In addition, each term had to be assigned to one of the two sentiments, positive and negative. If a term was assigned to one of these ten items, it got a value of 1, if not a value of 0. The resulting EmoLex is available in 105 different languages. In this study, the English version was used to determine in the first step, which emotions appear in which reviews, and in the second step, which emotions are triggered by the above-mentioned Airbnb accommodation characteristics. Before the string-matching attempt between the EmoLex and the Airbnb accommodation reviews was run, several data preparation tasks, described below, were performed on the raw review text as well as the EmoLex term lists.

The EmoLex originally consists of 14,182 terms. 7,714 were not assigned to one of the eight emotions. The remaining 6,468 terms ran through the subsequent lemmatization task [55]. Lemmatization is used in order to reduce inflected forms of a term to its basic shape, called lemma, group identical ones together and treat them as a single term. For 182 terms the lemma was not traceable. This resulted in 6,286 workable terms. 411 of them did not have unique lemmas. Hence, their emotion allocations had to be aggregated. If such overlapping EmoLex terms were assigned in different ways to the eight emotions, the mean value was calculated to account for their allocation strength. For example, one EmoLex term was assigned to anger with a value of 1, another one was not assigned to anger and got a value of 0, but both have the same lemma. Consequently, the lemma-aggregated value became .5. Thereafter, the string-matching attempt was conducted between 5,875 lemma-aggregated EmoLex terms and the lemmatized Airbnb reviews.

Out of all 248,455 Airbnb reviews, 80,545 were not classified as English reviews using Google's Compact Language Detector 2 [52]. The remaining 167,910 English reviews were lemmatized as well. Digits and punctuation marks were deleted. For the subsequent string-matching technique [53] the reviews were treated as a bag-of-words, which means the word order is lost but multiplicity of terms is retained.

Finally, the string-matching task resulted in a matrix with the size 5,875 (lemmatized aggregated EmoLex terms) x 167,910 (English reviews), with the number of matches in each cell. The absolute frequency distribution of these values (in brackets) was as follows: 985,406,166 (0), 1,003,301 (1), 53,186 (2), 6,774 (3), 1,358 (4), 324

(5), 92 (6), 29 (7), 10 (8), 7 (9), 2 (11), and 1 (27). Subsequently, they were weighted twice: First, to reduce the overshadowing effect of terms with extreme frequencies in certain reviews, e.g., a term that appears 27 times in a single review, the local weight at the single review level was:

$$\log(1 + f_{t,r}),$$

one plus the frequency f of a term t within a certain review r [56]. Second, for example, the term ‘good’ appears in 65,670 different reviews at least once, other terms only show up once in all reviews. The idea to put more weight on striking terms that appear rather seldom and to put less weight on colloquially used terms, requires a global weight at the review level. This weighting discriminates terms based on the number of different reviews they pop up. This was realised by the inverse document frequency (idf), one of the most often used global weights [e.g., 54]:

$$1 + \log\left(\frac{N}{n_t}\right),$$

one plus the logarithm of the overall number of reviews N divided by the number of reviews a certain term t shows up n_t .

However, not only the occurrences had to be weighted, but also the lemma-aggregated EmoLex values. The reason for this is that some dimensions of emotions contain disproportionately more terms compared to others, e.g., fear comes with 1,432 terms, surprise just with 526 terms (Table 1). Consequently, the likelihood of the appearance of terms related with fear is higher compared with terms of the surprise category. Thus, to neutralize this effect, the lemma-aggregated EmoLex values were divided by the lexicon’s term length of their respective emotion dimension.

Table 1. Descriptive statistics

		Sentiment		Anger	Anticipation	Disgust	Fear	Joy	Sadness	Surprise	Trust
		Positive	Negative								
Lexica length		2,258	3,206	1,209	818	1,020	1,432	667	1,148	526	1,212
Terms	Avg	5.26	.99	.32	2.42	.27	.38	2.84	.77	1.39	3.70
	Max	68	48	23	34	22	29	45	24	25	39
Unique terms	Avg	4.91	.93	.30	2.16	.25	.36	2.57	.73	1.19	3.41
	Max	48	31	15	20	14	13	29	16	15	27

After the multiplication of the weighted term-review occurrence matrix with the normalized lemma-aggregated EmoLex matrix, the review length had to be neutralised (maximum: 5,699 characters). Since the probability for EmoLex terms to appear in longer reviews is higher, the values of the resulting review x emotion matrix were divided row-wise by the number of characters of the respective reviews.

In the penultimate step, the eight emotion dimensions as well as the positive and negative sentiment values were divided by their sum. This results in relative emotion/sentiment percentages per review. Finally, these values were aggregated at the Airbnb accommodation level.

4 Results

Table 1 lists string-matching results (absolute frequencies) between the lemmatised 167,910 Airbnb reviews and the lemma-aggregated 5,875 EmoLex terms. Overall, 3,191 different EmoLex terms appeared in the reviews, 2,684 terms did not. 4,987 reviews did not contain a single EmoLex term, whereas 162,923 do. On average, each review contains about five positive terms but just one negative. This means that the reviews contained predominantly positive emotions. Trust, joy and anticipation are the strongest dimensions. On average, related terms appear more than twice in each review. Disgust, anger and fear do not even show up in every second review.

Compared to the raw occurrence values in Table 1, findings reported below are based on weighted normalized relative percentages. All data preparation procedures discussed in the methodology section, that should outweigh review or lexicon based distortions, are processed. Nonetheless, e.g., the dominance of uncommon terms in a particular EmoLex dimension, or similar inherent characteristics, might still be present, and influence the determined distribution of emotions over reviews in the end.

As a validity criterion, the lower triangle matrix of Fig. 1 exhibits Spearman’s rho (ρ) correlation coefficients between all emotion and sentiment percentages on the single review level. All p -values are ≤ 0.01 . The principal diagonal contains the variable names and the intensity of the gray tones/tilt of the ovals in the upper triangle matrix the pairwise relationship strength/direction (positive vs. negative). Positive sentiment is positively connected with joy and trust, but negatively connected with anger, disgust, fear and sadness. The opposite is true for negative sentiment. Surprise and anticipation do not seem to be in line with the simple positive vs. negative logic.

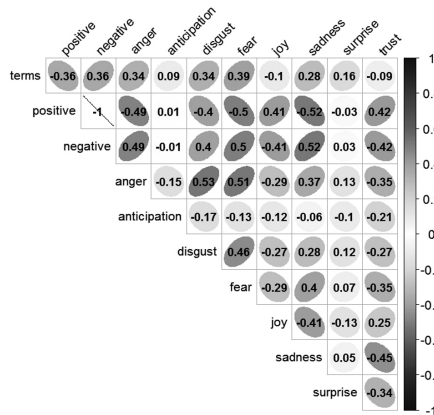


Fig. 1. The relationship between emotions

The strongest relationships are visible between sadness and fear (+), sadness and trust (-), sadness and joy (-), disgust and fear (+), anger and disgust (+), and anger and fear (+). All of them point in the expected direction. Surprise has very weak relationships with all other emotions. By comparison, anticipation is slightly negatively

related to all other emotions and misses any positive ones. Negative terms and emotions increase with the review length, for positive ones it is the direct opposite.

Figure 2 exhibits the link between the single Airbnb service property ratings and the emotions at the aggregated Airbnb accommodation level. There are no extremely negative ratings with a value of one. None of the characteristics has an average rating of three, except from cleanliness. For all other scale categories mean emotion percentage values were calculated from the absolute number of observations given below the x-axis labels. They reveal the typical J-shaped distribution of such ratings. The eight emotions were regressed separately on the six Airbnb property ratings. If an Airbnb property rating does not significantly affect an emotion, its trend is not shown in the respective Airbnb service property visualization in Fig. 2.

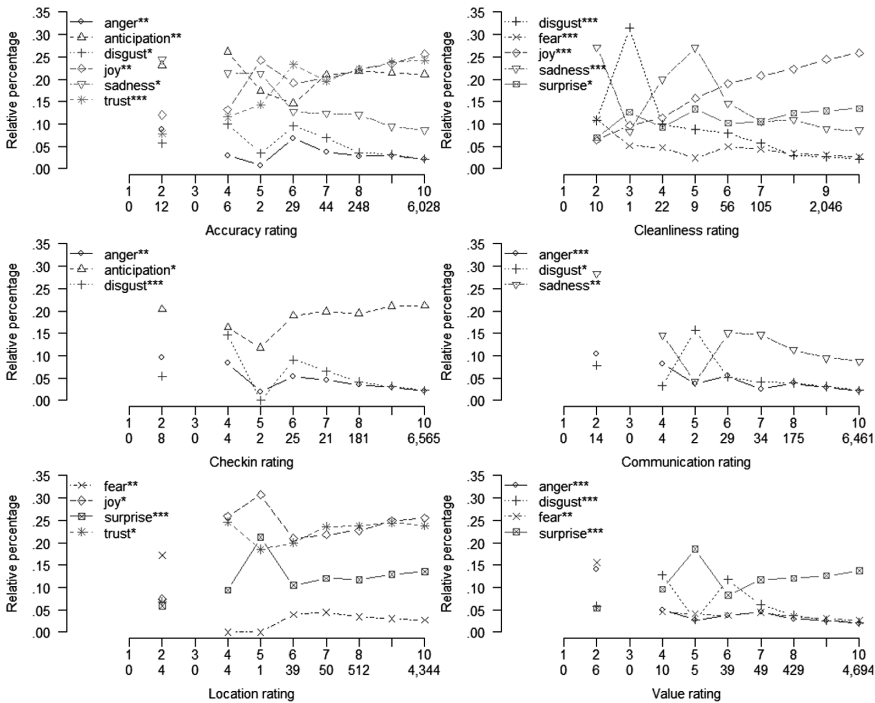


Fig. 2. Airbnb characteristics’ emotions (Significance: * $\alpha = 5\%$, ** $\alpha = 1\%$, *** $\alpha = 0.1\%$)

Generally, there are remarkable differences at the lower and mid-level of the scale (1–5). In many cases, a monotone increase or decrease is not visible at the negative pole of the rating scale because of the low number of observations. The composition of emotions at high satisfaction levels is highly similar for all six service qualities.

This is due to the fact, that no differentiation between service qualities is possible if the overall satisfaction level as well as the rating for the six service qualities is very high.

The emotion of joy can only be observed for three service and lodging aspects, namely accuracy, cleanliness, and location. It exhibits an increasing trend for all three aspects at better rating levels, whereas sadness (accuracy, cleanliness, and communication) and anger (accuracy, check-in, communication, and value) decrease with higher ratings. According to the data, there is no significant relationship between joy and communication, check-in, and value. This result leads to the assumption that the latter three aspects are less qualified for evoking consumer delight. Even more, a predominance of negative emotions is observed for these aspects. Hence, they are seen as basic factors, which primarily cause dissatisfaction. Accuracy significantly evokes six different emotions (namely anger, anticipation, disgust, joy, sadness, and trust) whereas check-in and communication only have three significant relationships with the eight emotions. A closer analysis shows that anger is negatively related to check-in, communication, value, and accuracy. Only check-in and accuracy significantly evoke anticipation.

5 Conclusions and Discussion

From a methodological perspective, this paper shows that emotions can be determined from reviews by employing a lexicon-based verbal emotion recognition technique. The NRC word emotion lexicon indicates valid relationships between the different emotions based on Airbnb reviews derived from the Inside Airbnb project. The validity is reflected by the fact that all positive emotions tend towards the same direction, as well as all negative emotions. Relationships between the emotions and Airbnb lodging and service aspects are manifold. Most of the eight emotions clearly point in the expected direction (e.g., cleanliness and disgust, or check-in and anticipation), even on the single item rating level. Thus, as far as methodology is concerned, this paper shows that the NRC word emotion lexicon is a practical tool for detecting emotions expressed in text. This methodology can also be applied to all kinds of text expressing consumer opinions.

The reviews generally contained much more positive terms than negative ones. To some extent, this can be explained by the motives of writing online reviews. Yoo and Gretzel [36] found that travel review writers are mostly driven by concerns for other consumers and for the service provider as well as needs for enjoyments. According to the authors, writing reviews is not a vehicle for venting negative feelings. Furthermore, as stated in the literature review, the bilateral reviewing system provided by Airbnb favours positive feedback [30, 31]. Another general statement about positive and negative terms can be drawn about the relationship between the review length and the number of positive and negative terms, namely, the longer the review the more negative terms and the less positive ones occur. This result is in line with the findings of Ullah et al. [39]. They found that the average length of reviews peaks at the 2-Star ratings (overall satisfaction) level.

The results of the analysis further show that communication is closely related to negative emotions (sadness, anger, and disgust), with all three decreasing as the rating increases. As online communication between host and guest is the first point of contact, this factor is obviously very important, and therefore can be assumed as must-be factor.

The aspects of location and value both reveal a generally very low level of negative emotions (fear and anger). This might be due to the fact that location and value are important factors during the planning process. These aspects can thus evoke joy (location) or surprise (value) if they are according to the expectations. Cleanliness evokes the greatest number of negative emotions compared to all other service and lodging aspects. This indicates that cleanliness might be a must-be factor, which definitely should be fulfilled.

Summarized, disgust is evoked by five out of six service and lodging aspects (accuracy, cleanliness, check-in, communication and value). Anger occupies the second place (accuracy, check-in, communication and value). Fear, joy, sadness and surprise are driven by three aspects, trust by two (accuracy and location). As online communication between host and guest is the first point of contact that can evoke negative emotions, it is obviously very important. In addition, the value has to meet the expectations and attention must be given to the check-in process on-site to avoid negative emotions.

As far as limitations are concerned, it must be recognized that there might be differences between the words within the reviews and the EmoLex terms in terms of linguistic features. In addition, the likelihood of terms to be used might be different between emotions and thus, the EmoLex might not be exhaustive. Furthermore, language styles like subjunctives, irony, interrogative formulations, bipolar opinions, negations, polysemy and ambiguity were not taken into consideration. The lemmatization was not possible for all reviews and EmoLex terms nor can it be guaranteed that it is 100% accurate due to lemma overlaps of original terms with different meanings.

For future studies, it would be interesting to gain more information on what the consequences of high emotional reviews are. Furthermore, other Airbnb listing information could be used to give an answer on further research questions, e.g. superhost vs. non-superhost differences, differences based on the time frame since being a host, etc.

References

1. Lessig L (2008) *Remix: making art and commerce thrive in the hybrid economy*. Penguin
2. Botsman R (2013) The sharing economy lacks a shared definition. <http://www.fastcoexist.com/3022028/the-sharing-economy-lacks-a-shareddefinition>. Accessed 18 June 2018
3. Airbnb (2018a) <https://www.airbnb.com/about/about-us>. Accessed 05 July 2018
4. Airbnb (2018b) <https://press.airbnb.com/fast-facts/>. Accessed 02 July 2018
5. Guttentag D (2015) Airbnb: disruptive innovation and the rise of an informal tourism accommodation sector. *Curr Issues Tour* 18(12):1192–1217
6. Oskam J, Boswijk A (2016) Airbnb: the future of networked hospitality businesses. *J Tour Futures* 2(1):22–42
7. Tussyadiah IP (2015) An exploratory study on drivers and deterrents of collaborative consumption in travel. In: Tussyadiah I, Inversini A (eds) *Information and communication technologies in tourism 2015*. Springer International Publishing, pp 817–830
8. Edelman BG, Luca M (2014) Digital discrimination: the case of Airbnb.com. HBS Working Paper Number: 14-054. Harvard Business School
9. Teubner T, Hawlitschek F, Dann D (2017) Price determinants on Airbnb: how reputation pays off in the sharing economy. *J Self-Gov Manag Econ* 5(4):53–80

10. Gretzel U, Yoo KH (2008) Use and impact of online travel reviews. In: O'Connor P, Höpken W, Gretzel U (eds) *Information and communication technologies in tourism 2008*. Springer International Publishing, pp 35–46
11. Kim J, Gupta P (2012) Emotional expressions in online user reviews: how they influence consumers' product evaluations. *J Bus Res* 65(7):985–992
12. Ludwig S, de Ruyter K, Friedman M, Brügger E, Wetzels M, Pfann G (2013) More than words: the influence of affective content and linguistic style matches in online reviews on conversion rates. *J Mark* 77(1):87–103
13. Yin D, Bond S, Zhang H (2014) Anxious or angry? Effects of discrete emotions on the perceived helpfulness of online reviews. *MIS Q* 38(2):539–560
14. Bansal HS, Voyer PA (2000) Word-of-mouth processes within a services purchase decision context. *J Serv Res* 3(2):166–177
15. Jalilvand MR, Samiei N (2012) The impact of electronic word of mouth on a tourism destination choice: testing the theory of planned behavior (TPB). *Internet Res Electron Netw Appl Policy* 22(5):591–612
16. Ye Q, Law R, Gu B, Chen W (2011) The influence of user-generated content on traveler behavior: an empirical investigation on the effects of e-word-of-mouth to hotel online bookings. *Comput Hum Behav* 27(2):634–639
17. Baka V (2016) The becoming of user-generated reviews: looking at the past to understand the future of managing reputation in the travel sector. *Tour Manag* 53:148–162
18. Dellarocas C (2003) The digitization of word of mouth: promise and challenges of online feedback mechanisms. *Manag Sci* 49(10):1407–1424
19. Litvin SW, Goldsmith RE, Pan B (2008) Electronic word-of-mouth in hospitality and tourism management. *Tour Manag* 29(3):458–468
20. Cox C, Burgess S, Sellitto C, Buultjens J (2009) The role of user-generated content in tourists' travel planning behavior. *J Hosp Mark Manag* 18(8):743–764
21. Vermeulen IE, Seegers D (2009) Tried and tested: the impact of online hotel reviews on consumer consideration. *Tour Manag* 30(1):123–127
22. Zhao X, Wang L, Guo X, Law R (2015) The influence of online reviews to online hotel booking intentions. *Int J Contemp Hosp Manag* 27(6):1343–1364
23. Havitz ME, Dimanche F (1990) Propositions for testing the involvement construct in recreational and tourism contexts. *Leis Sci* 12(2):179–195
24. Olson K (2013) National study quantifies reality of the 'Sharing Economy' movement. http://www.campbell-mithun.com/678_national-study-quantifiesreality-of-the-sharing-economy-movement. Accessed 15 June 2018
25. Möhlmann M (2015) Collaborative Consumption: determinants of satisfaction and the likelihood of using a sharing economy option again. *J Consum Behav* 14(3):193–207
26. Ert E, Fleischer A, Magen N (2016) Trust and reputation in the sharing economy: the role of personal photos in Airbnb. *Tour Manag* 55:62–73
27. Dolnicar S (2017) Unique features of peer-to-peer accommodation networks. In: Dolnicar S (ed) *Peer-to-peer accommodation networks: pushing the boundaries*. Goodfellow Publishers, Oxford, pp 1–14. <https://dx.doi.org/10.23912/9781911396512-3599>
28. Hrobath BA, Leisch F, Dolnicar S (2017) Drivers of price in city destinations: Vienna. In: Dolnicar S (ed) *Peer-to-peer accommodation networks: pushing the boundaries*. Goodfellow Publishers, Oxford, pp 137–147. <https://dx.doi.org/10.23912/9781911396512-3610>
29. Zervas G, Proserpio D, Byers J (2015) A first look at online reputation on Airbnb, where every stay is above average. <https://collaborativeeconomy.com/research/a-first-look-at-online-reputation-on-airbnb-where-every-stay-is-above-average/>. Accessed 28 June 2018

30. Dellarocas C, Wood CA (2008) The sound of silence in online feedback: estimating trading risks in the presence of reporting bias. *Manag Sci* 54(3):460–476
31. Bolton G, Greiner B, Ockenfels A (2013) Engineering trust: reciprocity in the production of reputation information. *Manag Sci* 59(2):265–285
32. Berger J, Milkman KL (2012) What makes online content viral? *J Mark Res* 49(2):192–205
33. Rice RE, Love G (1987) Electronic emotion: socioemotional content in a computer-mediated communication network. *Commun Res* 14(1):85–108
34. Hennig-Thurau T, Gwinner KP, Walsh G, Gremler DD (2004) Electronic word-of-mouth via consumer-opinion platforms: what motivates consumers to articulate themselves on the internet? *J Interact Mark* 18(1):38–52
35. Alick MD, Braun JC, Glor JE, Klotz KL, Magee J, Sederholm H, Siegel R (1992) Complaining behavior in social interactions. *Pers Soc Psychol Bull* 18(3):286–295
36. Yoo KH, Gretzel U (2008) What motivates consumers to write online travel reviews? *Inf Technol Tour* 10(4):283–295
37. Bronner F, De Hoog R (2011) Vacationers and eWOM: who posts, and why, where, and what? *J Travel Res* 50(1):15–26
38. Ho JY, Dempsey M (2010) Viral marketing: motivations to forward online content. *J Bus Res* 63(9–10):1000–1006
39. Ullah R, Amblee N, Kim W, Lee H (2016) From valence to emotions: exploring the distribution of emotions in online product reviews. *Decis Support Syst* 81:41–53
40. R Core Team (2018) R: a language and environment for statistical computing. R Foundation for Statistical Computing, Vienna, Austria. www.R-project.org. Accessed 25 June 2018
41. Inside Airbnb (2018a) Detailed review data for listings in Vienna [reviews.csv.gz]. <http://data.insideairbnb.com/austria/vienna/vienna/2018-06-11/data/reviews.csv.gz>. Accessed 25 June 2018
42. Inside Airbnb (2018b) Detailed listings data for Vienna [listings.csv.gz]. <http://data.insideairbnb.com/austria/vienna/vienna/2018-06-11/data/listings.csv.gz>. Accessed 25 June 2018
43. Mohammad SM, Turney PD (2010) Emotions evoked by common words and phrases: using Mechanical Turk to create an emotion lexicon. In: Proceedings of the NAACL-HLT 2010 workshop on computational approaches to analysis and generation of emotion in text, LA, California, pp 26–34
44. Mohammad SM, Turney PD (2013) Crowdsourcing a word-emotion association lexicon. *Comput Intell* 29(3):436–465. <https://doi.org/10.1111/j.1467-8640-2012.00460.x>
45. Plutchik R (1962) The emotions: facts, theories and a new model. Random House, New York
46. Izard CE (1977) Human emotions. Plenum Press, New York
47. Russell JA, Mehrabian A (1977) Evidence for a three-factor-theory of emotions. *J Res Pers* 11:273–294
48. Ekman P (1992) Are there basic emotions? *Psychol Rev* 99:550–553
49. Ekman P (1992) An argument for basic emotions. *Cogn Emot* 6:169–200
50. Plutchik R (1997) Circumplex models of personality and emotions. American Psychological Association, Washington, DC
51. Ortony A, Turner TJ (1990) What's basic about basic emotions? *Psychol Rev* 97:315–331
52. Ooms J (2018) cld2: Google's compact language detector 2. R package version 1.2. <https://CRAN.R-project.org/package=cld2>. Accessed 25 June 2018
53. Gagolewski M (2018) R package stringi: character string processing facilities. <http://gagolewski.com/software/stringi>. Accessed 25 June 2018

54. Grün B, Hornik K (2011) Topicmodels: an R package for fitting topic models. *J Stat Softw* 40(13):1–30
55. Rinker TW (2018) Textstem: tools for stemming and lemmatizing text version 0.1.4. Buffalo, New York. <http://github.com/trinker/textstem>. Accessed 25 June 2018
56. Wild F (2015) lsa: Latent semantic analysis. R package version 0.73.1. <https://CRAN.R-project.org/package=lsa>. Accessed 25 June 2018



UK Residents' Opinions of Peer-to-Peer Accommodation Impact on Quality of Life

Jason L. Stienmetz^(✉), Anyu Liu, and Iis P. Tussyadiah

School of Hospitality and Tourism Management,
University of Surrey, Guildford, UK

{j.stienmetz, anyu.liu, i.tussyadiah}@surrey.ac.uk

Abstract. The aim of this study was to explore UK residents' opinions of how peer-to-peer (P2P) accommodation listings within their communities impact upon their quality of life (QoL). Seven hundred and eighty open-ended questions were collected across the UK and content analysis was conducted to investigate the textual data. It is found that 13% of UK residents held positive opinion on P2P accommodation whereas another 13% expressed negative attitude and the rest kept neutral opinions. More people believed P2P accommodation brought positive economic and negative environmental impacts on the QoL, while the social influence was neutral. Opinions of London residents on P2P accommodation are different from those of non-London residents. Practical implications are provided to policymakers based on the empirical findings.

Keywords: Peer-to-peer accommodation · Quality of life · Tourism impact
Host-guest relationship

1 Introduction

The fast-growing peer-to-peer (P2P) accommodation has generated significant economic contributions [1] and provided new employment opportunities [2] in tourism destinations. However, there are concerns that the rapid growth of P2P accommodation results in such issues as gentrification [3], increased housing prices [4], discrimination [5], avoidance of government regulation [6], and threats to traditional tourism and hospitality businesses [7]. While several studies have investigated socio-economic characteristics of areas with P2P listings [8], little work has been undertaken to understand how this disruptive innovation has affected the overall well-being of community residents from a holistic (social, economic, and environmental) perspective [9, 10]. The delicate balance between tourists and residents has long been a topic of interest for tourism scholars [11, 12] and the increase of tourists in residential areas brought by P2P accommodation will continue to place a strain on this important relationship. Under the framework of Social Exchange Theory (SET), numerous studies show that residents who perceive positive benefits from tourism will be more likely to support tourism development [13–15]. Studies have further shown that the local community's support for P2P accommodation is also dependent on perceived social and economic impacts [16].

Therefore, using a holistic community well-being framework, this study aims to provide important insights into how the development of P2P accommodation services can influence the well-being of local residents. The findings of the study will complement the literature on impacts of P2P accommodation, help practitioners to anticipate the range of benefits and externalities from P2P accommodation more comprehensively, and provide academic support for policymakers and other stakeholders to ensure the growth and impacts of P2P accommodation will align with sustainable development goals in the tourism industry and across destinations.

2 Theoretical Foundation

By matching unmet demand with untapped supply in the accommodation marketplace, P2P accommodation platforms such as Airbnb have enjoyed increasing popularity and thus phenomenal growth. It has been suggested that guests choose P2P accommodation to satisfy their cost-saving and social needs [17]. Interactions with hosts, the local culture, and personalisation were found to be the most attractive features of P2P accommodation appreciated by guests [18, 19]. As a result, the expansion of P2P accommodation has affected the traditional hotel industry. As customers tend to use P2P accommodation as a substitution of traditional hotels [20], studies have evidenced the negative impacts of P2P accommodation on hotel performance. In particular, using data from Texas, US, it was found that the influence of P2P accommodation is stronger on lower-end hotels [21] and that these effects are moderated by the price gap between P2P accommodation and hotels [22]. However, as P2P accommodation and hotels are penetrating into their counterparts' markets, the impact of P2P accommodation needs to be further investigated beyond that on hotels.

Indeed, the influence of P2P accommodation development goes beyond the tourism and hospitality industry. The emergence of P2P accommodation is said to potentially boost the housing rental rate in the US [23, 24]. Evidence of race discrimination in P2P accommodation was also revealed [3]. Based on a field experiment, it was identified that guests with African American names experienced a lower booking acceptance rate than White Americans [25]. Finally, as P2P accommodation develops, numerous challenges to current regulations were also reported [26].

The impact of P2P accommodation development on destinations is not unique. Intensive studies have shown the influence of tourism development on the destinations from economic, social, and environmental perspectives [10, 15]. According to SET [27], if the positive impact of tourism is larger than the negative one, residents will support further development of tourism in the future; or else, they will show no interest in tourism development. The attitude of residents toward tourism development has been widely examined by scholars in a number of destinations in various time periods [28]. Most empirical findings support the propositions in SET. More recently, a utility maximization model was adapted to explain residents' support for tourism from a conceptual perspective [12].

The development of tourism may not only affect the attitudes of hosts, but also the communities' quality of life. A positive relationship between tourism development and communities' quality of life (QoL) was found using one-off survey data [29, 30]. In

contrast, using six waves of the European Social Survey data in 2002–2013, it was evidenced that as the tourism industry developed, the QoL of local residents increased at the beginning, but started to decline after the tourism development passed a certain level, indicating the negative impact of over-tourism [31].

Although the impact of tourism development on the QoL of the local community has been intensively investigated, the examination of SET in this emerging sector, P2P accommodation, has been overlooked. A one rare case [32] indicated that residents could perceive both positive and negative impacts brought by P2P accommodation in economic, social, and environmental realms. More efforts should be paid into this field to investigate the relationship between P2P accommodation development and the QoL of local residents. The answer to this question is not only important to the sustainable development of P2P accommodation industry, but also could provide empirical support for the development of initiatives by government and stakeholders in order to achieve a win-win situation for both the industry and local residents.

3 Method

The aim of this study was to explore UK residents' opinions regarding how P2P accommodation listings within their communities have impacted their QoL. For this purpose an online questionnaire methodology was used where study participants were first provided with a working definition of P2P accommodation ("the short-term rental of private residences that is available through companies such as Airbnb and Home-Away") followed by an open-ended question "please share with us your opinions of how peer-to-peer accommodations have impacted the quality of life in your community." An academic definition of QoL was not provided to participants as doing so may have influenced their responses. Rather, respondents' own interpretation of "quality of life in your community" allowed for an unbiased expression of issues related to P2P accommodation. The online survey was distributed via Survey Sampling International (SSI) and targeted SSI panel members residing in the UK (including England, Wales, Scotland, and Northern Ireland). Because issues surrounding P2P accommodation are particularly salient for urban communities and because London is one of the cities with the highest number of P2P listings, a purposive sampling strategy required 50% of the sample to reside in the Greater London area. Data were collected in June 2018 and resulted in a total of 780 valid responses, 390 of which resided in Greater London and 390 living elsewhere in the UK.

Survey respondents were also asked demographic questions regarding region of residence, gender, age, and education, number of years they have lived in their current community, and whether they had experience staying in P2P accommodation or listing a P2P accommodation. Responses to the open-ended question were then coded manually into three categories: (1) those reporting a negative impact on QoL in their community, (2) those reporting neutral impact on quality of life, and (3) those reporting a positive impact on QoL in their community. Responses describing both negative and positive impacts were coded as neutral. The open-ended responses were also processed using KH Coder content analysis software [33].

4 Results

Characteristics of the UK sample are reported in Table 1. The distribution of region of residence for the outside London subsample was similar to that of the UK, and there was a representative distribution of gender, age, and education levels for the sample. The level of education of Greater London residents was significantly higher with 52.1 reporting at least a bachelor's degree compared to 34.6% of non-London residents reporting the same levels of education. The Greater London area subsample could also be described as generally younger (40.3% were less than 45 years old) compared to the non-London subsample (71.3% at least 45 years old). Overall, nearly half (49.1%) of the sample had lived in their current community for 20 years or more, and only 12.4% of the sample had lived in their community less than five years. Interestingly, about a fifth of the total sample (21.4%) reported having previously stayed in P2P accommodation, with the share of London residents using P2P accommodation slightly higher than non-London residents (26.9% compared to 15.9%). Only a minority of the sample (6.2%) listed accommodations on P2P platforms.

Table 1. Sample characteristics, n = 780

		All UK residents (n = 780)	Greater London (n = 390)	Outside London (n = 390)
Region	England	93.1%	100%	86.2%
	Scotland	3.3%	0%	6.7%
	Wales	2.4%	0%	4.9%
	Northern Ireland	1.2%	0%	2.3%
	Gender	Male	50.5%	53.8%
	Female	49.5%	46.2%	52.8%
Age	18–24 years	5.8%	7.7%	3.8%
	25–34 years	13.2%	15.4%	11.0%
	35–44 years	15.5%	17.2%	13.8%
	45–54 years	19.2%	17.7%	20.8%
	55–64 years	23.8%	18.7%	29.0%
	65 years or older	22.4%	23.3%	21.5%
Education	No qualifications	5.6%	4.1%	7.2%
	GSCE or equivalent	20.6%	16.2%	25.1%
	A levels or equivalent	21.8%	20.0%	23.6%
	Apprenticeship	2.3%	1.8%	2.8%
	Bachelor's degree	30.8%	36.9%	24.6%
	Master's degree	9.0%	10.8%	7.2%
	Other qualifications	6.3%	5.9%	6.7%
	Doctorate degree	3.6%	4.4%	2.8%

(continued)

Table 1. (continued)

		All UK residents (n = 780)	Greater London (n = 390)	Outside London (n = 390)
Stayed in P2P	No	78.6%	73.1%	84.1%
	Yes	21.4%	26.9%	15.9%
Listed with P2P	No	93.8%	92.8%	94.9%
	Yes	6.2%	7.2%	5.1%
Years living in community	Less than 5 years	12.4%	13.3%	11.5%
	5–9 years	15.3%	15.6%	14.9%
	10–19 years	23.2%	21.8%	24.6%
	20 or more years	49.1%	49.2%	49.0%
Opinion of P2P on community QoL	Positive impact	13.1%	14.4%	11.8%
	Neutral impact	73.7%	67.7%	79.7%
	Negative impact	13.2%	17.9%	8.5%

Manual coding of the open-ended responses reveals a balance of opinions, with three quarters (73.7%) of UK residents having a neutral opinion of the impact of P2P accommodations, and the remaining one quarter almost evenly split between positive (13.1%) and negative (13.2%) opinions. Importantly, there are significant differences between the subsamples. In London, where P2P listings are more prevalent, fewer residents have a neutral opinion and there is a larger proportion of negative opinions towards P2P accommodation. Outside of London there are more positive than negative opinions of P2P accommodation's impact on QoL (11.8% compared to 8.5%). These differences in opinions towards P2P accommodation between Londoners and the rest of the UK are statistically significant ($\chi^2 = 18.1$, $df = 2$, $p < .001$).

Chi-square analysis (see Table 2) was also conducted to identify additional factors that might influence the valence of opinion towards P2P accommodation. Results indicate that perceptions of the impact of P2P accommodation on QoL vary significantly by age ($\chi^2 = 33.4$, $df = 10$, $p < .001$), with younger generations perceiving more positive impacts on QoL, while older generations perceive more negative impacts. Neither gender ($\chi^2 = 4.2$, $df = 2$, $p = .12$), nor education level ($\chi^2 = 22.5$, $df = 14$, $p = .07$) were found to have a statistically significant relationship with opinion towards P2P accommodation.

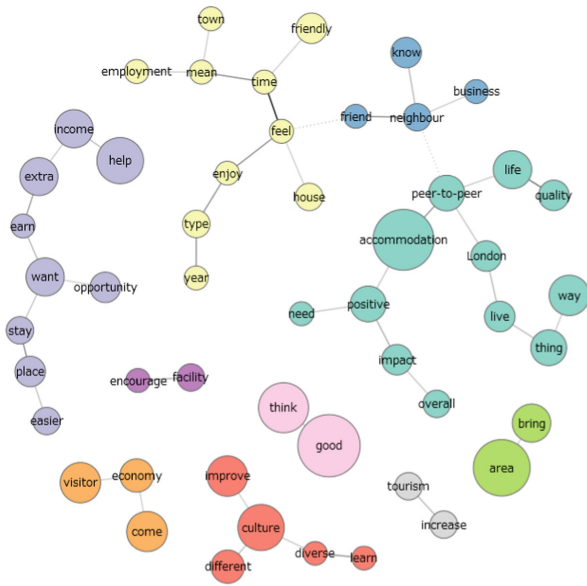
Previous experience, however, is found to have a statistically significant relationship with opinions, with those having stayed in P2P accommodation ($\chi^2 = 46.8$, $df = 2$, $p < .001$) and those listing accommodation on P2P platforms ($\chi^2 = 44.0$, $df = 2$, $p < .001$) exhibiting much more favourable opinions than those that have not. Finally, years living in the community is also found to have a statistically significant relationship with opinions towards P2P accommodation and QoL ($\chi^2 = 14.7$, $df = 6$, $p = .02$), though the relationship does not appear to be linear. The dominant negative opinion is observed among those residents having lived in the community between five to nine years and those living in the community 20 years or more. Dominant positive

Table 2. Chi-square analysis Peer-to-Peer accommodation's impact on community quality of life, n = 780

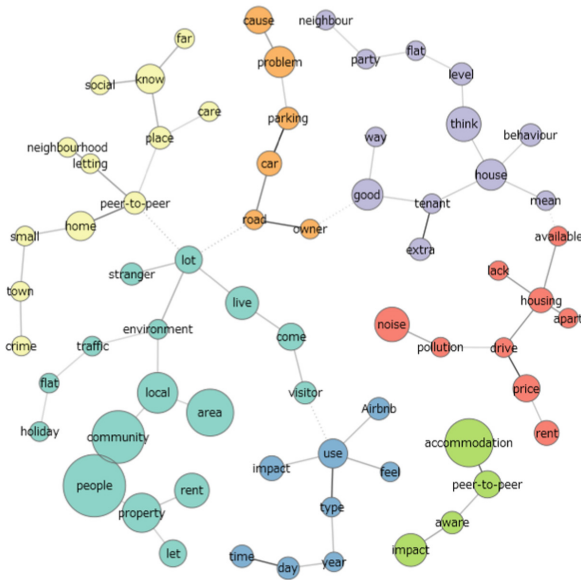
		Negative opinion	Neutral opinion	Positive opinion
Gender ($\chi^2 = 4.2$, $df = 2$, $p = .12$)	Male	14.0%	75.4%	10.7%
	Female	12.4%	72.0%	15.5%
Age ($\chi^2 = 33.4$, $df = 10$, $p < .001$)	18–24 years	6.7%	60.0%	33.3%
	25–34 years	14.6%	67.0%	18.4%
	35–44 years	14.9%	66.9%	18.2%
	45–54 years	14.0%	75.3%	10.7%
	55–64 years	10.8%	79.6%	9.7%
	65 years or older	14.9%	78.3%	6.9%
Education ($\chi^2 = 22.5$, $df = 14$, $p = .07$)	No qualifications	11.4%	81.8%	6.8%
	GSCE or equivalent	13.7%	78.9%	7.5%
	A levels or equivalent	11.8%	75.3%	12.9%
	Apprenticeship	5.6%	83.3%	11.1%
	Bachelor's degree	13.8%	68.8%	17.5%
	Master's degree	17.1%	61.4%	21.4%
	Other qualifications	16.3%	73.5%	10.2%
	Doctorate degree	7.1%	89.3%	3.6%
Stayed in P2P ($\chi^2 = 46.8$, $df = 2$, $p < .001$)	No	12.1%	78.8%	9.1%
	Yes	17.4%	55.1%	27.5%
Listed with P2P ($\chi^2 = 44.0$, $df = 2$, $p < .001$)	No	13.1%	75.8%	11.1%
	Yes	14.6%	41.7%	43.8%
Years living in community ($\chi^2 = 14.7$, $df = 6$, $p = .02$)	Less than 5 years	12.4%	70.1%	17.5%
	5–9 years	19.3%	68.9%	11.8%
	10–19 years	9.4%	72.4%	18.2%
	20 or more years	13.3%	76.8%	9.9%
Community Location ($\chi^2 = 18.1$, $df = 2$, $p < .001$)	Outside London	8.5%	79.7%	11.8%
	Greater London	17.9%	67.7%	14.4%

opinions are observed among those living in the community less than five years and those living in the community between 10 and 19 years.

Content analysis of the open-ended responses was next conducted to determine factors that influence opinions towards P2P accommodation. Only responses indicating a non-neutral impact of P2P accommodation on QoL were included in the content analysis (n = 211). Using KH Coder, responses were first pre-processed in order to eliminate stop words (e.g. “a”, “an”, and “the”), extract the root form of words (i.e., lemmatization), and determine the part-of-speech (i.e., noun, verb, adjective) of each word. Word co-occurrence networks based on the top frequency words were then created in order to further understand patterns in the ways people communicate their opinions of P2P accommodation and QoL and to identify overall themes in the opinions of respondents. Separate analysis was conducted for the responses indicating positive opinions (n = 108) and negative opinions (n = 109). Figure 1 illustrates the



(a) Positive Opinions of Peer-to-Peer Accommodation



(b) Negative Opinions of Peer-to-Peer Accommodations

Fig. 1. Word association networks describing opinions of Peer-to-Peer accommodation and quality of life

word co-occurrence networks, where size of the nodes indicates word frequency, the thickness of lines (edges) connecting nodes indicates the strength of the connection between word pairs, and shades of nodes indicate the different communities or themes within the text of the responses that were identified using the random walk method [34].

Words such as “people”, “community”, “local”, and “visitor” were the most commonly used and are an indication that social issues related to QoL were most prevalently discussed among respondents. Less frequently used words such as “rent”, “money”, and “income” related to economic factors, and words such as “area”, “noise”, and “place” related to environmental factors. Examining the word association network for positive opinions of P2P accommodation, themes such as the opportunity to generate extra income, improve the cultural diversity, support local businesses, create jobs, and encourage the development and/or improvement of community facilities are revealed. Similarly, the word association network for negative opinions of P2P accommodation reveal themes related to increases in housing prices, increases in noise, litter, and traffic congestion, and the disruptive behaviour (e.g., parties and crime) of strangers to the neighbourhood.

Based on the patterns observed from the word co-occurrence networks, the response data was manually coded to further categorise the data into themes of social, environmental, and economic factors leading to both positive and negative opinions of P2P accommodation. Table 3 reports the frequency with which each of the themes is observed for the overall sample and the London/non-London resident subsamples.

Among all groups, social factors related to P2P accommodation's influence on QoL are the most frequently mentioned. Quotes such as “...it helps everybody to be friendly...” and “...meet people from diverse cultures and learn something from them...” illustrate the positive social impacts of P2P accommodations on quality of life, while quotes such as “...I have a very acute awareness for my personal safety, I maybe a bit paranoid” and “...no community feel. No children playing or living in my flats. Over pricing pushing up costs in the area” illustrate the perceived negative social impacts of P2P accommodation.

Table 3. Peer-to-Peer accommodation factors influencing community quality of life, n = 211

	All UK residents (n = 211)	Greater London (n = 131)	Outside London (n = 80)
Positive economic impact	18%	17%	20%
Positive environmental impact	4%	4%	4%
Positive social impact	25%	24%	26%
Negative economic impact	9%	8%	11%
Negative environmental impact	16%	18%	14%
Negative social impact	29%	32%	24%

While positive social impacts are discussed only slightly less frequently than negative social impacts, the positive economic impacts of P2P accommodation are discussed with much greater frequency than the negative economic impacts. Examples of positive economic impact, such as supporting local business, increased employment, and secondary income opportunities are exemplified by quotes such as “...more people come into the community thus using the services provided and helping the economy...” and “...good way to earn extra money - some tenants might not be reputable.” The greater frequency of discussed positive economic impact compared to negative economic impact is somewhat surprising considering media coverage of housing price increases associated with P2P accommodation [6]. Examples of residents’ concerns about negative economic impact include “...the house prices have increased...” and “...worried that people who would otherwise sell are renting and hence reducing the supply of housing and driving up prices. And has the potential to destroy communities if only floating resident.”

Conversely, negative environmental impacts appear to outweigh any positive environmental impacts caused by P2P accommodation. Quotes such as “...constant bibs and loud music, untidy front gardens, too many cars belonging to one residence causing parking problems...” and “...more trash is left outside rented buildings...” illustrate concerns regarding litter, noise pollution, and increased traffic and parking congestion. Positive environmental impacts were seldom mentioned, but several quotes such as “...encouraged the local council to improve facilities...” and “...accommodations have had to be maintained to an acceptable standard...” suggest that some respondents perceive improvements to local infrastructure and services due to P2P accommodation in their community.

5 Conclusions

Based on the results, it is apparent that most UK residents do not feel QoL in their community has been significantly impacted by the development of P2P accommodation. However, there is also evidence that in the Greater London area P2P accommodation does have a greater impact on QoL compared to other parts of the UK. Indeed, throughout the UK, the amount of positive sentiment is roughly equal to the negative sentiment towards P2P accommodation, but the proportion of negative sentiment is larger in London while the opposite is true outside of London. Considering London is one of the highest growth major markets of Airbnb, the higher proportion of negative sentiment may be associated with the extent of P2P accommodation development in the communities of respondents. This calls for further studies to explore the link between growth and residents’ attitude over time. Drawing on a previous study showing evidence of increasing residents’ negative attitude after tourism development reaches a certain level [31], it is imperative that mechanism is built (e.g. regulatory framework) to anticipate an optimum level of development without sacrificing residents’ QoL. Age, experience with P2P accommodations, and time spent living in a community all influence residents’ opinions on the impact of P2P accommodation on community QoL.

Based on content analysis, factors influencing both positive and negative sentiment towards P2P accommodation have been categorised as social, environmental, and economic factors. This categorisation of impacts is consistent with previous P2P accommodation studies, such as [16] and [32]. Social factors encompass the most prevalent issues, while environmental issues seem to have the least impact on QoL. Different from the findings of [16] and [32], economic issues, which capture news headlines, are found to be of secondary concern to social factors. Further, negative economic factors (such as increased cost of living) is a more discussed issue outside of London, rather than within the Greater London area. Further, negative environmental factors seem to outweigh negative economic factors. The identification of social, environmental, and economic factors are consistent with existing theoretical frameworks explaining tourism's impact on residents' QoL. Further research is now needed to better understand the relative power each factor has in influencing the overall well-being and QoL for residents and to assess the optimum level of P2P accommodation development within a community. Future studies may also wish to investigate how residents' satisfaction with current social, environmental, and economic conditions may influence attitudes towards P2P accommodation.

Several recommendations for decision makers can be made. First, it is essential to recognize that P2P accommodation in the eyes of residents appears to be a double-edged sword, with the number of residents supporting and opposing P2P accommodation in near balance. Support for P2P accommodation in part seems to be influenced by age and experience. Therefore, the public relations of P2P platforms may focus on communicating with older generations in order to win community support. Additionally, because of the particular importance of social issues revealed through this study, greater attention needs to be given to what might be described as the possible erosion of community identity as P2P accommodation is introduced. Policies and best practices should be devised which preserve and celebrate the unique social/cultural identity of communities, understanding that it is often this sense of community that attracts visitors in the first place, and which community members are most concerned with losing.

Acknowledgements. This work was supported by the University of Surrey, School of Hospitality and Tourism Management.

References

1. Levendis J, Dicle MF (2016) The economic impact of Airbnb on New Orleans. SSRN Electron J. <https://doi.org/10.2139/ssrn.2856770>
2. Fang B, Ye Q, Law R (2016) Effect of sharing economy on tourism industry employment. *Ann Tour Res* 57(3):264–267
3. Schor JB, Attwood-Charles W (2017) The “sharing” economy: labor, inequality, and social connection on for-profit platforms. *Sociol Compass* 11(8):e12493. <https://doi.org/10.1111/soc4.12493>
4. Brauckmann S (2017) City tourism and the sharing economy—potential effects of online peer-to-peer marketplaces on urban property markets. *J Tour Futur* 3(2): 114–126. <https://doi.org/10.1108/JTF-05-2017-0027>

5. Cheng M, Foley C (2018) The sharing economy and digital discrimination: the case of Airbnb. *Int J Contemp Hosp Manag* 70:95–98
6. Cheng M (2016) Current sharing economy media discourse in tourism. *Ann Tour Res* 60:111–114. <https://doi.org/10.1016/j.annals.2016.07.001>
7. Blal I, Singal M, Templin J (2018) Airbnb's effect on hotel sales growth. *Int J Hosp Manag* 73:85–92. <https://doi.org/10.1016/j.ijhm.2018.02.006>
8. Quattrone G, Proserpio D, Quercia D, Capra L, Musolesi M (2016) Who benefits from the “Sharing” economy of Airbnb? 1385–1394. <https://doi.org/10.1145/2872427.2874815>
9. Kim K, Uysal M, Sirgy MJ (2013) How does tourism in a community impact the quality of life of community residents? *Tour Manag* 36:527–540. <https://doi.org/10.1016/j.tourman.2012.09.005>
10. Uysal M, Sirgy MJ, Woo E, Kim H (2016) Quality of life (QOL) and well-being research in tourism. *Tour Manag* 53:244–261. <https://doi.org/10.1016/j.tourman.2015.07.013>
11. Lin Z, Chen Y, Filieri A (2017) Resident-tourist value co-creation: the role of residents' perceived tourism impacts and life satisfaction. *Tour Manag* 61:436–442. <https://doi.org/10.1016/j.tourman.2017.02.013>
12. Fan DXF, Liu A, Qiu RTR (2018) Revisiting the relationship between host attitudes and tourism development: a utility maximization approach. *Tour Econ*. <https://doi.org/10.1177/1354816618794088>
13. Nunkoo R, So KKF (2016) Residents' support for tourism. *J Travel Res* 55(7):847–861. <https://doi.org/10.1177/0047287515592972>
14. Zhang HQ, Fan DXF, Tse TSM, King B (2017) Creating a scale for assessing socially sustainable tourism. *J Sustain Tour* 25(1):61–78
15. Qiu H, Fan DXF, Lyu J, Lin PMC, Jenkins CJ (2018) Analyzing the economic sustainability of tourism development: evidence from Hong Kong. *J Hosp Tour Res*. <https://doi.org/10.1177/1096348018777046>
16. Garau-Vadell JB, Gutiérrez-Taño D, Díaz-Armas R (2018) Residents' support for P2P accommodation in mass tourism destinations. *J Travel Res* 004728751876706. <https://doi.org/10.1177/0047287518767067>
17. Tussyadiah IP, Pesonen J (2018) Drivers and barriers of peer-to-peer accommodation stay—an exploratory study with American and Finnish travellers. *Curr Issues Tour* 21(6):703–720
18. Paulauskaite D, Powell R, Coca-Stefaniak JA, Morrison AM (2017) Living like a local: authentic tourism experiences and the sharing economy. *Int J Tour Res* 19(6):619–628
19. Mody MA, Suess C, Lehto X (2017) The accommodation experiencescape: a comparative assessment of hotels and Airbnb. *Int J Contemp Hosp Manag* 29(9):2377–2404
20. Guttentag DA, Smith SLJ (2017) Assessing Airbnb as a disruptive innovation relative to hotels: substitution and comparative performance expectations. *Int J Contemp Hosp Manag* 64:1–10
21. Zervas G, Proserpio D, Byers JW (2017) The rise of the sharing economy: estimating the impact of Airbnb on the hotel industry. *J. Mark. Res.* 54(5):687–705
22. Xie KL, Kwok L (2017) The effects of Airbnb's price positioning on hotel performance. *Int J Hosp Manag* 67:174–184
23. Barron K, Kung E, Proserpio D (2017) The sharing economy and housing affordability: evidence from Airbnb. https://papers.ssrn.com/sol3/papers.cfm?abstract_id=3006832
24. Horn K, Merante M (2017) Is home sharing driving up rents? Evidence from Airbnb in Boston. *J Hous Econ* 38:14–24
25. Edelman B, Luca M, Svirsky D (2017) Racial discrimination in the sharing economy: evidence from a field experiment. *Am Econ J Appl Econ* 9(2):1–22
26. Nieuwland S, van Melik R (2018) Regulating Airbnb: how cities deal with perceived negative externalities of short-term rentals. *Curr Issues Tour* 1–15

27. Ap J (1990) Residents' perceptions on the social impacts of tourism. *Ann Tour Res* 19 (3):665–690
28. Sharpley R (2014) Host perceptions of tourism: a review of the research 2014. *Tour Manag* 42:37–49
29. Nawijn J, Mitas O (2012) Resident attitudes to tourism and their effect on subjective well-being: the case of Palma de Mallorca. *J Travel Res* 51(5):531–541
30. Woo E, Kim H, Uysal M (2015) Life satisfaction and support for tourism development. *Ann Tour Res* 50:84–97
31. Lvlevs A (2017) Happy hosts? International tourist arrivals and residents' subjective well-being in Europe. *J Travel Res* 56(5):599–612
32. Jordan EJ, Moore J (2018) An in-depth exploration of residents' perceived impacts of transient vacation rentals. *J Travel Tour Mark* 35(1):90–101
33. Higuchi K (2016) A two-step approach to quantitative content analysis: KH coder tutorial using Anne of green gables (Part I). *Ritsumeikan Soc Sci Rev* 52(3): 77–91. <http://www.ritsumei.ac.jp/file.jsp?id=325881>
34. Pons P, Latapy M (2005) Computing communities in large networks using random walks. <http://arxiv.org/pdf/physics/0512106v1.pdf>



An Analysis of Regional Developments of Airbnb in Switzerland: Insights into Growth Patterns of a P2P Platform

Blaise Larpin^(✉), Julien Mabillard, Miriam Scaglione, Pascal Favre,
and Roland Schegg

Institute of Tourism, University of Applied Sciences and Arts Western
Switzerland Valais, Sierre, Switzerland

{blaise.larpin, julien.mabillard, miriam.scaglione,
pascal.favre, roland.schegg}@hevs.ch

Abstract. The rapid emergence of Airbnb in Switzerland is at the origin of this study. The main objective of this work is to describe the development of Airbnb's offer in Switzerland in terms of temporal and geographical evolution. In addition, the study aims to understand Airbnb's relative weight compared to the traditional hotel sector and its professionalisation. An analysis at the municipality level gives evidence of a positive link between the Airbnb supply and the tourism intensity of regions. The supply of beds by Airbnb and traditional commercial hotels are the variables under study in this context. As a result, this research highlights the fact that Airbnb mainly reinforces supply in rural tourist regions and large and medium-sized cities, leading to competition with a high hotel supply rather than an expansion of supply in regions where hotel supply is relatively low.

Keywords: Airbnb · Switzerland · Regional differences · Vacation rental
P2P platform · Airbnb professionalisation

1 Introduction

The success of Peer-to-Peer (P2P) platforms such as Airbnb raises numerous questions. Firstly, Airbnb is mainly seen as an urban phenomenon with high-profile discussions on its place and regulation in cities like New York, Barcelona, San Francisco or London [1]. In Switzerland, the case analysed in this study, measures to control P2P accommodation platforms have recently been taken in Zurich, Geneva, Basel and Bern [2]. Despite the media focus on Airbnb, little is known however about the growth dynamics of P2P platforms outside urban areas, for example in rural regions or well-developed leisure destinations in the mountains.

Secondly, the effects of P2P accommodation platforms entering the hospitality sector have surpassed the expectation of many experts [3]. Hotels fear the unfair competition from P2P platforms leading to a loss in market share as the new players benefit from looser legal constraints [4]. The impact of the growth of P2P platforms is not yet clear though. Some believe that Airbnb caters to different customer

demographics than hotels [5] while Zervas, Proserpio and Byers [6] have found that the impact of Airbnb is uneven across the hotel industry in Texas, with a strong impact particularly on budget hotels. As tensions between hotels and Airbnb could increase with the rapid growth of the Airbnb supply compared to hotel offer, the monitoring of the magnitude and evolution of this ratio in different regions and contexts becomes a critical issue for tourism policy.

Third, little is known about how the established commercial hospitality sector and travellers will deal with the increased peer-to-peer professionalisation [3]. Professionalisation of Airbnb is translated in an increasing proportion of hosts owning multiple listings, called “multihosts”. These hosts use Airbnb to earn money or are already professionals in the traditional vacation rental industry and see Airbnb as a new distribution channel. It generates debates about the loss of the original spirit of Airbnb that could repel travellers who use P2P accommodations, as they want to live like the locals, have an “authentic” host family experience [7]. On the other hand, this evolution may satisfy other customers who seek a standardised service, diminishing the risk of having a bad experience.

The present study focuses on quantitative aspects of the development of the Airbnb supply in Switzerland. Its main goal is to know if Airbnb listings are evenly distributed throughout Switzerland and if they compete with hotels. In addition, the development of the Airbnb market in Switzerland will be analysed and it will be determined whether Airbnb is losing its P2P orientation due to the professionalisation of the hosts. The organisation of the paper is the following: after the literature review and the methodology chapter, a descriptive analysis part reveals main trends of the Airbnb development in Switzerland. The empirical part is completed by an analysis studying the link between the typology of regions (e.g. urban versus rural municipalities) and the ratio of the hotel supply versus the Airbnb supply. At the end, a discussion and conclusion section follows.

2 Literature Review

In recent years, under the impetus of social, economic and technological factors [8] new forms of collaborative consumption have emerged in sectors that until recently were not of a collaborative nature [9, 10]. Also known as the P2P economy [11], or sharing economy, this “new” form of socio-economic exchange emphasises utilisation rather than ownership and can be described as “distributed networks of connected individuals and communities, as opposed to centralized institutions [...] sharing underutilized assets from spaces to skills to stuff for monetary or non-monetary benefits” [11]. However, the use of the term “sharing” in current forms of collaborative consumption is strongly questioned. Belk [9] shows that an overly broad definition of sharing does not correspond to these new forms of collaborative consumption and therefore proposes a definition involving “people coordinating the acquisition and distribution of a resource for a fee or other compensation” [9]. Applied to tourist accommodation, the definition of P2P accommodation excludes accommodation services without “compensation” (i.e. couchsurfing) [12].

The professionalisation of the collaborative economy encompasses several questions reported in the literature. One of these is its impacts on the quality of service: Does the quality of the expected service differ according to the type of hosting sought by the visitor? Stors and Kagermeier [13] argue that it is unknown how visitors will respond to an increasing proportion of professionals on P2P platforms. Tourists who are “explorers” could eventually seek authentic experiences elsewhere. “Despite the informal appearance of the new P2P-economic model, there are signs that this sector is becoming increasingly professionalised. Home-sharing hosts currently feel pressure from platforms and their peers to offer lower prices and provide high-standard services in order to keep attracting new guests.” [14, pp. 3]. Consequently, original non-professional hosts are getting annoyed feeling cast aside by Airbnb who began recruiting professionals for their own financial gains [15–17].

In return, many Airbnb listings have begun to resemble those of a hotel, the initial “ideal” of authenticity may well dwindle, and the regulatory leniency that such platforms have could be called into question as the border between peer hosts and professionals blurs. Originally, platforms such as Airbnb were characterised by the sharing of rooms by local hosts while today the current reality consists more of (luxury) apartments managed by professional companies [14]. According to Li, Moreno and Zhang [18], one of the main differences between markets that follow the “sharing economy” paradigm and traditional two-way markets is that supply on platforms such as Airbnb often comprises individual non-professional actors, in addition to professional companies and agents. The issue lies with the definition of professional. Whether it is someone who has followed extensive training to provide the specific service or someone who provides a specific service full time or what is more commonly seen on P2P platforms, a non-licensed person providing a service at the same level as that of a licensed trader. Economically, when comparing listings on Airbnb between professional (hosts managing multiple listings) and non-professional hosts (hosting a single property), substantial differences exist in terms of operational and financial performances [18].

The sharing economy and P2P platforms such as Airbnb put also pressure on the players of the traditional accommodation sector [19]. The boundaries between Airbnb, traditional vacation rental agencies and hotels are blurring as some listings are listed on both agencies and Airbnb platforms or both hotel and Airbnb platforms. This is no coincidence as Airbnb wants to attract hotels on its platform [20]. Where Airbnb listings are located is one of the regularly asked questions by municipalities, hoteliers and travellers as well [21]. Quattrone et al. [21] and Maxim [19] studied the spatial distribution of Airbnb listings’ in the metropolitan area of London and underlined that there are substantial differences in the nature of P2P listings across geographical regions with specific socio-demographic characteristics. Quattrone et al. [21] also showed that, as opposed to hotels, Airbnb listings have a wider geographic coverage across London. An analysis of the spatial distribution of Airbnb listings’ in Barcelona by Gutiérrez et al. [22] reveals however a close spatial relationship between accommodations offered by Airbnb and those offered by hotels, with a marked centre-periphery pattern.

3 Data Gathering and Methodology

Data Acquisition: To collect Airbnb supply data for Switzerland, the authors used the API provided by Airbnb. A script was developed by the Valais Tourism Observatory (www.tourobs.ch) that collected data for each city or municipality in the country. The idea behind this approach is to search the area by moving a frame horizontally and vertically across the country. In this way, there is almost no chance that parts of the country will be missed during the process. Another reason for this approach is that the API allows a maximum of 1000 listings retrieval by query. When a search is done by coordinates, as it was developed for this project, the results sent by the API are limited to the listings of the area, which often results in less than the limit of 1000 listings.

After the data collection, the authors used the latitudes and longitudes of the identified Airbnb listings to project them onto a Swiss map provided by the Swiss Confederation. Thus, with a simple topographic query, each listing could be assigned to a Swiss municipality and canton. This data gathering process was run 6 times since 2014 (October 2014, October 2015, June 2016, January 2017, June 2017 and January 2018) and allows a better understanding of the evolution of the Airbnb offer in Switzerland. Airbnb supply data collected by the authors have been complemented in 2018 by data provided by Transparent (<http://seetransparent.com>), a provider of market intelligence data for the vacation rental market. This enlarges the scope of the 2018 dataset to other relevant vacation rental P2P platforms (namely: Casamundo, Booking.com, HomeAway, E-domizil and TripAdvisor) in Switzerland and allows to compare the main players in this market.

Regional Analysis: One of the aims of the paper is to grasp the difference in the development of the Airbnb supply across regions in Switzerland. Besides the typology of a geographic region, the traditional hotels supply was taken into account as an explanatory variable to study whether Airbnb offerings were located in areas with presence of traditional forms of accommodation or not. To do so, a spatial unit of analysis that is representative of Switzerland was first defined. The level of the municipality (there are more than 2,200 municipalities in Switzerland) was chosen allowing a fine granularity of the analysis at the national level.

The 2017 Airbnb datasets was used. The dependent variable is the total number of Airbnb beds and the independent variable is the number of beds in hotels on the municipality level. There are 1,503 municipalities with an Airbnb supply in Switzerland that have been analysed. The municipality typology of the Swiss Federal Statistical Office that defines 25 different territorial classes was used. The authors ordered the municipalities in two groups. The first group (G1) is composed by municipalities having the following typologies [23]: City-centre of a large or medium urban area, urban tourist town of a small or outside urban area, tourist municipality of a rural centre and peripheral tourist rural municipality. The second group (G2) gathers all other municipalities. The number of municipalities for G1 is 65 and 1,438 for G2. In terms of analytical tools, Anova was used in a first step to identify differences between G1 and G2 municipalities and a regression analysis for the regional investigation.

4 Results

The results of the study are presented in four main themes highlighting remarkable findings regarding the development of Airbnb in Switzerland and topics discussed above.

4.1 Airbnb Clearly Leads the P2P Platforms in Switzerland

If one compares the number of listings of Airbnb with data from other relevant P2P platforms, it becomes clear that Airbnb is by far the market leader in Switzerland with 32,761 listings (corresponding to 35% of the market share of the analysed platforms) and 92,286 beds in January 2018 compared to other platforms (Fig. 1). Valais is one the main regions for the development of leisure tourism in the Swiss Alps and is the canton with the highest number of Airbnb listings and beds in Switzerland (6,284 listings and 28,427 beds in January 2018 compared with 5,150 listings and 22,953 beds in June 2017).

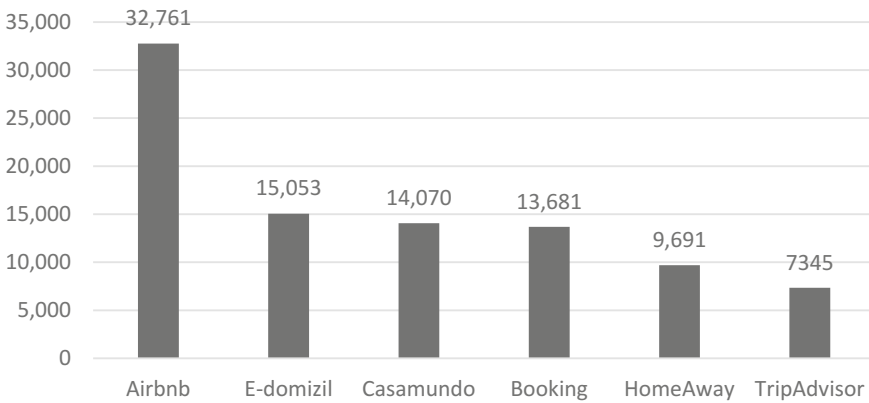


Fig. 1. Number of listings of main P2P platforms in Switzerland in January 2018

Yet, this analysis shows that the growth of the Airbnb offer in Switzerland appears to be declining. An impressive increase was observed between October 2014 (6,032 listings) and October 2015 (12,937 listings). In fact, the number of listings has increased by 114% (a doubling of supply) and since then growth rates have been declining from analysis to analysis (a growth of 34% has been observed between January 2017 with 24,464 listings and January 2018 with 32,761 listings). Therefore, there seems to be a slowdown in growth.

When considering the persistence of listings on Airbnb for the period from 2016 to 2018, a high level of renewal appears. On the 50,991 unique Airbnb listings identified

in this period, 40.7% were available for a single period while only 11% have been on the platform for all periods. This means that less than half of the listings rented in January 2016 were still rented in January 2018 (i.e. 5,612 on 12,937 listings).

4.2 The Evolution of the Airbnb Supply Reveals Regional Differences

Switzerland has a strong regional component due to its political structure formed by cantons and differences between urban and rural/mountainous areas. Those regional differences show up in this study, the alpine touristic cantons (Valais, Graubünden and Bern) being in the Top 3 of the list in terms of number of Airbnb beds due to the higher number of beds per listing compared to urban areas. In terms of the number of listings, the cantons of Valais (6,284 listings), Zurich (4,335), Vaud (3,340), Geneva (3,090) and Basel (2,808) are important.

In this respect the difference between Airbnb and the other P2P platforms is clear, the latter being almost exclusively used to rent listings in touristic mountain areas. Indeed, Valais, Graubünden and Bern represent three quarter of the listings (75.3%) rented on P2P platforms other than Airbnb. Two urban cantons (Geneva 9.3% and Basel-Stadt 11.3%), on the other hand, have the lowest proportion of non-Airbnb listings.

In general, the temporal trend shows a shift of market share from urban areas to tourist regions. The Airbnb market share of Valais, Graubünden and Bern together rises from 29.7% in January 2016 to 38.9% in January 2018, while that of Zurich, Geneva and Basel-Stadt together falls from 37.9% to 29.8%. This suggests that urban areas were early adopters of Airbnb in Switzerland, and then Alpine tourist regions demonstrated a growing interest in using this platform as a new distribution channel.

Regional Analysis: In this second part, the revealed regional differences of the Airbnb supply in Switzerland are analysed on a more granular level: the municipality (see the methodology chapter for more details). The goal of this analysis is to measure the relationship of number of Airbnb offerings in different types of municipalities in Switzerland in relation to the level of the traditional hotel supply. Descriptive statistics show that the mean of Airbnb beds per town is $G1 = 436.15$ vs $G2 = 23.85$ and hotel beds $G1 = 1920.3$ vs $G2 = 80.99$ indicating that the average of beds per municipalities in G1 set (i.e. cities and touristic municipalities) is higher than in G2 municipalities; for both hotels and Airbnb supply. In order to test if these different are significant different across the G1 and G2 the t-student test was performed on the log in order in to insure a normal distributions. The t-test show significant differences in the means of beds for Airbnb p-value <0.001 (t-value = 16.73 df = 1500) and for hotels p-value < 0.001 (t-value = 16.02 df = 1500). For sake of space, the outputs of this analysis can be downloaded from http://extranet.tourobs.ch/content/enter2019/Airbnb_Switzerland_Analysis_Output.xlsx. Figure 2 shows the scatter plot of the dependent variable (Airbnb beds) versus the independent one (hotels beds), clustered by G1 and G2. In both cases, a positive relationship can be observed; more Airbnb beds goes together with more hotel beds in a location.

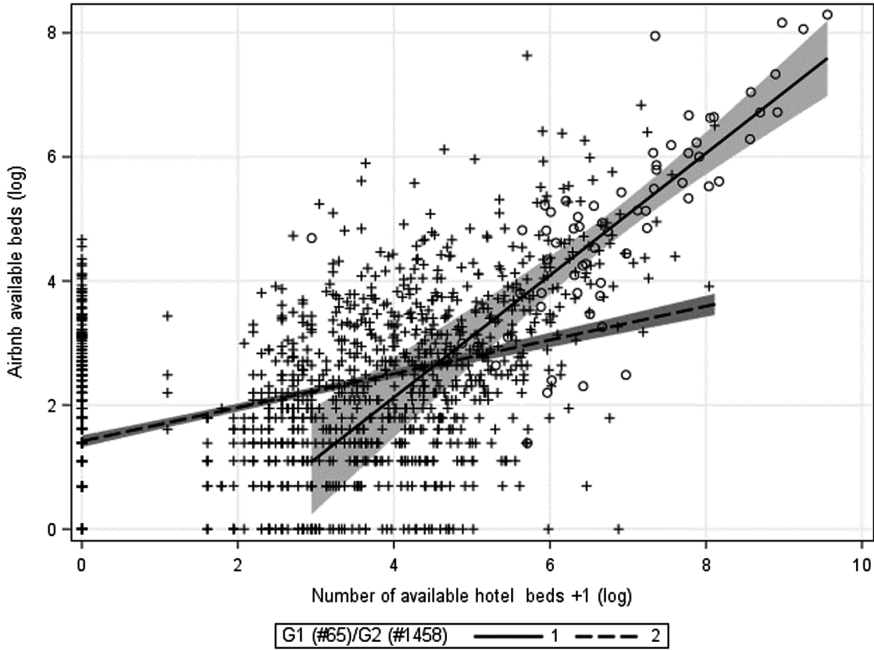


Fig. 2. Scatter plot: number of Airbnb beds (y-axis) vs hotel beds (x-axis) showing linear regressions line per set of municipality typology (G1, G2)

In order to explore the link between the two variables across G1 and G2, the authors use a regression model with binary dummy variables namely G1 and G2. This is a standard analysis “Dummy variables are most frequently used in regression equation that also contain other qualitative variables” than comparing two means [24].

A general linear model used dummy variables representing G1 and G2:

$$G1 : \log(\text{airbnb beds}) = \alpha_1 + \beta_1 \log(\text{hotels beds}) + \delta_1(\text{dummy} = 1) * \log(\text{hotels beds}) + \varepsilon$$

$$G2 : \log(\text{airbnb beds}) = \alpha_2 + \beta_1 \log(\text{hotels beds}) + \varepsilon$$

where $\varepsilon \sim N(\eta, \sigma)$

(1)

Table 1 shows the estimates of the linear model indicating that all variables have significant coefficients. The model’s criteria for assessing its goodness-of-fit are good. The scale deviance, based on the difference between maximum log likelihood and the model under consideration [25] is close to 1 and so for Pearson scaled deviance. Wald statistics for type 3 analysis is significant at less than 1 for $\log(\text{hotels beds})$, dummy variable G1/G2 and their interaction showing the contribution of those variables on the variability of the dependent variable, the number of Airbnb beds:

Table 1. Estimates for the general linear model

Parameter	Estimate	Standard error	Wald 95 confidence limits		Wald Chi-Square	Pr > ChiSq
B_1	0.2721	0.0143	0.2441	0.3002	361.34	<.0001
α_1	-1.8129	0.8508	-3.4804	-0.1454	4.54	0.0331
α_2	1.4160	0.0475	1.3229	1.5092	887.49	<.0001
δ_1	0.7117	0.1228	0.4711	0.9524	33.60	<.0001
Scale	1.1851	0.0216	1.1434	1.2282		

The following equations show the predictive function yielded by the values of Table 1 for each group where y is the log of Airbnb beds:

$$\begin{aligned} G1: \log(\text{airbnb beds}) &= -1.81 + (0.27 + 0.71) * \log(\text{hotel_beds}) \\ G2: \log(\text{airbnb beds}) &= 1.42 + 0.27 * \log(\text{hotel_beds}) \end{aligned} \quad (2)$$

The intercept (α_i) is lower for G1 towns and the opposite happens with the elasticity of Airbnb beds with respect to the number of hotel beds. In G1, composed by city centre of a large or medium urban area, urban tourist town of a small or outside urban area, the elasticity is near 1 ($0.27 + 0.71 = 0.98$) thus near perfect elasticity, meaning that an increase of 1 of hotel beds will have an increase of 1 for Airbnb beds. For G2 representing all others municipalities the increase is only 0.27.

These results show that there is a positive link between the number of beds belonging to Airbnb and hotel beds, but elasticities are different. For the high touristic towns included in G1 the elasticity is almost one whereas in all other towns it is near 0.27.

4.3 Airbnb Increasingly Important Compared to the Traditional Hotel Sector

At the beginning of 2018, Airbnb had 92,315 beds, compared with 33,422 beds in January 2016. This increase is typical of a new player in a market. It stands in stark contrast to hotels belonging to a mature industry and whose number of beds is more or less stagnating (269,315 beds in 2018 compared to 266,150 beds in 2016). It is not surprising that the weight of Airbnb is becoming increasingly important compared to hotels. The ratio of Airbnb beds to hotel beds on a national level soared from 12.6% in 2016 to 34.3% in 2018. On a regional level, the canton of Valais records the most impressive ratio in this context, 89.7%, far ahead of the city and canton of Basel (45.7%). It means that in Valais, one of the most touristic Alpine cantons, there are almost as many Airbnb beds as beds in hotels in 2018, whereas the ratio was of one fourth only two years ago. If the trend remains so, there will be more beds on Airbnb than in hotels in Valais in 2019.

When considering cantonal trends, the weight of beds available on Airbnb is two to more than four times bigger than two years ago, with the notable exception of the cantons with the biggest cities (Zurich, Geneva and Basel-Stadt) which occupy three of

the five last places. This observation does not mean that Airbnb is not well implemented in the big cities, on the contrary their ratio Airbnb/hotels beds is rather high. It could be explained by the fact that they were early adopters and thus had a lower potential for increase after 2016. Their housing stock, which can be placed on Airbnb, also appears to be more limited than in tourist regions such as Valais or Graubünden, where many holiday homes and under-occupied second homes can be rented out via Airbnb.

4.4 Airbnb’s Professionalisation is Well Under Way

To analyse the professionalisation of Airbnb, the number of listings rented by hosts was taken as the reference indicator. In this study, a host who rents ten Airbnb listings or more is called a “multihost” and is considered as an Airbnb professional because he/she is supposed to earn rather significant revenues through it.

In January 2018, 21,227 different hosts have at least one listing to rent in Switzerland. Among them, 17,761 rent only one listing, called ‘unihosts’, for a market share of 54.2%, versus 168 multihosts who rent 6,102 listings for a market share of 18.6%. Representing only 0.8% of the hosts, multihosts are not numerous but hold a significant share of the market. The evolution in Fig. 3 shows that if uni- and multi-hosts shares in number of hosts are only slightly decreasing and increasing respectively, their shares in number of listings is rapidly evolving to the advantage of multihosts.

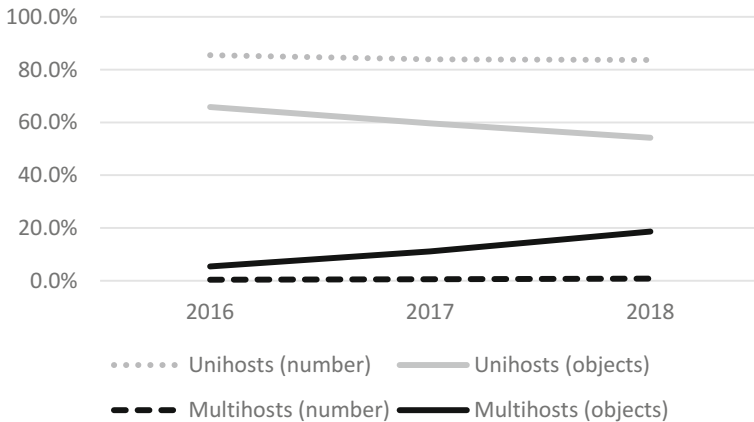


Fig. 3. Evolution of uni- and multihosts in number and listings shares at the beginning of each year

By looking at the data, two phenomena can be highlighted: the professionalisation of Airbnb and its concentration. The professionalisation of Airbnb is two-sided. Besides the multihosts growth in share of listings already mentioned, there is also a large part of identifiable real estate and vacation rental agencies among the multihosts.

Therefore, the professionalisation of Airbnb is largely led by vacation rental professionals that use Airbnb as a new channel to rent their listings. The supply concentration can be seen in the great difference between the share of multihosts in number and their share in listings. The multiple profiles linked to the same real estate agency confirm this concentration phenomenon, for example *Interhome* accounts for at least 24 multihosts and *Inter Chalet* for 15. These two agencies alone represent more than twenty percent of the multihosts and nearly forty percent of their listings. Moreover, they both belong to the same holding - *Hotelplan*.

5 Discussion and Conclusions

This analysis shows that Airbnb is clearly the main P2P platform for vacation rental in Switzerland with more than twice as many listings as other platforms. It benefits from its experience in a market that evolves rapidly as evidenced by Airbnb's growth and high rate of listings renewal over the last two years. However, very rapid changes could also be seen as a threat to its leading place that is far to be guaranteed in the future.

The geographic concentration of Airbnb listings in Switzerland reveals the versatility of the platform, which is strongly present in the urban and alpine tourist cantons. If Airbnb is often seen as an urban phenomenon, in the case of Switzerland it is more than that. The trend even shows a shift from urban areas, which were early adopters, to touristic regions in the Alps representing the classical mountain leisure destinations. In that sense, it seems that Airbnb becomes more like its competitors that are almost exclusively active in alpine touristic cantons.

Regarding the comparison between Airbnb with hotels, Airbnb supply in beds becomes rather significantly higher in regions of Switzerland where the traditional supply of hotels is also higher than in other regions. It is particularly the case in Valais where Airbnb beds are likely to overcome hotels beds by 2019, a symbolic and significant turning point that could trigger further reflections on their respective role in tourist accommodation of that canton. The analysis based on the classification of towns combining the study of regional differences and the comparison between Airbnb and hotels reveals the positive link between the supply of Airbnb and hotel beds. This tends to indicate that Airbnb is more a competitor rather than a complement to hotels. Indeed, the Airbnb supply is growing in urban and touristic municipalities where hotels are numerous while it remains low in other municipalities with few hotels. The results of this study are in line with findings of Gutiérrez et al. [22] who demonstrated a close spatial relationship between accommodations offered by Airbnb and those offered by hotels in Barcelona. Different studies such as the one by Zervas et al. [6] show that each increase in Airbnb supply results in a decrease in monthly hotel-room revenue. These findings suggest that tensions between hotel owners and Airbnb will not settle down, but are likely to increase.

As Airbnb grows, the share of listings owned by professionals, or multihosts, follows the same trend. Real estate and vacation rental agencies use the Airbnb platform as an additional distribution channel and concentrate a large number of listings. If some small agencies have also taken this opportunity, it appears that the main actors believing in the potential of Airbnb in Switzerland are the big players like the *Hotelplan*

holding. The fact that a large part of identifiable real estate and vacation rental agencies can be found among the multihosts is an indication for the professionalisation of Airbnb's host structure in Switzerland. Since the sharing economy represents a general paradigm shift towards non-professional service providers, it is particularly important to understand the impact of behavioural anomalies on market outcomes according to Li, Moreno and Zhang [18]. They provide empirical evidence that listings managed by professional agencies have higher daily revenue as well as occupancy rates, and are less likely to exit a market compared with those managed by nonprofessional hosts. These inefficiencies, which result from the use of non-professional hosts, could be a possible explanation for the change in the host structure observed in this study. The multihost business model therefore appears to be more economically viable and favours the growth of the market shares of professional hosts compared to single-listing hosts.

At the same time, there are still many owners who rent a single listing but they are losing market share, which will probably soon fall below 50%. So even if the unihosts, corresponding to the image of the original spirit of Airbnb, still dominate the market, they are about to lose their position which gives credit to the "fear" of disappearance of the peer-to-peer aspect of Airbnb. Thus, all discussions about the professionalisation of Airbnb in Switzerland are going to be more acute in the near future. In conclusion, it appears that the evolution of Airbnb in Switzerland is close to a turning point on several issues. Therefore, it will be very interesting to observe and analyse carefully how the situation evolves and how actors react to changing market conditions.

Essentially, this paper presents an analysis of the growth of the Airbnb offer comparing between urban/tourist areas and rural/mountainous areas in Switzerland and the relative comparison of professional/non-professional hosts. A precise spatial analysis could provide further insights into the underlying dynamics of Airbnb's development in Switzerland. Future research should also tackle the analysis of the host structure (single listing host versus multiple listing-hosts) by including additional variables allowing to assess degree of professionalism of the market players.

References

1. Hong S, Lee S (2018) Adaptive governance, status quo bias, and political competition: Why the sharing economy is welcome in some cities but not in others. *Gov Inf Q* 35:283–290
2. Timmann P (2018) Airbnb: Wachstum und Regulierung in der Schweiz. *htr hotel revue*
3. Dolnicar S (2017) Peer-to-peer accommodation networks: Pushing the boundaries. Oxford
4. Fox JT (2017) Hotels increase competition with Airbnb, OTAs as technology changes rules of the game. hotelmanagement.net
5. Nath T (2014) Airbnb vs The hotel industry, Who will win <https://www.investopedia.com/articles/investing/112414/airbnb-brings-sharing-economy-hotels.asp>
6. Zervas G, Proserpio D, Byers J (2016) The rise of the sharing economy: estimating the impact of Airbnb on the hotel industry. Boston University School of Management Research Paper 2013-16
7. Tussyadiah L, Zach F (2017) Identifying salient attributes of peer-to-peer accommodation experience. *J Travel Tour Mark* 34:636–652
8. Owyang S, Samuel A, Grenville A (2014) Sharing is the new buying: How to win in the collaborative economy. *Vision Critical/Crowd Companies*, Vancouver

9. Belk R (2014) You are what you can access: sharing and collaborative consumption online. *J Bus Res* 1595–1600
10. Oksam J, Boswijk A (2016) Airbnb: the future of networked hospitality businesses. *J Tour Futur* 2:22–42
11. Botsman R, Rogers R (2010) What's mine is yours: the rise of collaborative consumption. Harper Business
12. Tussyadiah L, Pesonen J (2018) Drivers and barriers of peer-to-peer accommodation stay—an exploratory study with American and Finnish travellers. *Curr Issues Tour* 21:703–720
13. Stors N, Kagermeier A (2015) Motives for using Airbnb in metropolitan tourism—Why do people sleep in the bed of a stranger? *Reg Mag* 299:17–19
14. Ranchordás S (2017) Peers or Professionals? The P2P-economy and competition law. *Eur Compet Regul Law Rev* 1:320–333
15. Airbnb (2016) Travel agencies instead of real hosts. <https://community.withairbnb.com/t5/Hosting/Travel-agencies-instead-of-real-hosts/td-p/49487>
16. Coldwell W (2016) Airbnb: from homesharing cool to commercial giant. *theguardian.com*
17. Montevago J (2018) Airbnb launches hotel distribution platform. *travelmarketreport.com*
18. Li J, Moreno A, Zhang D (2015) Agent behavior in the sharing economy: evidence from Airbnb. Ross School of Business Working Paper Series
19. Maxim C (2017) Challenges faced by world tourism cities—London's perspective. *Curr Issues Tour*. <https://doi.org/10.1080/13683500.2017.1347609>
20. Bosa D, Paayal Z (2018) Airbnb is overhauling its business to further take on the hotel and travel industries. *cnn.com*
21. Quattrone G, Proserpio D, Quercia D, Capra L, Musolesi M (2016) Who benefits from the “Sharing” economy of Airbnb? In: 25th international conference on world wide web Montréal, Québec, Canada
22. Gutiérrez J, Garcia-Palomares JC, Romanillos G, Salas-Olmedo MH (2017) The eruption of Airbnb in tourist cities: comparing spatial patterns of hotels and peer-to-peer accommodation in Barcelona. *Tour Manag* 62:278–291
23. Swiss Federal Statistical Office (2018) Les niveaux géographiques de la Suisse. Neuchâtel, CH
24. Greene WH (1993) *Econometric analysis*. Macmillan, New York etc
25. SAS Institute Inc. (2013) *SAS/STAT® 13.1 User's Guide*. SAS Institute Inc., Cary, NC

Destination Marketing



The Effects of Virtual Reality on Destination Image Formation

Ashelle McFee, Tanja Mayrhofer, Andrea Baràtovà,
Barbara Neuhofer^(✉), Mattia Rainoldi, and Roman Egger

Salzburg University of Applied Sciences, Puch bei Hallein, Austria
barbara.neuhofer@fh-salzburg.ac.at

Abstract. The mental image potential visitors have of a destination is a critical factor when making travel decisions. Research has shown that destination image formation correlates with users' involvement with a device or platform, such as virtual reality (VR). While the impact of VR on the formation of a destination image has only received limited attention, literature suggests that the use of VR could have a positive influence on destination image. This study set out to examine the impact of VR on the formation of a destination image in comparison to an identical video viewed on a computer. An experiment with a post-user survey was conducted. The analysis confirms that the higher levels of involvement through using VR goggles do have a positive correlation with destination image formation. For destination marketing, this study suggests VR as a tool to positively influence the image of a destination.

Keywords: Virtual reality · Destination image formation · 360-degree video
Virtual destination image

1 Introduction

In 1938, the French author and dramaturgist Antonin Artaud presented the concept of virtual reality for the first time in his collection of essays *Le Théâtre et son Double*. However, VR as a device that engaged multiple senses at once was not introduced until the 1960s by cinematographer Morton Heilig [1]. The device called “Sensorama” provided users with the opportunity to choose from multiple rides, which were emphasized by sounds, smells and wind machines. VR has since been implemented into areas such as medicine, entertainment, design and simulation training [2, 3].

While this technology was not developed specifically for the tourism industry, VR plays an increasingly important role in this sector [3]; this is particularly true for the area of eTourism [4]. In line with latest developments, including social media and interactive websites, which facilitate potential tourists to be informed about locations without travelling to the destination [4–6], VR may influence the tourists' destination image formation process. Recent research has shown that destination image formation correlates with users' involvement with a device or platform, while traditional printed materials, websites and videos no longer have a major impact on the perceived destination image [5, 7]. Although VR may still face several challenges, such as user

acceptance and authenticity of the destination representation, tourism may also take advantage of the opportunities that this technology presents [3].

In terms of destination image, Kisali et al. [8] stated that the image of a destination can be formed through four factors: sociocultural factors, project image, user generated content and technology. Additionally, there are three forms of images according to Gartner [9]: the cognitive, affective and conative images. In a tourism marketing setting, those images may be influenced through VR, which may help to promote the image of a destination and attract more tourists. This can be done through several unique characteristics, including “visualization components”, the “immersion into the experience” and the “interactivity involved in the experience” [10].

The image of the destination is significant. Destinations that have a clear, distinctive and noticeable image have a higher chance of being selected by the traveller [11]. The image represents an essential part of tourists’ decision-making [12, 13] since it encompasses a personal mental image made of characteristics of a destination [11]. As consumers are becoming more familiar with this VR, it may become an important tool to help develop, promote and enhance a destination. Hence this paper seeks to contribute to the field of destination image formation, by focusing on the device perspective and not solely on the content. In the following sections, this paper provides an overview of destination image, VR and the virtual destination image. The subsequent sections present the operationalized research model and offer an outline of the method and sampling techniques. Lastly, the outcome of this study, its limitations and suggestions for further research are discussed.

2 Literature Review

2.1 Destination Image

The concept of destination image has been broadly utilized in empirical research, however, a proper definition and a substantial structured concept is yet to be established [11, 13]. One of the first scholars to conceptualize destination image formation was Gartner [9] and since then, numerous authors have done research on the topic [11–15]. As a result, multiple definitions exist on destination image [5, 9, 13, 16, 17]. One such definition by Lai and Li [18] regards tourism destination image as “a voluntary, multisensory, primarily picture-like, qualia-arousing, conscious, and quasi-perceptual mental (i.e., private, nonspatial, and intentional) experience held by tourists about a destination”. This encounter is combined with other cerebral factors, such as senses, feelings, beliefs and biases of the destination [18]. The image of a destination is highly subjective.

According to Kisali et al. [8], the image of a destination can be formed through four factors: sociocultural factors, projected image, user generated content and technology. These factors play a twofold role in destination image formation. The first is that the sociocultural aspects and the projected image have a high impact on what the destination offers. Secondly, technology and user generated content are increasingly important for the formation of the destination. These are especially important factors since they play a role in the information that is shared between the destination and tourists, and among consumers [8]. Destination marketing organisations can also resort to other tools, such

as direct marketing, brochures and tourism fairs [19]. Generally, image can be understood as a collection of beliefs made up of a combination of information from multiple sources [9, 13, 20, 21]. Therefore, the actual information and the way the information is shared are crucial in the process of forming the image of a destination.

In addition to these four factors, the image of a destination is created through the combination of three types of images: the cognitive, affective and conative image. The cognitive image is formed when an individual intrinsically accepts the values associated with an object; the affective image is formed during the search phase of the customer journey. This is associated with the individual's intrinsic and extrinsic reasons for travelling [9]. Lastly, Gartner [9] stated that "the conative image component is analogous to behaviour because it is the action component". Generally, the cognitive image is related to the individual, while the affective image is related to the product, for example the destination [22]. A combination of these two aspects is what creates the conative image since it represents the actual decision to travel to a selected destination. According to MacKay and Fesenmaier [13] the image of a destination hence is an amalgam of multiple services and characteristics knotted together to form an overall perception.

Baloglu and McCleary [12] stated that stimulus factors and personal factors are two major agents that guide the image of a destination. Personal factors include demographics and psychological characteristics, while stimulus factors focus on the source, type and the amount of information [12]. Information seems to be the constant in destination image since tourists highly depend on it to make their travel decisions [5, 11, 12]. Thus, it is important to understand how destination image is formed through websites, social media and other technologies (e.g. VR) to market a tourism destination [5, 14, 23]. A destination image can be enhanced by contemporary technologies, such as 360-degree videos and virtual reality.

2.2 VR and 360-Degree Video

A review of the literature on VR shows that a common definition is missing as scholars ascribe different properties to what is necessary for an experience to be classified as VR [3, 24, 25]. Guttentag [3] defines VR as a "computer-generated 3D environment" that the user can control and potentially interact with; this leads to a simulative real-time situation including the five senses of the user [1, 3, 25]. VR is described as an experience that enables individuals to physically immerse into and be psychologically present in the virtual environment. VR tools using head-mounted displays can be rated as fully immersive. The full immersion alludes to the degree of how strongly isolated the user is from the real world, which should add to the effectiveness of the experience, while requiring a high level of involvement [1].

Quite a significant amount of attention has been dedicated to the level of involvement and its influence on destination image. 'Involvement' is highlighted as one of the most significant features influencing a person's destination image [5, 16, 26]. The concept of involvement is rooted in the assumption that a person's beliefs and attitude are provoked through arousal and this can anticipate prospective conduct [39]. Specifically, Havitz and Dimanche [27] describe involvement in tourism as an individual's mental state characterized by stimulation, concern or motivation in relation with the destination or leisure activities.

The study by Frias et al. [16] found a correlation of individuals' level of involvement during the information gathering process and the effect on their destination image, concluding that the level of involvement benefits the destination image of potential visitors. Punj and Moore [28] suggest that the higher the involvement level of individuals, the higher the cognitive attempt to arrive at a sound judgement. When dealing with cognitive capacity, VR has the potential to transmit information with both low equivocation and low uncertainty due to its ability to capture a complete environment accurately. Its media richness is what sets it apart from other technologies according to a model by Draft and Lengel [29].

For tourism, VR has the potential to revolutionize the way companies promote and sell tourist products, services and experiences [30]. Previously, the tourism industry was not capable of offering potential customers trials before purchase [3, 31–33]. Virtual environments can provide an experience so close to reality that it enables communication and creates a destination image through the presentation of sketches, pictures and videos [34]. Virtual experiences can offer realistic experiences due to sophisticated information technology [35], such as a 360-degree video.

A 360-degree video can be seen as a virtual tour of a destination. Although this technical form of presenting a destination has improved dramatically, it is still less costly compared to other forms of virtual tours, such as virtual reality. This full-screen panoramic image presentation allows the viewer to virtually experience a scene in 360° [36]. Although the production of a 360-degree video is relatively easy, it provides the consumer with an authentic image of reality. This means of presentation may help viewers to become immersed in the consumption before booking a trip [31].

For tourism destinations, this implies that virtual experiences may enhance a destination image through virtual tours [34]. These experiences may help potential visitors to pre-experience a destination and have a clearer image of the location. However, reality shows that fully immersive videos within the industry are not yet widespread and often 360-degree videos are used instead. 360-degree videos are becoming increasingly popular marketing materials. When consuming the video, the user is fully empowered to choose the angle and what the user sees through an individual dragging and rotation function [37]. This may capture the consumers' attention and thus render them more interested in visiting the destination.

A recent Google study found that 360-degree videos received considerably more subscriptions, shares and views when compared to traditional videos [38]. Interactivity of 360-degree videos on websites has been endorsed by marketing specialists to intrigue online customers, increase online purchasing and strengthen loyalty [4]. This is because virtual tours convey richer information of a destination, which increase the destination's image quality [39]. Through virtual tours, future visitors could assess the destination and the travel experience more precisely because they experience the venue more intensively [34]. 360-degree tours are viewed as one of the best sources of information for potential visitors. When they can freely navigate and experience the tours independently, users can focus and seek attributes and information they are most interested in [34]. As a result, many destination management organisations have devoted vast resources to creating web-based virtual experiences [31] to influence destination image formation.

2.3 Virtual Destination Image Formation

To develop a model of virtual destination image formation, our study builds on Hyun and O’Keefe [7], who expanded Gartner’s original image formation model, by adding the telepresence lens. Telepresence is defined as a feeling of “being there” [40]. While this term was first introduced in relation to virtual reality, scholars agree that any medium has the potential to produce telepresence [41]. Their findings suggest that interactive web-based media can affect telepresence in a way that offline material cannot. Telepresence from web-based materials demonstrates a minimal effect on the affective image [7]. Recent research confirms that traditional websites, unlike social media, do not influence the affective image [5]. However, VR technology may induce high physiological emotions [42, in Press]. VR is considered more suitable for triggering emotions than its predecessors and seems to create a stronger affective image [43], and the absorbed information while being aroused is more likely to be recalled later [44].

Thus, previous research suggests that VR positively influences the affective image and that VR’s telepresence may influence the cognitive image. This hypothesis is supported by the fact that virtual environments give users reliable and accurate information quicker and cheaper than traditional promotional materials [4]. An experiment comparing VR and traditional brochures indicates that VR does have a positive influence on the tourist’s information search as well as the decision-making process [45]. As a result, this research aims to find out whether VR can positively influence the image formation process of users. The guiding research question is: Does viewing a 360-degree video through VR goggles lead to an increased intention to visit a destination in comparison to a computer platform? To answer the research question, the study has developed six hypotheses regarding cognitive, affective and conative image based on the model presented by Molinillo et al. [5] as follows:

- H1: Virtual reality (high level of involvement) has a positive impact on the cognitive image.
- H2: Virtual reality (high level of involvement) has a positive impact on the affective image.
- H3: A favourable cognitive image has a positive impact on the overall image.
- H4: A favourable cognitive image has a positive impact on the affective image.
- H5: A favourable affective image has a positive impact on the overall image.
- H6: A favourable overall image has a positive impact on tourists’ intention to visit.

The literature has clarified that VR influences the affective image of a destination. This study’s aim was to test the reliability of this previous study and, beyond that, test whether VR has a stronger influence on the cognitive image when compared to a 360-degree video containing the same information. As such, the study used the original model (Fig. 1) of Molinillo et al. [5] and implemented it into the research process.

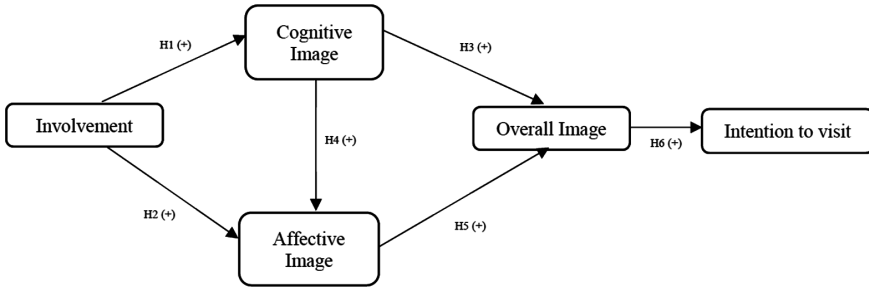


Fig. 1. Research model

3 Research Design

An experimental research design was conducted. A 360-degree video available on YouTube about the destination of Madrid was used. The video was determined as suitable and neutral and researchers were able to observe a potential conversion factor. Data collection was conducted in two groups. The first test group visited the destination through watching the 360-degree video via the Samsung Gear VR headset, while the second control group watched the same 360-degree video on a computer device using the mouse as navigation to rotate to the desired angle while watching. The video lasted for 2.33 min.

A purposive convenience sampling strategy was used to recruit participants via e-mail and personal approach close to the experiment location, the Salzburg University of Applied Sciences. The convenience sampling strategy was selected given that there was a greater opportunity of collecting the necessary data [46]. Upon arrival, the participants were randomly assigned to the computer or VR goggles group on the basis of counting in twos. As an additional measure, it was vital to overcome the novelty effect of using VR the first time [47] since, according to Rooney et al. [48], there is a high possibility that the test group is more fascinated and enthusiastic when trying a new technology for the first time. Therefore, a criterion for the researchers was to ensure that the participants using the VR goggles had used the device before. For participants who had not used a VR goggles before, they were first shown a video of the Niagara Falls, which was a highly-rated promoted 360-degree video within the Samsung Gear VR goggle interface at the time.

After watching the video either in the goggles or on the computer, both groups answered the same quantitative questionnaire. The questionnaire was created and distributed using Jotform.com and was administered using laptop computers. The questionnaire included a total of 25 questions broken down into sections based on the three types of images by Gartner [9], as demonstrated in Table 1.

The responses were analysed using SPSS Version 25. A total of 156 responses were gathered, while 30 responses were eliminated in the data cleaning process due to missing variables, leaving a total sample of 126 respondents. The sample size is acceptable however borderline and results therefore need to be interpreted with caution. These responses constitute 72 participants of the VR goggles group and 54 participants

Table 1. Source(s) of questions for the quantitative research instrument

Type of image	No. of items	Source(s)
Cognitive	7	Lin et al. (2007); Smith et al. (2015)
Affective	4	Lin et al. (2007)
Overall	1	Molinillo et al. (2018)
Intention of visit	4	Molinillo et al. (2018)

were part of the computer group. Cronbach's Alpha test was conducted to test internal reliability, resulting in an average of 0.788 and the Spearman's Rho test was conducted to test the hypotheses.

4 Findings

4.1 Demographic Sample Profile and Reliability Analysis

The tested sample consisted of 126 respondents, 57% of these respondents were assigned to the VR goggles and 43% were assigned to the computer. Most of the respondents, 51% were between the ages 25–34, and consisted of 55% male and 44% female. Furthermore, the highest education level represented was 27% from A-Levels. To measure how consistently and completely the items represent the construct, a reliability analysis was conducted with Cronbach's alpha. All constructs, except one, exceed the suggested minimum Cronbach's alpha of .70 [49] (Table 2). The cognitive image's internal reliability may be low because two question types were used.

Table 2. Reliability analysis with Cronbach's alpha

Construct	Number of factors	Cronbach's alpha
Affective image	4	.728
Cognitive image	7	.629
Involvement	3	.766
Overall image	1	1
Intention of visit	4	.818

4.2 Comparison VR Goggles and 360-Degree Computer Group

Spearman's Rho correlation analysis was used to test each hypothesis including both groups and then separately for the VR goggles group and the computer group. The results of the full sample (Table 3) show that the three types of images correlate positively with each other. The cognitive image correlates positively with the overall image with a value of 0.596. The cognitive image correlates positively with the affective image (0.596) and the affective image positively correlates with the overall image (0.556). This means that H3, H4 and H5 could be supported.

Table 3. Correlation Results of Full Sample

Full sample (n = 126)	Spearman’s Rho	Effects
H1: Involvement → Cognitive	0.385**	Supported
H2: Involvement → Affective	0.292**	Supported
H3: Cognitive → Overall image	0.526**	Supported
H4: Cognitive → Affective	0.596**	Supported
H5: Affective → Overall image	0.556**	Supported
H6: Overall Image → Intention of visit	0.468**	Supported

**Correlation is significant at the 0.01 level (2-tailed)

With regard to H1, H2 and H6 in the full sample calculation, these have been supported. Each hypothesis shows a positive correlation between the dependent and the independent variable. The next correlation test conducted was for the VR goggles group. The results in Table 4 show that all hypotheses are supported. Here again, all three types of images correlate positively with each other. The cognitive image correlates with the overall image (0.525) in Spearman’s Rho and it correlates positively with the affective image (0.646). The affective image positively correlates with the overall image (0.450).

Table 4. Results of hypotheses testing for both groups

Hypotheses	VR Goggles group (n = 72)		Computer group (n = 54)	
	Spearman’s Rho	Effects	Spearman’s Rho	Effects
H1: Involvement → Cognitive	0.451**	Supported	0.24*	Not Supported
H2: Involvement → Affective	0.309**	Supported	0.273*	Not Supported
H3: Cognitive → Overall Image	0.525**	Supported	0.508**	Supported
H4: Cognitive → Affective	0.646**	Supported	0.535**	Supported
H5: Affective → Overall Image	0.450**	Supported	0.656**	Supported
H6: Overall Image → Intention of visit	0.354**	Supported	0.535**	Supported
# Involvement → Intention to visit	0.468**	Supported	0.374**	Not Supported

**Correlation is significant at the 0.01 level (2-tailed)

#Test done to measure direct link

The final correlation test conducted was for the computer group. The results (Table 4) show that H3, H4, H5 and H6 are supported while H1 and H2 are not. Again, the three types of images correlate positively with the computer group. Cognitive image positively correlates with the overall image (0.508) in Spearman’s Rho.

Cognitive image positively correlates with the affective image (0.535) and the affective image correlates with the overall image (0.656). Finally, the overall image correlates positively with the intention to visit with a result of 0.535.

In conclusion, a t-test was conducted (Table 5) to see how far apart the means are between the two groups within the variable of involvement, cognitive image, affective image and intention to visit. The results show that the variables of affective image, cognitive image and intention to visit do not vary largely from each other in each group. Within the variable of involvement, however, there was a large variance. Specifically, the calculated means had a difference of approximately 1. Furthermore, the SD for the computer group was 0.913 and for the VR goggles group 0.629, showing a difference of 29%.

Table 5. Results of t-test

Images	Device	Mean	Std. Deviation (SD)
Involvement	VR	1.986	0.629
	Computer	2.419	0.913
Affective	VR	2.166	0.061
	Computer	2.194	0.079
Cognitive	VR	2.039	0.051
	Computer	2.153	0.064
Intention to visit	VR	3.288	0.912
	Computer	3.393	1.131

While the results of the t-test may not seem very distinct, they can be considered as useful for destination image formation and marketing practice, which are explained next.

5 Discussion

Previous research done by Marchiori et al. [45] found that traditional printed materials had almost no effect on image and that web platforms also fail to significantly influence the affective image. This study compared 360-degree videos via two different tools to test image formation and it was found that the computer does not influence the affective image, however, the VR goggles do. Furthermore, research done by Molinillo et al. [5] found that traditional websites and promotional videos do not create significant affective or cognitive images, but similar information shared through social media sites do. This result suggests that image formation is not solely dependent on content, but rather on the medium through which it is displayed. This is in line with our study, which reveals differences in the image formation process based on the tool. The study shows that VR has a positive impact on affective and cognitive image. The assumption that the usage of a computer also influences the affective and cognitive image could not be supported.

The analysis further revealed that there is a clear difference in involvement and cognitive image, and involvement and affective image among the two tools. The respondents using the VR goggles felt more involved than the computer group. This reflects results from recent literature suggesting that involvement is regarded as one of the most significant features that influences a person's destination image [5, 16]. Another interesting difference is that the impact of involvement on the intention to visit is only highly significant within the VR group, while no significance within the computer group was found. This is based on the findings that higher involvement leads to positive affective and cognitive image resulting in an overall positive image, confirming the study by Molinillo et al. [5]. What sets this research apart from its predecessors was that both the VR and the computer group received the exact same information in the same format. By controlling the format, this study concludes that the used device, and not the information itself, significantly impacts the image formation.

6 Conclusion and Implications

This research shows that the use of VR goggles has a more significant impact on the destination image formation when compared to identical content viewed on a computer, and therefore shows an increased intention to visit a destination. For the tourism industry, this study recommends VR as a useful tool for travel agents, presenting destinations to potential customers at either exhibition booths or at the agencies. For content production companies, the findings suggest to focus on activities delivering 360-degree video formats, which are compatible with VR goggles, as this viewing platform leads to higher consumer engagement. This can also be beneficial for destinations in their promotional activities of less-known tourist areas to manage both overcrowding and seasonality.

In terms of theoretical implications, the study validates Molinillo's et al. [5] model and expands that it is reliable across various media platforms (computer and VR goggles). Our study further indicates that VR shows higher levels of consumer involvement when compared to the computer platform, despite having the same medium displayed. It can therefore be concluded that 80 years after Antonin Artaud wrote about VR, the technology has proven to be a valuable tool for the tourism industry. In terms of limitations, it is acknowledged that the purposive convenience sample led to a limited generalisability of the results. The majority of the respondents are aged between 18 and 34 years old, which gives a dominant focus on a young age group. Additionally, the number of participants of the VR group (72 respondents) and the computer group (54 respondents) is uneven and could be more evenly distributed when replicating our work. For future research, it is recommended to test the model and content across a wider range of platforms and devices. Moreover, studies could expand the used model with further interesting dimensions worthy of investigation (e.g. concept of flow or willingness to pay construct) and further tap into the experiential aspects of the VR viewing experience by examining the involvement of a user's sensory dimensions and the effect on image formation.

References

1. Gutierrez M, Vexo F, Thalmann D (2008) Stepping into virtual reality. Springer Science & Business Media
2. Cheong R (1995) The virtual threat to travel and tourism. *Tour Manag* 16(6):417–422
3. Guttentag DA (2010) Virtual reality: applications and implications for tourism. *Tour Manag* 31:637–651
4. Buhalis D, Law R (2008) Progress in information technology and tourism management: 20 years on and 10 years after the Internet—The state of eTourism research. *Tour Manag* 29(4):609–623
5. Molinillo S, Liébana-Cabanillas F, Anaya-Sánchez R, Buhalis D (2018) DMO online platforms: image and intention to visit. *Tour Manag* 65:116–130
6. Neuhofer B, Buhalis D, Ladkin A (2012) Conceptualising technology enhanced destination experiences. *J Destin Mark Manag* 1(1–2):36–46
7. Hyun MY, O’Keefe RM (2012) Virtual destination image: testing a telepresence model. *J Bus Res* 65(1):29–35
8. Kisali H, Kavaratzis M, Saren M (2016) Rethinking destination image formation. *Int J Cult Tour Hosp Res* 10(1):70–80
9. Gartner WC (1994) Image formation process. *J Travel Tour Mark* 2(2–3):191–216
10. Hobson JSP, Williams P (1997) Virtual reality: the future of leisure and tourism? *World Leis Recreat* 39(3):34–40
11. Beerli A, Martin JD (2004) Factors influencing destination image. *Ann Tour Res* 31(3):657–681
12. Baloglu S, McCleary KW (1999) A model of destination image formation. *Ann Tour Res* 26(4):868–897
13. MacKay KJ, Fesenmaier DR (1997) Pictorial element of destination in image formation. *Ann Tour Res* 24(3):537–565
14. Michaelidou N, Siamagka NT, Moraes C, Micevski M (2013) Do marketers use visual representations of destinations that tourists value? Comparing visitors’ image of a destination with marketer-controlled images online. *J Travel Res* 52(6):789–804
15. Smith WW, Li X, Pan B, Witte M, Doherty ST (2015) Tracking destination image across the trip experience with smartphone technology. *Tour Manag* 48:113–122
16. Frías DM, Rodríguez MA, Castañeda JA (2008) Internet vs. travel agencies on pre-visit destination image formation: an information processing view. *Tour Manag* 29(1):163–179
17. Kim H, Richardson SL (2003) Motion picture impacts on destination images. *Ann Tour Res* 30(1):216–237
18. Lai K, Li X (2015) Tourism destination image: conceptual problems and definitional solutions. *J Travel Res* 55(8):1065–1080
19. Shani A, Chen P-J, Wang Y, Hua N (2010) Testing the impact of a promotional video on destination image change: application of China as a tourism destination. *Int J Tour Res* 12:116–133
20. Buhalis D (2000) Marketing the competitive destination of the future. *Tour Manag* 21:97–116
21. Hosany S, Ekinci Y, Uysal M (2006) Destination image and destination personality: an application of branding theories to tourism places. *J Bus Res* 59:638–642
22. Pan S (2011) The role of TV commercial visuals in forming memorable and impressive destination images. *J Travel Res* 50(2):171–185
23. Jeong C, Holland S, Jun SH, Gibson H (2012) Enhancing destination image through travel website information. *Int J Tour Res* 14(1):16–27

24. Burdea GC, Coiffet P (2003) *Virtual reality technology*, 2nd edn. Wiley-Interscience, Hoboken, NJ
25. Vince J (2004) *Introduction to virtual reality*. Springer, New York
26. Rodríguez-Molina MA, Frías-Jamilena DM, Castañeda-García JA (2015) The contribution of website design to the generation of tourist destination image: the moderating effect of involvement. *Tour Manag* 47:303–317
27. Havitz ME, Dimanche F (1990) Propositions for testing the involvement construct in recreational and tourism contexts. *Leis Sci* 12(2):179–195
28. Punj G, Moore R (2009) Information search and consideration set formation in a web-based store environment. *J Bus Res* 64:644–650
29. Draft RL, Lengel RH (1986) Organizational information requirements, media richness and structural design. *Manag Sci* 32(5):554–571
30. Williams P, Hobson JP (1995) Virtual reality and tourism: fact or fantasy? *Tour Manag* 16(6):423–427
31. Gibson A, O’Rawe M (2018) Virtual reality as a travel promotional tool: insights from a consumer travel fair. In: Jung T, tom Dieck M (eds) *Augmented reality and virtual reality*. Progress in IS. Springer, Cham, pp 93–107
32. Sanchez-Vives MV, Slater M (2005) From presence to consciousness through virtual reality. *Nat Rev Neurosci* 6(4):332–339
33. Slater M, Lotto RB, Arnold MM, Sanchez-Vives MV (2009) How we experience immersive virtual environments: the concept of presence and its measurement. *Anuario de Psicología* 40(2):193–210
34. Cho YH, Wang Y, Fesenmaier DR (2002) Searching for experiences: the web-based virtual tour in tourism marketing. *J Travel Tour Mark* 12(4):1–17
35. Staats H, Gatersleben B, Hartig T (1997) Change in mood as a function of environmental design: arousal and pleasure on a simulated forest hike. *J Environ Psychol* 17:283–300
36. Nodes S (2012) What is the best for travel websites-videos or virtual tours? <https://www.tnooz.com/article/what-is-the-best-for-travel-websites-videosorvirtual-tours/>. Accessed 28 Jan 2018
37. O’Neill S (2016) Live, 360, or virtual video: facebook’s new video formats catch marketers’ eyes. <https://www.tnooz.com/article/live-360-or-virtual-video-facebooks-new-video-formats-may-appeal-to-marketers/>. Accessed 28 Jan 2018
38. Nodes S (2017) Engaging travel audiences through 360-degree video. <https://www.tnooz.com/article/360-degree-travel-video/>. Accessed 28 Jan 2018
39. Vogt CA, Fesenmaier DR (1998) Expanding the functional information search model. *Ann Tour Res* 25(3):551–578
40. Steuer J (1992) Defining virtual reality: dimensions determining telepresence. *J Commun* 42(4):73–93
41. Suh KS, Chang S (2006) User interfaces and consumer perceptions of online stores: the role of telepresence. *Behav Inf Technol* 25(2):99–113
42. Beck J, Rainoldi M, Egger R (In Press) Virtual reality in tourism: a state of the art review. *Tour Rev*
43. Diemer J, Alpers GW, Peperkorn HM, Shibani Y, Mühlberger A (2015) The impact of perception and presence on emotional reactions: a review of research in virtual reality. *Front Psychol* 6:26
44. Marchiori E, Niforatos E, Preto L (2017) Measuring the media effects of a tourism-related virtual reality experience using biophysical data. In: Schegg R, Stangl B (eds) *Information and communication technologies in tourism 2017*. Springer, Cham, pp 203–215

45. Driescher V, Lisnevskaja A, Zvereva D, Stavinska A, Relota J (2016) Virtual Reality: an innovative sneak preview for destinations. In: Egger R, Maurer C (eds) *Tourism research perspectives, proceedings of the international student conference in tourism research 2017*, pp 65–76
46. Bryman A (2012) *Social research methods*. Oxford University Press, Oxford
47. Bradley MM, Lang PJ, Cuthbert BN (1993) Emotion, novelty, and the startle reflex: habituation in humans. *Behav Neurosci* 107(6):970–980
48. Rooney B, Benson C, Hennessy E (2012) The apparent reality of movies and emotional arousal: a study using physiological and self-report measures. *Poetics* 40(5):405–422
49. Cortina JM (1993) What is coefficient alpha? An examination of theory and applications. *J Appl Psychol* 78(1):98–104



Comparing Tablet and Virtual Reality Glasses for Watching Nature Tourism Videos

Katja Pasanen¹(✉), Juho Pesonen¹, Jamie Murphy¹,
Johanna Heinonen², and Jenni Mikkonen¹

¹ Business School, Centre for Tourism Studies, University of Eastern Finland,
Joensuu, Finland

{katja.pasanen, juho.pesonen, jenni.mikkonen}@uef.fi,
jamie.perth@gmail.com

² RDI Sustainable Wellbeing, South-Eastern Finland University of Applied
Sciences, Kotka, Finland

johanna.heinonen@xamk.fi

Abstract. 360-degree videos offer great tourism marketing opportunities. Compared to traditional videos, 360-degree videos offer more compelling imagery of potential travel destinations, a “try before you buy” experience. These 360-degree videos can be viewed with various devices, including tablet and VR (Virtual Reality) goggles. The study, conducted at Helsinki-Vantaa airport, comprised 221 international tourists given VR glasses or iPads to watch a 360-degree video and answer a survey. The results reveal that the VR glasses and the iPad tablet had similar effects on travel intentions and behaviours. However, the viewing experience differs depending on the device. These findings suggest that some 360-videos will actually perform better on a tablet than with VR glasses. Tourism businesses and destinations should develop different content and situations for different devices. This study contributes to media richness theory and helps us to understand VR content as a type of rich media.

Keywords: Virtual reality (VR) · Tourism marketing · 360-videos
Nature tourism

1 Introduction

Virtual reality (VR), a powerful marketing tool, offers great opportunities for tourism and destinations. VR can provide compelling destination imagery to potential tourists through a sense of being there, a “try before you buy” experience [1] or communicate how a distant place or experience feels [2]. VR can reduce the perceived risk of intangible services, helping travellers make more informed decisions with more realistic expectations [3].

Virtual reality is “a real or simulated environment in which a perceiver experiences telepresence [4, p. 7].” Even though almost three decades old, the definition contains the important elements of simulated environment and user experience. Thus, this paper includes 360-degree videos viewed with virtual reality goggles in the VR discussion.

The marketing potential of VR lies primarily in its ability to provide extensive sensory information to prospective tourists [5]. This VR capability suits tourism as many tourism products are ‘confidence goods’, which consumers cannot test in advance and must purchase, or not purchase, based simply on available descriptive information [6, 7]. The experiential nature of VR makes it an optimal tool for providing rich media data [8] to potential tourists seeking destination information.

Yet gauging the effectiveness of VR technology to induce favourable tourism destination attitudes and visiting intentions is challenging [9]. The potential VR tourism opportunities include planning the places and experiences, reducing barriers to accessibility, opening up remote places, educating and guiding visitors, preserving fragile sites [5], enhancing entertainment [10], and broadening global interaction among travellers [11].

As VR becomes more widely accessible [12], tourism marketers need more information of the use of VR technology. However, little empirical research investigates VR use in tourism marketing and how VR affects tourist information search, travel decisions, behaviour, and attitude towards a destination or type of tourism. Furthermore, researchers call for comparing new technologies, such as VR, with traditional viewing devices [13]. Media richness theory suggests that different devices have different communication effects as the media content and ways to view it differ [14]. However, studies that examine these effects in tourism, and especially in VR tourism, are not common.

This research widens virtual reality technology use in general and particularly, consumer experiences of and willingness to use VR-technology in travel situations. Specifically, the study explores how potential visitors perceive 360-degree Finnish nature video, how this VR experience and the device used for watching the video affects their future travel intentions. Media richness theory [14, 15] serves as the theoretical base to help understand how consumers perceive media, such as VR. This study contributes to understanding of VR devices and content from media richness theory perspective.

2 Theoretical Background

2.1 Media Richness

Media differ in their communication effects. As media increase in richness and information, such as adding pictures to text or shifting from pictures to moving pictures, such media richness increases communication effectiveness [14, 15]. For example, users perceive destination websites more realistic or positive depending on the media elements in a website [3, 16]. Tourism companies and destinations can incorporate virtual reality (VR), the latest in a long line of media rich innovations, to enhance their communication mix and customer experiences [17].

Potential customers have high expectations and high uncertainty when purchasing tourism services. Adding media richness, such as VR, enhances the media experience and augments the versatility and trustworthiness of tourism product information [18] and attenuates purchase decision barriers. VR, which provides both instrumental and

experiential benefits, also improves responses in the Attention, Interest, Desire and Action (AIDA) advertising model [19, 20].

Yet adding media richness does not guarantee positive customer behaviours. The situation can affect online communication experiences and could benefit from adapted content [21, 22]. Interactivity might enhance the online experience and help consumer decision-making and engagement [8, 23]. Virtual reality increases media richness, particularly with moving images in a 360-degree environment that envelops the user. However, little to no research examines the effect of this viewing device on media richness.

2.2 Video Content, Destination Marketing and Behavioural Intentions

Films and videos are important in creating destination awareness and intention to visit due to their unique ability to create emotions that relate directly destination recommendations and visits [24]. Scholars argue that positive tourism experiences include at least two basic emotions, interest and happiness [25–29]. Where happiness promotes attachment to rewarding things, interest motivates trying new things, places or experiences [28, 30].

The Theory of Planned Behavior (TPB), which argues that the intention to perform a behaviour is the closest cognitive antecedent of actual behaviour, also supports emotion's role [e.g. 31–33]. The TPB implies that intentions to engage in a behaviour accurately predict performing that behaviour. Many studies substantiate the predictive validity of behavioural intentions [34], which could arise from viewing a film or video.

Short promotional, as well as full length, films and movies can change viewer perceptions of a destination, create positive destination images and increase willingness to travel to that destination [e.g. 35–40]. As tourist interest in real and authentic leisure experiences grows, and their time shrinks, prospective tourists seek information sources that will heighten their experiences, and reduce their chances of disappointing experiences [41]. Videos should give relevant information to help viewers imagine their future destination experiences [42, 43]. The mental images that tourists form influence the expected destination experiences and subsequent destination choice [43, 44].

Relative to films, promotional video effectiveness has been less studied. One study found that destination video content and repeating certain shots could enhance traveller perceived destination image and trigger potential traveller interest in collecting more information and visiting the destination [40]. Promotional video research also suggests that a dramatized event can affect viewer attitudes positively toward the destination and the event [38]. However, evidence suggests that video might not be the most efficient media to influence buying decisions and to study various media forms [45].

Finally, two factors for trusting online videos are the source, user- versus agency-generated and technical quality. Relative to agency videos, user-generated videos may exhibit higher source credibility and thereby a stronger influence on intended behaviour with low quality videos [46]. The generating source had no impact on high quality video trustworthiness [46]. Online video's technical quality and source merit consideration when investigating perceived credibility and its impact on intended consumer behaviour.

2.3 Virtual Reality and Destination Marketing

Emerging virtual reality research provides empirical evidence to support and explain VR as an effective tourism promotional tool. One study [2] for example, compared the impacts of viewing a South African destination promotional material in VR, traditional 2D videos or as website pictures. Relative to the website pictures, VR condition participants reported a significantly stronger affective destination image, intention to visit, seek further information, share information and suggest South Africa as a destination. The VR condition also performed better than the 2D condition, albeit not as strongly as versus pictures on the website.

Researchers [1, 9] used spatial presence, the sense of being in a virtual environment, to study VR experiences and travel decision making. User attention to VR environments contributed significantly to spatial presence: the more attention users allocated during the VR experience, the more spatial presence. Thus, reducing user distractions to VR objects or events becomes important. The studies also found that spatial presence positively affected post VR attitude change toward tourism destinations, indicating VR persuasiveness.

Four central issues relate to VR persuasiveness and VR presence [9]. First, a sense of presence during VR leads to positive attitude change toward a destination. Second, the effect of presence on VR enjoyment confirms VR as a hedonic experience. Third, a positive change in attitude leads to visit intention, confirming VR's persuasiveness. Finally, VR is more persuasive when the virtual environment conveys its situated affordances. Emotional theories support this view, where visual engagement leads to revisits, while happiness leads merely to recommendation [47].

Related to persuasiveness, viral advertising research argues that videos with strong feelings increase the chance of spreading a video [48]. Furthermore, the expected video control, inclusion and affection benefits can significantly affect video forwarding intentions [49]. This intention to forward a video derives from two factors: sufficiently interesting video content quality and empathy. Empathy associates closely with the forwarder and recipient's relationship.

Finally, a recent study used the Oculus Rift virtual environment to examine perceived VR visual appeal and emotional involvement to visit a cultural heritage destination [50]. Perceived visual appeal had a positive relationship with user intention to visit, recommend and seek additional destination information, and with user emotional involvement. It is also implied that videos with positive images create positive emotions that spark a desire to visit the destination [24]. One good option is to show tourists having a good time [51].

The literature review presented above suggests that video content can affect tourists' attitudes, intention, and thus behaviour [39, 40]. VR material should be more effective than other material [2]. The richer the media, the more effective communication should be [17]. However, these assumptions are hardly ever discussed in the viewing device context. How are the viewing experience and the changes in consumer behaviour affected by the device used to watch the content?

3 Study Methods

This exploratory study was conducted during four days in December 2017 and January 2018 at Helsinki-Vantaa airport, convenience sampling 221 of departing international travellers from Schengen and non-Schengen flights to get answers from different nationalities and, from Finland's main markets. Convenience sampling is appropriate given the study's exploratory nature. The participants received Samsung Gear VR glasses ($n = 114$) or an iPad ($n = 108$) to watch the same 360-degree video filmed in eastern Finland's Ruunaa nature tourism area in autumn 2017 (video: <https://www.youtube.com/watch?v=p90d33rTSJg>). Both groups wore headphones while watching the video and were asked to turn around and look around while watching the video. After watching the video the travellers answered a survey, in English, concerning the video. Data collectors stood nearby to help use the device or complete the survey. On average it took 10 to 15 min to watch the video and fill in the survey. The questionnaire had altogether 21 questions.

Filmed by Karelia University of Applied Sciences students, the three-minute video showed four different situations in order to test which settings appealed to international visitors. The first setting, lakeside, let viewers experience watching the scenery. In the second setting, the viewers could see people walking past in the forest without being part of the action or the group. The third setting immersed the viewer in a moving boat with others. In the final setting, the watcher was also part of the action, sitting with a group by a campfire.

The survey stemmed from tourism and video marketing research. The survey examined if watching a 360-video would increase willingness to travel to the destination and participate in the activities on the video [2, 30, 52], participant feelings about the video [30], their spatial presence while watching the video [1, 30, 53, 54] and their intentions to share the video on social media [46].

The survey also explored how familiar tourists were with VR technology and in which part of their decision making process (inspiration, looking for potential destination information, planning after the decision has been made, while on holiday) VR technology would interest them. The survey included socio-demographic background questions as well as tourist interest towards outdoor activities and interest in nature holiday in Finland. In summary, the survey examined how VR could market a nature tourism destination, and how significant a role VR has when watching promotional destination videos.

The data was analysed using comparative analysis methods such as chi-square test and Independent Samples Mann-Whitney U-test. Also ordinal regression analysis was used to study if differences in the two samples affected the results.

4 Results

Table 1 below profiles the respondents evenly distributed between men and women and with a mean age of 31.8 years, mostly young people. Major countries represented are the UK, France, China, Russia, Germany and Australia. Respondents are highly educated and more than half of them do outdoor activities at least monthly.

Table 1. Respondent Profile.

Age	% (N = 218)	Nationality	% (N = 221)
17–24 years	25.7%	UK	12.7%
25–34 years	43.1%	France	8.6%
35–44 years	19.7%	China	7.7%
45–54 years	7.8%	Russia	6.3%
55–73 years	3.7%	Germany	5.0%
		Australia	5.0%
		Other	54.7%
Mean age	31.8		
Gender	% (N = 220)	Education	% (N = 218)
Male	50.5%	Comprehensive school/basic education	0.9%
Female	48.6%	Secondary education	15.8%
Other/Don't want to answer	0.9%	Bachelor's degree	34.4%
		Master's degree	42.7%
		Doctoral degree	4.6%
		Other	1.4%
How often do you do nature/outdoor activities (e.g. hiking, kayaking, canoeing, mountain biking or related)?			
Weekly	22.9%		
Monthly	28.0%		
Couple of times a year	36.7%		
Once a year	7.3%		
Less than once yearly	5.0%		

The respondents reported what feelings they had when watching the 360-degree nature video, either on an iPad or Samsung Gear VR glasses (1: Not at all, 6: Very much). Both devices created feelings of interest, relaxation, comfort, and happiness, which were the feelings people ranked the highest. However, the only statistically significant difference was that there was more boredom with the iPad than VR glasses (Mann-Whitney U test, $p = 0.027$).

Chi-square tests reported no statistically significant differences in behavioural intentions towards nature tourism holiday between watching the video with VR glasses or an iPad. Nor there were any statistical differences regarding the device used in interest in nature holiday in Finland, information search, word-of-mouth or intention to participate in the activities seen in the video.

Respondents, however, differed significantly in background factors when comparing VR glasses and iPad users. These sampling differences led us to examine if 360-

VR video watched with VR glasses generated more interest in nature holiday in Finland than watching the same video on an iPad. The ordinal regression was used. In the regression analysis interest in Finnish nature tourism holidays was used as the dependent factor. Respondent socio-demographics and video watching device were the factors explaining the interest in the nature tourism holiday. The regression analysis identified that only respondent origin country explained the differences in interest in nature holidays in Finland. This result also suggests that despite differences in interest in nature tourism activities between the devices, the device they watched the video from was not the reason for these differences.

The videos had four scenarios: lakeside, walking in the forest, boating and sitting by the campfire. The cross-tabulation and chi-square test results showed that the preferred videos differed between the video watching device, albeit walking in the forest was the least preferred scene on both devices (Table 2). Boating was the preferred scene with VR glasses, almost triple the forest scene. Lakeside was the preferred tablet scene, about double walking in the forest, with the boating and campfire scenes in between.

Table 2. Preferred video scene by device

Which part you liked the most?	VR glasses	Tablet	$X^2 = 7.964$, $p = 0.047$
Lakeside, me watching the nature	24.6%	31.1%	
Walking in the forest, me watching other people	15.8%	15.1%	
Boating, me on the boat with other people	44.7%	28.3%	
Sitting by the campfire, me together with others	14.9%	25.5%	

Comparing respondent feelings during the film showed that those who watched the 360-video with iPad were more distracted than VR glasses users (Table 3). VR glasses users were more immersed in the video and 360-video seemed more enjoyable to watch.

Finally, the results of a Mann-Whitney U-test showed no statistical differences in spreading word-of-mouth between VR glasses users and iPad users. On average, people were likely to share both kinds of videos.

5 Discussion and Conclusions

This study contributes to the discussion of 360-degree videos as a tourism marketing tool. The research concentrated on consumer experiences of, and willingness to use, VR technology in travel situations. The study explored how consumers perceive 360-degree Finnish nature video, and how VR experience and the device used for watching the video affects their future travel intentions.

Even though the experience of watching 360-degree nature tourism video on VR glasses or iPads differs, the resulting effects are similar. The results suggest that it does

Table 3. How the video made the respondent feel

	Device	N	Median	Independent samples Mann-Whitney U test sig.
How you felt during the film. (1 = at no time ... 6 = almost all the time)				
I had the feeling that I was in the middle of the action rather than merely observing	VR glasses	114	4	0.072
	Tablet (iPad)	107	4	
I felt like I was actually there in the environment of the presentation	VR glasses	114	4	0.242
	Tablet (iPad)	107	4	
I was fully focused to this film	VR glasses	114	5	0.013
	Tablet (iPad)	107	4	
I was distracted by other things during watching the film	VR glasses	114	2	0.025
	Tablet (iPad)	107	2	
The computer generated world became the “reality” for me, and I forgot about the “real world” outside	VR glasses	114	3.5	0.021
	Tablet (iPad)	107	3	
I felt emotionally attached to the video	VR glasses	114	3	0.700
	Tablet (iPad)	107	3	
I enjoyed watching the video	VR glasses	114	5	0.022
	Tablet (iPad)	107	5	
I felt as if I was in the real world whilst watching the video	VR glasses	114	4	0.238
	Tablet (iPad)	107	4	
I was aware of surroundings	VR glasses	114	4	0.059
	Tablet (iPad)	107	4	
I felt detached from the outside world	VR glasses	114	3	0.009
	Tablet (iPad)	107	3	
I noticed events taking place around me in the real world	VR glasses	114	3	0.001
	Tablet (iPad)	107	4	

Italics in median value denote statistically higher mean rank value where there is a statistically significant difference

not matter if the traveller watches the 360-video with and iPad or Samsung Gear, for intentions to visit or seek information about the destination. In both cases, the video itself aroused positive feelings and interest towards nature tourism in Finland. This result supports a study showing that the device matters little [13]. This also contributes to the theoretical understanding of the device type as a moderating variable in digital experiences.

However, the experience was more immersive when watching the video with the Samsung Gear VR. The feeling was more of being part of the action rather than just observing as well as being detached from the real world. It was also easier to focus on the film and pay less attention to things going on in real world compared to watching video with iPad. The results suggest that the viewing device does not affect media richness, even though it could be thought to affect [21, 22].

Visual appeal in VR content is important both for creating emotional involvement and increasing the intention to visit the destination [9]. What is notable, is that the video used in this study was filmed in late autumn, when the Finnish nature is not at its best and the perceived visual appeal perhaps negative, the video aroused positive feelings and interest to travel to Finnish nature destination. One contribution of this study is identifying several differences in emotions created between different media. It seems that when studying emotions, considering the device is important.

Research has confirmed that both 2D videos and VR engage consumers and affect positively the intention to travel [2, 24, 35–38]. Rich media content like normal videos and especially 360-degree videos as well as VR content reduces disappointing experiences when making travel decision and traveling, and removes barriers from buying [18]. Different aspects - spatial presence and enjoyment - affect the persuasiveness of VR content. Similar effects were identified also in this study. The results also suggest that in this case the viewing device does not affect expected video control, inclusion and affection benefits [11].

Based on this research, destinations and tourism businesses should consider adopting 360-degree videos and also consider the results of this study. The results show that 360-videos increased positive feelings and willingness to travel regardless of watching with a tablet or VR glasses. 360-degree videos provide more information than traditional videos and work well to demonstrate tourism experiences and locations, no matter the device. Marketers rarely decide what device the end user uses, but for example in exhibitions and events, 360-degree videos can be shown with a tablet. With much action and various things going on simultaneously or to make the potential traveller feel part of the action or a group, like in the boating video, VR glasses may be preferred.

Despite these contributions, this research has limitations, of which most relate to the data collection. The airport was the best place to reach many nationalities at the same time but situational challenges affected the data collection. Some spaces were too small or crowded to do the research, which might have affected the sample size and representativeness of different nationalities. Another limitation is the video filming season.

In the future, translating the survey in different languages would reduce language barriers especially with the Asian travellers, which prevented some of them to take part in this study. It would also be interesting to use two or three different kinds of 360-video clips to see if the experience of watching the video and willingness to try the activities and travel to the destination differs between the videos where you passively watch the people and action around you versus videos where the respondent are part of the group and feels like they are doing the activity. Media richness levels of different devices and content should be more precisely measured and analysed.

Acknowledgements. The authors wish to thank Rural Programme of Finland and Virtual Outdoors Finland project for funding this research.

References

1. Tussyadiah I, Wang D, Jia C (2017) Virtual reality and attitudes toward tourism destinations. In: Schegg R, Stangl B (eds) *Information and communication technologies in tourism 2017*. Springer International Publishing, Switzerland, pp 229–239
2. Griffin T, Giberson J, Lee S, Guttentag D, Kandaurova M (2017) Virtual reality and implications for destination marketing. *tourism travel and research association: advancing tourism research globally* 29. <https://scholarworks.umass.edu/cgi/viewcontent.cgi?article=2103&context=tra>. Accessed 30 Aug 2018
3. Klein LR (2003) Creating virtual product experiences: the role of telepresence. *J Interact Mark* 17(1):41–55
4. Steuer J (1992) Defining virtual reality: dimensions determining telepresence. *J Commun* 42(4):73–93
5. Guttentag DA (2010) Virtual reality: applications and implications for tourism. *Tour Manag* 31:637–651
6. Gratzner M, Werthner H, Winiwarter W (2004) Electronic business in tourism. *Int J Electron Bus* 2(5):450–459
7. Liu SQ (2005) A theoretic discussion of tourism e-commerce. In: *Proceedings of the 7th international conference on electronic commerce*. ACM Press, Xi'an, China, pp 1–5
8. Tan WK, Tan CH, Teo HH (2012) Conveying information effectively in a virtual world: insights from synthesized task closure and media richness. *J Am Soc Inf Sci Technol* 63(6):1198–1212
9. Tussyadiah I, Wang D, Jung T, Tom Dieck MC (2018) Virtual reality, presence, and attitude change: empirical evidence from tourism. *Tour Manag* 66:140–154
10. Healy N, van Riper CJ, Boyd SW (2016) Low versus high intensity approaches to interpretive tourism planning: the case of the Cliffs of Moher, Ireland. *Tour Manag* 52:574–583
11. Huang YC, Backman SJ, Backman KF, Moore DW (2013) Exploring user acceptance of 3D virtual worlds in travel and tourism marketing. *Tour Manag* 36:490–501
12. Ulrich M (2015) Seeing is believing: using the rhetoric of virtual reality to persuade. *Young Sch Writ* 9:5–18
13. Varan D, Murphy J, Hofacker CF, Robinson JA, Potter RF, Bellman S (2013) What works best when combining television sets, PCs, tablets, or mobile phones? how synergies across devices result from cross-device effects and cross-format synergies. *J Advert Res* 53(2):212–220
14. Daft RL, Lengel RH (1983) Information richness. A new approach to managerial behavior and organization design. *Res Organ Behav* 6
15. Daft RL, Lengel RH (1986) Organizational information requirements, media richness and structural design. *Manag Sci* 32(5):554–571
16. Jacob C, Guéguen N, Petr C (2010) Media richness and internet exploration. *Int J Tour Res* 12:303–305
17. Miguez-González M, Fernández-Cavia J (2015) Tourism and online communication: interactivity and social web in official destination websites. *Commun Soc* 28(4):17–31
18. Chen CC, Chang YC (2018) What drives purchase intention on Airbnb? perspectives of consumer reviews, information quality and media richness. *Telemat Inform* 35(5):1512–1523
19. Fiore AM, Kim J, Lee HH (2005) Effect of image interactivity technology on consumer responses toward the online retailer. *J Interact Mark* 31(3/4):285–296

20. Yeh C, Wang Y, Li H, Lin S (2017) The effect of information presentation modes on tourists' responses in Internet marketing: the moderating role of emotions. *J Travel Tour Mark* 34(8):1018–1031
21. Sundar SS (2000) Multimedia effects on processing and perception of online news: a study of picture, audio, and video downloads. *Journal Mass Commun Q* 77(3):480–499
22. Fiorella L, Mayer RE (2016) Effects of observing the instructor draw diagrams on learning from multimedia messages. *J Educ Psychol* 108(4):528–546
23. Häubl G, Trifts V (2000) Consumer decision making in online shopping environments: the effects of interactive decision aids. *Mark Sci* 19(1):4–21
24. Marques Teixeira JE (2017) The role of promotional touristic videos in the creation of visit intent to Barcelona. *Int J Sci Manag Tour* 3(1):463–490
25. Barbano MF, Cador M (2007) Opioids for hedonic experience and dopamine to get ready for it. *Psychopharmacology* 191:497–506
26. Berridge KC (2003) Pleasures of the brain. *Brain Cogn* 52(1):106–128
27. Hidi S, Ainley M (2008) Interest and self-regulation: Relationships between two variables that influence learning. In: Schunk DH, Zimmerman BJ (eds) *Motivation and self-regulated learning: theory, research, and applications*. Lawrence Erlbaum Associates Publishers, Mahwah, NJ, US, pp 77–109
28. Silvia PJ (2008) Interest—the curious emotion. *Curr Dir Psychol Sci* 17(1):57–60
29. Vittersø J, Søholt Y, Hetland A, Thoresen IA, Røysamb E (2010) Was hercules happy? some answers from a functional model of human well-being. *Soc Indic Res* 95(1):1–18. <https://doi.org/10.1007/s11205-009-9447-4>
30. Hetland A, Vittersø J, Fagermo K, Øvervoll M, Dahl TI (2016) Visual excitement: analyzing the effects of three Norwegian tourism films on emotions and behavioral intentions. *Scand J Hosp Tour* 16(4):528–547
31. Fishbein M, Ajzen L (1975) *Belief, attitude, intention and behavior: an introduction to theory and research*. Addison-Wesley, Reading, Mass, Don Mills, Ont.
32. Triandis HC (1977) *Interpersonal behavior*. Brooks/Cole, Monterey, CA
33. Gollwitzer PM (1993) Goal achievement: the role of intentions. *Eur Rev Soc Psychol* 4(1):141–185
34. Ajzen I, Fishbein M (2005) The influence of attitudes on behavior. In: Albarracín D, Johnson BT, Zanna MB (eds) *The handbook of attitudes*. Mahwah, NJ, Lawrence Erlbaum Associates, pp 173–221
35. Riley RW, van Doren CS (1992) Movies as tourism promotion: a 'pull' factor in a 'push' location. *Tour Manag* 13(3):267–274
36. Kim H, Richardson SL (2003) Motion picture impact on destination. *Ann Tour Res* 30(1):216–237
37. Hudson S, Wang Y, Gil SM (2011) The influence of a film on destination image and the desire to travel: a cross-cultural comparison. *Int J Tour Res* 13:177–190
38. Mathisen L, Prebensen NK (2013) Dramatizing an event through a promotional film: testing image effects. *J Travel Tour Mark* 30(7):672–689
39. Gong T, Tung VWS (2017) The impact of tourism mini-movies on destination image: the influence of travel motivation and advertising disclosure. *J Travel Tour Mark* 34(3):416–428
40. Leung D, Dickinger A, Nixon L (2017) Impact of destination promotion videos on perceived destination image and booking intention. In: Schegg R, Stangl B (eds) *Information and communication technologies in tourism 2017*. Springer International Publishing, Switzerland, pp 361–376

41. Reino S, Hay B (2014) The use of Youtube as a tourism marketing tool. Tourism travel and research association: advancing tourism research globally 69. <https://scholarworks.umass.edu/cgi/viewcontent.cgi?referer=https://www.google.fi/&httpsredir=1&article=1647&context=ttra>. Accessed 08 Sep 2018
42. Hou Z, Joppe M, Choi C, Lin Z (2016) Exploratory study of promotional videos in the 10 major tourist destinations in china: a content analysis. Tourism travel and research association: advancing tourism research globally. 45. <http://scholarworks.umass.edu/ttra/2011/Visual/45>. Accessed 30 Aug 2018
43. Lee W, Gretzel U (2012) Designing persuasive destination websites: a mental imagery processing perspective. *Tour Manag* 33:1270–1280
44. Oh H, Fiore AM, Jeoung MY (2007) Measuring experience economy concepts: tourism applications. *J Travel Res* 46:119–132
45. Adelaar T, Chang S, Lancendorfer KM, Lee B, Morimoto M (2003) Effects of media formats on emotions and impulse buying intent. *J Inform Technol* 18(4):247–266
46. Hautz J, Füller J, Hutter K, Thürridl C (2014) Let users generate your video ads? the impact of video source and quality on consumers' perceptions and intended behaviors. *J Interact Mark* 28(1):1–15
47. Vittersø J, Prebensen NK, Hetland A, Dahl T (2017) The emotional traveler: happiness and engagement as predictors of behavioral intentions among tourists in Northern Norway. In: Chen JS (ed) *Advances in hospitality and leisure*, vol 13. Emerald Publishing Limited, pp 3–16
48. Phelps JE, Lewis R, Mobilio L, Perry D, Raman N (2004) Viral marketing or electronic word-of-mouth advertising: examining consumer responses and motivations to pass along email. *J Advert. Res* 44:333–348
49. Huang J, Chen R, Wang X (2012) Factors influencing intention to forward short internet videos. *Soc Behav Personal* 40(1):5–14
50. Marasco A, Buonincontri P, van Niekert M, Orlowski M, Okumus F (2018) Exploring the role of next-generation virtual technologies in destination marketing. *J Destin Mark Manag* 9:138–148
51. Rajaguru R (2014) Motion picture-induced visual, vocal and celebrity effects on tourism motivation: stimulus organism response model. *Asia Pac J Tour Res* 19(4):375–388
52. Pavlou P, Gefen D (2002) Building effective online marketplaces with institution-based trust. In: *ICIS 2002 Proceedings*. 63. <http://aisel.aisnet.org/icis2002/63>. Accessed 29 Aug 2018
53. Slater M, Usoh M, Steed A (1994) Depth of presence in virtual environments. *Presence Teleoperators Virtual Environ* 3:130–144
54. Vorderer P, Wirth W, Gouveia FR, Biocca F, Saari T, Jäncke F, Böcking S, Schramm H, Gysbers A, Hartmann T, Klimmt C, Laarni J, Ravaja N, Sacau A, Baumgartner T, Jäncke P (2004) MEC spatial presence questionnaire (MECSPQ): short documentation and instructions for application. Report to the European Community, Project Presence: MEC (IST-2001-37661). <https://academic.csuohio.edu/kneuendorf/frames/MECFull.pdf>. Accessed 7 Sept 2018



“I Want to Go There Too!” Evaluating Social Media Influencer Marketing Effectiveness: A Case Study of Hokkaido’s DMO

Yi Xuan Ong¹(✉) and Naoya Ito²

¹ Graduate School of International Media, Communications and Tourism Studies, Hokkaido University, Sapporo, Japan

yixuanong@eis.hokudai.ac.jp

² Research Faculty of Media and Communications, Hokkaido University, Sapporo, Japan

naoya@imc.hokudai.ac.jp

Abstract. Social media and the power of word-of-mouth (WOM) have resulted in the rise of user-generated content (UGC) which thereby created prominent users who have congregated their own clout of followers as opinion leaders of the new digital century – social media influencers (SMIs). Becoming an integral player in the marketing industry in Singapore, Destinations Management/Marketing Organisations (DMOs) are recognising the influential power of SMIs, employing them as part of its integrated marketing strategy to increase inbound tourism. However, effectiveness of SMI marketing, even more so, social media campaign of a DMO has been minimally examined. Thus, to evaluate the effectiveness of the SMI marketing campaign executed by Hokkaido Tourism Organization, factor analysis and Structural Equation Modelling (SEM) is used. This study suggests that SMI marketing is effective in changing attitude among consumers, especially on destination image, which would consequently affect the consumers’ travel intention and intention to do word-of-mouth.

Keywords: Social media influencer · DMO · Attitude-towards-ad model Effectiveness

1 Introduction

Social media has become an integral medium where travellers access information on destinations, book and plan trips, share information and their own travel experiences [1, 2]. The rising use of social media, as well as the birth of user-generated content (UGC), led to the evolution of word-of-mouth (WOM) to eWOM (electronic-word-of-mouth), impacting the hospitality and tourism industry significantly [3, 4]. Platforms such as TripAdvisor, recommendations on Facebook and reviews on booking websites have become competitors for consumers’ attention of DMOs’ marketing campaigns online [5, 6]. As such, social media is becoming an emerging platform where destination management/marketing organisations (DMOs) compete for the attention of travellers [7, 8]. However, based on Hays, Page and Buhalis [4], most DMOs are still

exploring the new media platforms which thus, limiting the use of social media as a platform of disseminating destination information.

In 2015, the Japanese version of the DMO system was officially acknowledged, with its mission to revitalize local communities through tourism via the management and coordination of various stakeholders involved in the destination [9]. In November 2015, Hokkaido Tourism Organization invited one of Singapore's top influencers, Bellywellyjelly, to travel around Hokkaido in exchange of promoting Hokkaido to her followers. This sponsored trip was one of the DMO's destination marketing campaigns to increase inbound travellers from Singapore to Hokkaido [10]. The campaign was a great success on multiple social media platforms with high social interaction and engagement rates of more than 350,000 views on YouTube, 832 Likes, 265 comments and 1,100 shares on Facebook [11]. Since the execution of the SMI marketing campaign, there was a 20% increase in the tourism numbers from Singapore in the following year, from 49,800 travellers in 2015, to 59,400 travellers in 2016 [12, 13]. In order to understand how the campaign has affected Singaporeans' travel consumption to Hokkaido, this research has three objectives:

- (1) To evaluate the effectiveness of the SMI marketing campaign executed by Hokkaido Tourism Organization on whether an attitude change in Singaporean consumers had occurred after interacting with the campaign, thereby affecting their travel behavioural such as intention to travel to destination and intention to do eWOM.
- (2) To compare the hypothesised model with prior literature, namely Leung et al. [14] study on the marketing effectiveness of social media in the hotel industry.
- (3) To contribute to the progress of SMI marketing in the tourism and hospitality industry.

2 Literature Review

2.1 DMO and Social Media

The age of social media has created a paradigm shift when it comes to the dissemination and production of information [1, 2, 4]. Especially even more so in tourism, with it being an 'information-intensive industry' [4, 15]. The rise of UGC facilitated by social media meant that every user is a creator, a source of information that has the power through eWOM to affect someone else on its customer journey [3, 16]. As such, the rising popularity of social media as a marketing channel to reach consumers more directly and effectively has led to the increase in use of social media marketing by DMOs [4].

2.2 Japan – The Promotion Towards Tourism Nation

With the aims of promoting Japan as a tourism nation, the Koizumi Cabinet launched the Visit Japan Campaign in April 2003, and subsequently passed the Tourism Nation Promotion Basic Law in December 2006 [17]. In 2015, the establishment of Japan's

DMO system served as the turning point for Japan's tourism industry, where DMOs take the management role of related stakeholders to revitalise local communities through tourism [9]. Subsequently, DMOs in various levels all over Japan started using social media actively for destination marketing. For example, the target DMO used in this study, Hokkaido Tourism Organisation, only established its Facebook page in 2016 [18]. With the above evidences, it can be inferred that the use of social media to promote Japan's inbound tourism can be said to have started relatively later as compared the targets in Hays, Page and Buhalis [4]. This late start may have resulted in weaker destination awareness, engagement with possible travellers and converting them to actual travellers [19].

2.3 Social Media Influencers

As a characteristic in the age of social media, UGC as a form of eWOM has impacted the tourism industry significantly [3]. Users which have accumulated a strong base of followers become Social Media Influencers (SMIs), who are then leveraged by brands to share related information, influencing their followers through their recommendations [20]. In contrast to "Opinion Leaders" highlighted in Katz and Lazarsfeld's [21] Two-step Flow Theory, SMI takes the perspective of a consumer, sharing the information of products and services, as well as his/her own experience through a multi-faceted interaction with the followers, and thereby steer the followers to a certain action [22]. As such, it should be considered that SMI has an effect to brand building or marketing effectiveness [23]. With such expectations to SMI and the effects it could possibly bring for destination marketing, it is imperative to undergo a detailed examination on the campaign executed by Hokkaido Tourism Organisation in order to provide insights to future strategies on destination marketing.

2.4 The Use of Attitude-Toward-the-Ad Model (A_{AD}) and Attitude-Toward-the-Website Model (A_{WS})

The attitude-toward-the-ad model (A_{AD}) originated from Mitchell and Olsen [24] and Shrimp [25]. The model was found on the basis whereby an attitude toward the advertisement is formed after an exposure to a persuasive advertisement, thereby exerting an influence on effects of persuasive advertising such as attitude change and formation towards a brand and behavioural changes [14, 24–26]. Studies related to A_{AD} have provided four hypothesised models of how A_{AD} directly and indirectly mediate brand attitude and purchase intention of a certain product: (1) the affect transfer hypothesis (ATH) assumes on the direct effect of A_{AD} on attitude toward the brand; (2) the dual mediation hypothesis (DMH) posits on a two-way effect of A_{AD} on attitude toward the brand; (3) the reciprocal mediation hypothesis (RMH) based its theory on the reciprocal effect of A_{AD} and attitude toward the brand; and (4) the independent influences hypothesis (IMH) hypothesises on how A_{AD} has no effect on attitude toward the brand and has a direct effect on purchase intention [14, 26, 27]. In this study, and as a comparison with Leung et al. [14] model, ATH model will be used to investigate the direct effect of how the exposure of the ad affects the consumers' ad cognition and

brand cognition, which then attitude toward the ad and then the attitude toward the brand [24, 25].

With the evolution of media platforms, which also strongly impacts advertising, the A_{AD} model has evolved to explain effects of advertising on the Internet [28]. The A_{AD} model has evolved into the A_{WS} (Attitude-toward-the-website) model to evaluate advertising effectiveness on websites, providing an alternative hypothesis that the medium of the ad has an impact on the consumers’ reaction to the ad [28, 29]. In addition, Bruner and Kumar [29] highlighted that the key role of one’s experience on the website affects the A_{AD} , which consequently impacts attitude towards the brand and purchase intention.

While prior literature has emphasised on each individual concept of A_{AD} and A_{WS} models separately, Leung et al. [14] study has effectively combined both models, using the ATH model as the theoretical framework along with the integration of A_{WS} to study on the marketing effectiveness of hotels’ social media pages. Figure 1 presents the results of Leung et al. [14] study with path coefficients on how American consumers’ social media marketing experiences of a famous hotel brand on Facebook and Twitter (in brackets) affected their attitude toward the hotel brand, which in turn, affected their intention to book the hotel and do eWOM. The research highlighted the importance of social media experience by suggesting that, through the consumers’ experience of the hotels’ social media pages, consumers’ attitudes towards the hotels’ social media pages is formed, thereby directly impacting their attitudes towards the hotel brand, which in turn affects their hotel booking intention. Additionally, Leung et al. [14] research added the intention to (positive) eWOM, as a marketing outcome of social media which was expected to be influenced by two constructs: attitudes toward hotel brand and hotel booking intention. WOM is incorporated into Leung et al. [14] model as a marketing outcome to showcase customer loyalty towards the hotel brand.

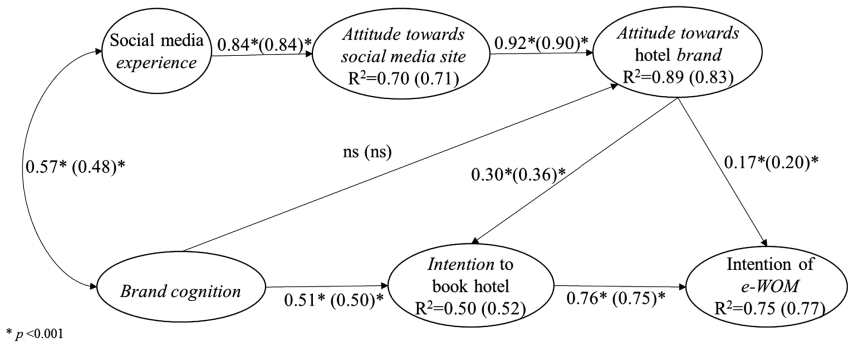


Fig. 1. Structural model of social media experience with standardised path coefficients of Facebook and Twitter (in brackets) (Adapted from Leung et al. [14], p. 160)

Leung et al. [14] research is effective in explaining the importance of consumers’ social media experience. The study illuminates that consumers’ social media experience is significant in influencing their attitudes-toward-social media sites, which

subsequently affect their attitudes-toward-hotel-brand. Consequently, consumers' attitudes-toward-hotel-brand affect their hotel booking intentions and the intentions to leave positive reviews or eWOM [14]. More importantly, the findings of the research suggest that different social media platforms such as Facebook and Twitter have similar marketing mechanism in the marketing effectiveness model [14]. As such, with the case study of SMI marketing campaign executed by Hokkaido Tourism Organisation which used multiple social media platforms, Leung et al. [14] model will be employed without comparing different social media platforms. Additionally, the study will be using campaign experience, campaign attitude, destination image, destination awareness, travel intention, and intention to WOM as constructs to better fit the objectives of this study.

2.5 Hypothesised Model

With the focus of the study being the SMI marketing campaign promoting Hokkaido as a destination, Leung et al. [14] model on hotel's social media website (Fig. 1), has been modified to the hypothesised model of SMI marketing effectiveness as shown in Fig. 2. The hypothesised model of this study proposed that through consumers' experiences of the SMI marketing campaign, attitudes toward the SMI marketing campaign are formed, thereby directly affecting their destination image, which then influences their travel intention to the destination. Therefore, instead of social media experience in Fig. 1, the input of the model is changed to consumers' SMI campaign experiences. Similarly, instead of brand cognition of the hotel directly affecting consumers' attitudes-toward-hotel-brand and intention to book hotel in Leung et al. [14] study, destination awareness is proposed to have a direct effect on consumers' destination image and travel intention to destination. Intention to WOM is retained as a marketing outcome in addition to travel intention to destination. With this, a total of six variables and nine hypotheses were proposed in the study (Fig. 2). One key difference of the hypothesised model from Leung et al. [14] model that we would like to point out is the introduction of hypothesis 9, which posits on the idea of WOM as a marketing tool, which in turn positively influences travel intention [3, 14].

3 Methodology

3.1 Data Collection and Sampling

An online survey was conducted in April 2018. A convenient sample was selected based on the author's personal network as it consists of primary target audience of SMI marketing who are consumers aged 18-35 immersed in social media every day [30]. First 70 participants who are Singaporeans or Permanent Residents of Singapore were invited to take the survey via the link in the email sent to them. The convenient sample was then snowballed to a total number of 200 complete responses in two weeks. All respondents were checked whether they had experienced the campaign before. Those who did not were asked to experience the SMI marketing campaign before they could proceed to the measurement items in the questionnaire.

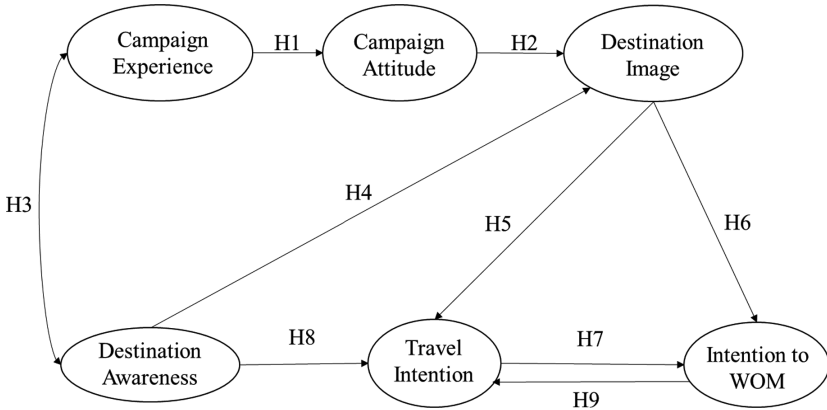


Fig. 2. Hypothesised model of SMI marketing effectiveness

3.2 Measures

The survey consisted of questions on the constructs (Fig. 2), were measured with multiple items adapted from Leung et al. [14] with adequate changes to fit the study. Respondents were asked to value all the measurement items based on 5-point semantic differential scales ranged from *not at all* (1) to *very much* (5). The first section consisted of questions regarding campaign experience, campaign attitude, destination image, destination awareness, travel intention and intention to do WOM [14]. The second section consisted of items on the consumers’ perception should they know that the social media influencer in the campaign was involved in a negative incident that affected her reputation. The last section consisted of demographic profile on gender, age, race, and social media usage.

The validity and reliability of measurement constructs was first evaluated by SPSS 24.0, using maximum likelihood factor analysis with promax rotation on all items. One item in the measures for travel intention was removed due to low factor loading of less than .5. The remaining items were tested for internal consistency by Cronbach’s α . The results proved to have good internal consistency (.89–.95) for all measures with the exception of destination awareness (.52).

4 Results

4.1 Demographic Results of Respondents

Table 1 presents the demographic results of respondents of the survey. Regarding the medium of interacting with the SMI campaign which is the case study of this study, 49.3% of the respondents interacted with the campaign on the online media website, followed by 36.5% of the respondents experiencing the campaign via its Facebook post, 15.3% on YouTube Vlogs and 13.3% through Instagram of the influencer Belwellyjelly. About one-third of the respondents (33%) were followers of the influencer

in the marketing campaign. Additionally, all the respondents have heard of the destination Hokkaido despite only 35% of the respondents been to Hokkaido.

Table 1. Demographic results (N = 200)

	Frequency	%		Frequency	%
<i>Gender</i>			<i>Daily Social Media Usage</i>		
Male	60	30.00%	Less than 1 h	34	17.00%
Female	140	70.00%	1–3 h	95	47.50%
			3–6 h	55	27.50%
<i>Age</i>			7–9 h	13	6.50%
15–19	7	3.50%	9–12 h	1	0.50%
20–24	60	30.00%	More than 12 h	2	1.00%
25–29	104	52.00%			
30–34	20	10.00%	<i>Race</i>		
35–39	8	4.00%	Chinese	188	94.00%
50 and above	1	0.50%	Malay	6	3.00%
			Indian	4	2.00%
<i>Travelled to Hokkaido</i>			Eurasian/Others	2	1.00%
Yes	70	35.00%			
No	130	65.00%			

4.2 Structural Model

After undergoing factor analysis, data were then analysed by structural equation modelling (SEM) using AMOS 23.0. The data is imposed with the structure of the model to look at the goodness-of-fit of the hypothesised model for this study. Indirect effects were estimated by bootstrapping. Model fit of the structural model was evaluated based on the comparative fit index (CFI), non-normed fit index (NNFI), standardised root mean square residual (SRMR), and root mean square error of approximation (RMSEA). The recommended threshold of acceptability for NNFI and CFI is 0.95, while SRMR of less than .08 and RMSEA close to .06 indicates well-fitting models [31, 32]. As a result, goodness-to-fit model indices of the hypothesised model reported a $\chi^2(143) = 262.50$, $\chi^2/df = 1.84$, $p < .001$, CFI = .963, NNFI = .956, SRMR = .0867, RMSEA = .065. Figure 3 presents results of SEM for SMI marketing effectiveness in this research.

The results indicated that consumers having had a positive SMI marketing campaign experience had a significant effect on their attitudes towards the SMI marketing campaign ($\beta = .83$; $p < .001$), and a positive attitude to the SMI marketing campaign had a significant effect on their destination image (in this case, Hokkaido) ($\beta = .58$; $p < .001$). While consumers' awareness of Hokkaido does not have a significant effect on their image of the destination ($p > .05$) as refuted by H4, consumers' awareness of Hokkaido had significant effects to travel intention to travel to Hokkaido ($\beta = .68$; $p < .001$). The consumers' destination image on Hokkaido had a significant effect on

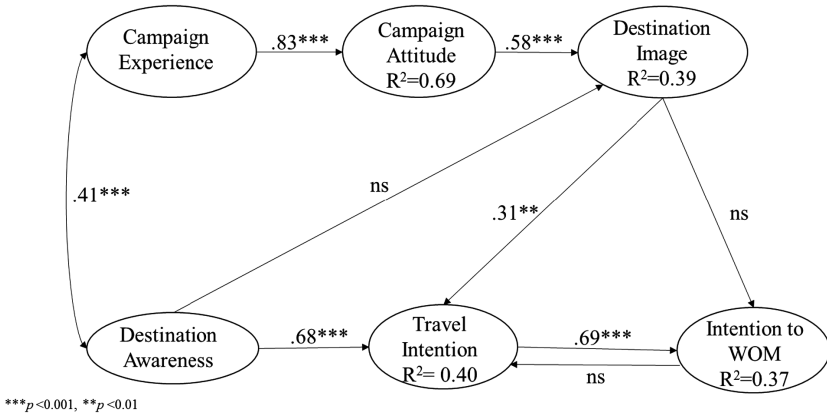


Fig. 3. Results of structural model of SMI marketing effectiveness

their intention to travel to the destination ($\beta = .31; p < .01$). On the other hand, the audience image of Hokkaido did not have a significant effect on the audience intention to do word-of mouth (in sharing) ($p > .05$), refuting hypothesis 6. Yet, the audience’s intention to travel to Hokkaido had a significant effect of their intention to do WOM ($\beta = .69; p < .001$) and not the other way round ($p > .05$), refuting H9.

4.3 Comparing with Leung et al. [14] Model

This study attempted to use a combination of A_{AD} and A_{WS} models to measure the marketing effectiveness of Social Media Influencer through a case study of a campaign executed by Hokkaido Tourism Organisation. With Leung et al. [14] model as a basis, the study proposed a hypothesised model. The results illuminated that hypotheses 1, 2, 3, 5, 7 and 8 were supported by the SEM results, while hypotheses 4, 6 and 9 were refuted. That is, this study supports and reinforces the exploratory study done by Leung et al. [14]. More importantly, it suggested the achievement of objective 1, whereby SMI marketing campaign did cause an attitude change among Singapore audiences. Therefore, the results demonstrate that a positive SMI marketing campaign experience leads to positive attitude-toward-campaign, which results in a positive destination image; therefore increasing consumers’ intention to travel to the destination, which then increases the consumers’ intention to recommend the destination.

Figure 3 illustrates that there are two paths that would affect consumers’ travel intention and intention to WOM, which are the marketing outcomes for the study and Leung et al. [14] study: one starting from SMI campaign experience and one starting from destination awareness. However, it is the route from SMI campaign experience which suggests that the SMI campaign had caused an attitude change among Singapore consumers. That is, with more positive experiences of the campaign on social media, they tend to have more favourable attitudes toward the campaign and therefore resulting in having positive attitudes toward destination. Thus, having a positive effect of .31 on the intention to travel to Hokkaido and intention to recommend the

destination. On the other hand, destination awareness has a non-significant direct effect on destination image, showing the importance of SMI campaign experience in causing effective attitude change towards destination image, mediated by attitudes toward the SMI campaign. This finding is supported by Leung et al. [14], as well as Bruner and Kumar [29] highlighting the importance of campaign experience to changing attitudes of target audiences on destination management and marketing. Therefore, this study suggests that DMOs can effectively make use of social media marketing for destination image building and engagement by providing positive campaign experiences through social media influencers.

The rejection of H6 on the relationship between destination image and intention to WOM is one of the main differences obtained from this study. It indicates that the consumers' destination image has a non-significant direct effect on the intention to WOM. This finding is thought-provoking as it differs from relationship between attitude-toward-hotel-brand and intention to eWOM in Leung et al. [14] study. Instead, in this study, as suggested by the alternative route from the consumers' attitudes toward Hokkaido, the intention to do WOM is mediated by the intention to travel to Hokkaido. This finding illuminates that consumers of the SMI marketing campaign are more likely to share or recommend the destination if they have a higher travel intention to the destination. This could also be inferred to show that with a higher intention to travel, there would be a higher likelihood to recommend the destination to be ascertained, get favourable feedback for a further push to have action. This finding is supported by Chen and Tsai [33] which highlighted that destination image, defined as attitude toward destination in this study, has both direct and indirect effect ($\beta = .178$) on behavioural intentions, which is defined as travel intention and intention to WOM in this study. Moreover, with limited research on how destination image perceived from marketing campaigns affects travel intention and intention to WOM before travelling, this finding supports the effects of destination image on intention to WOM mediated by travel intention as an important relationship and measure of marketing effects for DMOs on destinations [14].

The addition of H9 was introduced into the proposed model to test whether the more one has the intention to do WOM on a destination, the more one wants to travel to the destination. While H6 is supported by Leung et al. [14] study, which states that these two marketing outcomes are closely related to each other, the rejection of H9 suggests that Singapore consumers are more likely to recommend a destination if there is a high likelihood of travelling to the destination. This finding is consistent with the aforementioned finding, implying that with a more favourable attitude towards a destination, the consumer will be more likely to travel to the destination, and thus have a greater likelihood to recommend the destination to others before travelling.

5 Discussion

The main aim of this study is to evaluate the effectiveness of SMI marketing campaigns executed by DMOs to Singapore consumers. The concepts of A_{AD} and A_{WS} were incorporated in the study based on the exploratory model by Leung et al. [14]. Reinforcing on the theoretical framework of Leung et al. [14], findings of this study echo the

argument of the importance of a campaign experience, which thereby positively affects campaign attitude and destination image strongly. Thus, causing an attitude change in the consumers and affecting his/her behavioural intention. It can be implied that the SMI campaign has been effective in building destination image of the destination which thereby positively affects the travel intention of consumers as compared to just having destination awareness despite it being directly related to travel intention. Through the study, it also provided another possibility of how DMOs can effectively make use of social media marketing for destination image building and engagement with target audiences through social media influencers, showing the progress of DMO's utilization of social media beyond information transmission since Hays et al. [4].

5.1 Theoretical Implications

The study has achieved objective 3 by providing both theoretical and practical contributions in the field of destination marketing. Theoretically, the research on social media influencer, and its marketing effectiveness can be said to be very limited. This study aims to build on current literature with the application of commonly used concepts such as A_{AD} and A_{WS} to undergo an exploratory research on the marketing effectiveness of social media influencer. In addition, this research re-introduces the classic concept of "Opinion Leader" from Katz and Lazarsfeld [21] in the current context of social media, illustrating its evolution into social media influencer and its marketing effectiveness for DMOs. Additionally, this study reinforces the exploratory study of Leung et al. [14], supporting the use of a combined A_{AD} and A_{WS} concepts in the field of social media, through social media influencer marketing campaign. More importantly, this study extended the use of A_{AD} and A_{WS} from the domain of intention to book a brand to intention to visit a travel destination. It concerns about making efforts to investigate these theories in more possible research areas to take more insight of consumers' eWOM behaviour.

5.2 Practical Implications

In terms of practical contributions, DMOs can use findings of the study to invigorate their social media marketing strategies. The study illuminated that SMI marketing campaign experience is a pivotal construct in social media influencer marketing, demonstrating that DMOs should focus on engaging with consumers through social interaction, providing swift, informative and captivating content to contend for the attention of consumers, as well as enhancing consumers' campaign experience of the campaign. Thus, DMOs should make their social media campaigns more interesting, exciting, fascinating, and engaging, which makes consumers feel involved, which is highly likely to make their experience more positive. Through the study, SMI is proven effective in creating positive SMI campaign experiences, showing that DMOs should explore more in the use of SMI in creating interactive and engaging content. This study also indicates that destination image is also an important construct that has both positive direct and mediating effects on marketing outcomes. Therefore, DMOs are suggested to pay more attention on destination image building on social media. Moreover, this study also provides empirical evidence of the effectiveness of social media

influencer marketing on Singapore consumers. Findings of the study can be useful for DMOs targeting not just Singapore consumers as a new market for inbound tourism, but also Asian consumers of similar socio-economic status.

5.3 Limitations and Future Research

There is no such thing as a perfect research. One of the limitations of the study that needs to be addressed would be the use of a convenient and snowballing sample for collecting survey responses. This may have resulted in information source similarity, affecting the representativeness of the sample demographics. However, it is also the sensitivity and the main target of most SMI marketing campaigns that motivated the use of convenient sampling. Furthermore, the measurement of destination awareness construct should be further developed due to low internal consistency and factor loadings. Future research should address the limitation of the sample demographics and delve deeper on evaluating DMO's SMI marketing campaigns.

While this study posits itself on the research by Leung et al. [14], based on a hotel brand, future work could look at comparing the difference of marketing effectiveness of SMI marketing campaigns between a destination and a brand, as well as increasing the robustness of current model to better evaluate the extent of the effectiveness of DMO's SMI marketing campaigns by combining with other models. Impacts of involvement and impacts of sample demographics on attitude and behavioural intentions towards SMI marketing were not considered, which could possibly call for future applications using Elaboration Likelihood Model [34].

In actual fact, in April 2018, a negative incident that affected the influencer's reputation had befallen on the influencer (Bellywellyjelly) that appeared in the SMI marketing campaign used for this study. While the incident was not blown-up into exponential proportions or reported on mass media, online communities in Singapore had knowledge of the incident. A section of the questionnaire in this study was dedicated to understand how respondents of the survey would have change their attitudes toward the influencer, as well as attitudes toward the destination, and travel intention to destinations endorsed by aforementioned influencer. More than 80% of the respondents answered that despite the negative incident impacting the reputation of the influencer, it does not affect their destination image of the destination, nor their travel intention to destinations previously endorsed by the affected influencer. While this finding may show that DMOs do not require as much effort on rebuilding destination image after a crisis on the endorser, future studies are recommended to find out the extent of social media influencer marketing effectiveness for DMOs after knowing that it is effective.

References

1. Buhalis D, Law R (2008) Progress in information technology and tourism management: 20 years on and 10 years after the internet: the state of eTourism research. *Tour Manag* 29:609–623
2. Xiang Z, Gretzel U (2010) Role of social media in online travel information search. *Tour Manag* 31:179–188

3. Litvin SW, Goldsmith RE, Pan B (2008) Electronic word-of-mouth in hospitality and tourism management. *Tour Manag* 29(3):458–468
4. Hays S, Page SJ, Buhalis D (2013) Social media as a destination marketing tool: its use by national tourism organizations. *Curr Issues Tour* 16(3):211–239
5. Gretzel U (2006) Consumer generated content: trends and implications for branding. *E-rev Tour Res* 4(3):9–11
6. Rand M (2006) Online travel gets personal. http://www.forbes.com/2006/02/17/travelcity-orbitz-tripadvisor-in_mr_bow0217_inl.html. Accessed 4 Jan 2011
7. Hvass KA, Munar AM (2012) The takeoff of social media in tourism. *J Vacat Mark* 18:93–103
8. Yang X, Wang D (2015) The exploration of social media marketing strategies of destination marketing organizations in China. *J China Tour Res* 11(2):166–185
9. Japan Tourism Agency (2017) 日本版DMOとは?. [What is Japan's version of DMO?]. Japan Tourism Agency website http://www.mlit.go.jp/kankocho/page04_000048.html. Accessed 10 June 2018
10. Lim A (2015) 35 Reasons to visit Hokkaido at least once in your life. The Smart Local website: <http://thesmartlocal.com/read/visit-sapporo-hokkaido>. Accessed 10 June 2018
11. The Smart Local (2015) 35 Reasons to visit Hokkaido at least once in your life [Facebook Post]. <https://www.facebook.com/TheSmartLocal/posts/958731264214658>. Accessed 10 June 2018
12. Hokkaido Government (2016) 平成27年度北海道観光入込客数調査報告書. [2015 Hokkaido Inbound Tourist Report]. http://www.pref.hokkaido.lg.jp/kz/kkd/toukei/H27_irikomi_honpen_20160912.pdf. Accessed 10 June 2018
13. Hokkaido Government (2017) 平成28年度北海道観光入込客数調査報告書. [2016 Hokkaido Inbound Tourist Report]. http://www.pref.hokkaido.lg.jp/kz/kkd/toukei/H28_irikomi_honbun.pdf. Accessed 10 June 2018
14. Leung XY, Bai B, Stahura KA (2015) The marketing effectiveness of social media in the hotel industry: a comparison of Facebook and Twitter. *J Hosp Tour Res* 39(2):147–169
15. Gretzel U, Yuan Y, Fesenmaier D (2000) Preparing for the new economy: advertising strategies and change in destination marketing organizations. *J Travel Res* 39:149–156
16. Kaplan AM, Haenlein M (2009) Users of the world, unite! The challenges and opportunities of social media. *Bus Horiz* 53:59–68
17. Japan Tourism Agency (2016) Tourism Nation Promotion Basic Law. <http://www.mlit.go.jp/kankocho/en/kankorikkoku/kihonhou.html>. Accessed 10 June 2018
18. Hokkaido Tourism Organisation (2016) Hokkaido Tourism Organisation Facebook Page. <https://www.facebook.com/HTOvisitthokkaido/>. Accessed 10 June 2018
19. Andonian A, Kuwabara T, Yamakawa N, Ishida R (2016) The future of Japan's tourism: path for sustainable growth towards 2020. <https://www.mckinsey.com/industries/travel-transport-and-logistics/our-insights/can-inbound-tourism-fuel-japans-economic-growth>. Accessed 10 Oct 2018
20. Snijders R, Helms RW (2014) Analyzing social influence through social media: a structured literature review. In: *Proceedings of the 7th IADIS International Conference on Information Systems 2014*, pp 3–10
21. Katz E, Lazarsfeld PF (1955) *Personal influence: the part played by people in the flow of mass communication*. Free Press, Glencoe, IL
22. Uzunoğlu E, Kip SM (2014) Brand communication through digital influencers: leveraging blogger engagement. *Int J Inf Manage* 34(5):592–602
23. Booth N, Matic JA (2011) Mapping and leveraging influencers in social media to shape corporate brand perceptions. *Corp Commun Int J* 16(3):184–191

24. Mitchell AA, Olson JC (1981) Are product attribute beliefs the only mediator of advertising effects on brand attitude? *J Mark Res* 18:318–332
25. Shrimp TA (1981) Attitude toward the Ad as a mediator of consumer brand choice. *J Advert* 10(2):9–48
26. Lutz RJ, MacKenzie SB, Belch GE (1983) Attitude toward the Ad as a mediator of advertising effectiveness: determinants and consequences. *Adv Consum Res* 10:532–539
27. MacKenzie SB, Lutz RJ, Belch GE (1986) The role of attitude toward the Ad as a mediator of advertising effectiveness: a test of competing explanations. *J Mark Res*, 130–143
28. Chen Q, Wells WD (1999) Attitude toward the site. *J Advert Res* 39(5):27–37
29. Bruner GC, Kumar A (2000) Web commercials and advertising hierarchy-of-effects. *J Advert Res* 40(1–2):35–42
30. Salem TM, Twining-Ward LD (2018) The voice of travelers: leveraging user-generated content for tourism development 2018 (English). <http://documents.worldbank.org/curated/en/656581537536830430/The-Voice-of-Travelers-Leveraging-User-Generated-Content-for-Tourism-Development-2018>. Accessed 15 Oct 2018
31. Hooper D, Coughlan J, Mullen M (2008) Structural equation modelling: guidelines for determining model fit. *Electron J Bus Res Methods* 6(1):53–60
32. Hu LT, Bentler PM (1999) Cut-off criteria for fit indices in covariance structure analysis: conventional criteria versus new alternatives. *Struct Equ Model* 6(1):1–55
33. Chen CF, Tsai D (2007) How destination image and evaluative factors affect behavioral intentions? *Tour Manag* 28(4):1115–1122
34. Petty RE, Cacioppo JT (1986) The elaboration likelihood model of persuasion. *Adv Exp Soc Psychol* 19:123–205



The Impact of Visual Social Media on the Projected Image of a Destination: The Case of Mexico City on Instagram

Denis Bernkopf and Lyndon Nixon^(✉)

Department of New Media Technology, MODUL University Vienna,
Am Kahlenberg 1, 1190 Vienna, Austria
lyndon.nixon@modul.ac.at

Abstract. This paper considers if, and to what extent, visual social media can change the viewer's perceived image of a tourism destination as well as which types of visual content are most effective in projecting a destination image. The results from an online survey, which compares three different test groups and their image of Mexico City, shows that UGC images from Instagram, as well as random Google images, are more effective at improving destination image than the UGC images reposted by a DMO. Additionally, this study uses image annotations to determine which features in images are most important in terms of their contribution to an improvement in overall destination image, presenting a re-usable set of visual features for future work on using annotations in the measurement of visual destination image.

Keywords: Instagram marketing · DMO marketing · Media annotation
Visual analysis · Concept detection · Image annotation · Destination image
Tourism intelligence

1 Introduction

Social media has become an increasingly important destination-marketing tool. It is used by destination-marketing organisations (DMOs) to reach a large amount of people all over the world and provide them with content and information about a destination.

The ability of social media marketing to affect the consumer decision process is what makes it so appealing [1]. However, arguably more influential than the marketing efforts of DMOs is the user-generated content (UGC) posted by tourists themselves. This type of content, also known as Electronic-Word-of-Mouth (eWOM), is even more effective in changing consumer perception due to its “characteristics of global reach, the speed with which it travels, ease of use, anonymity and absence of direct face-to-face pressure” [2]. Due to this dramatic rise in significance of social media in tourism there is a high demand for research in this field, as studies “argue that social media usage among top DMOs is still largely experimental and that strategies vary significantly” [3]. With the advent of digital photography and widespread Internet accessibility, social networks have become increasingly visual, with photos and videos being shared globally at a previously unseen scale.

The purpose of this paper is to determine if, and to which extent, visual social media can change the viewer's perception of a tourist destination. Furthermore, different types of online content, such as random photos from online, DMO promotional images and UGC images from Instagram will be analysed in terms of their effect on perception using an online survey. Additionally, the features of effective images will be evaluated using image annotation, in order to suggest the ideal visual features for promoting a city. In particular, this research will be based on Mexico City as a tourist destination. In August 2017 the US Travel advisory issued their most recent warning to people considering travelling to Mexico, due to criminal activities, such as robbery, car theft, kidnapping and even homicide. However, the state-by-state assessment shows that there is no special advisory in place for Mexico City [4]. This is because a lot of the crime happens in the northern and Pacific states, which are located a considerable distance away from Mexico City. Therefore, tourists who have been exposed to a distorted portrayal of safety in the Mexican capital are often amazed by how safe the city actually feels when they decide to visit it [5].

However, Mexico City remains associated with crime and danger by people who have not travelled there and their tourism suffers from this image. This research will determine if online media can be used to change the viewers' perception of the city. The existing literature on social media use in destination marketing is reviewed (Chap. 2). Furthermore, a study will be conducted, which is expected to prove the hypothesis that social media can be used to change or improve viewers' perception of Mexico City as a tourist destination, as well as provide valuable insights about which types of content are effective in terms of influencing perception (Chap. 3). These insights will be used to accept or reject the hypothesis that a certain type of visual content is more effective in terms of improving destination image than other types of content (Chap. 4). The paper will be concluded with recommendations for DMOs and their social media marketing (Chap. 5).

2 Related Work

In terms of tourism, user-generated images mostly take the form of photos taken by travellers in order to share and remember experiences from their trip. For tourists these photos also serve as a kind of verification to prove to other people in their online community such as Facebook friends and Instagram followers that they have been to a certain place. Such photos are also an essential tool for DMOs, who are able to use them to build and broadcast a kind of brand image for the destination. Social networking sites such as Facebook and Instagram also allow DMOs to share visually appealing content with users, who are then able to react by liking, commenting or sharing the post [3]. This content is often UGC reposted by the DMOs' own social media channel. Research has shown that UGC reposted on DMOs' own social media channel lead to increased trust [6]. For example, the Instagram page of the official Mexican national tourism board consists entirely of reposted UGC, with credit given to the owner of the image [7]. Specific hashtags are used by DMOs to find and select these images. [8] analysed how consumer-generated content differs from content generated by DMOs with regard to its effect on consumer perception of a destination's image. They found that consumer-generated content has the ability to influence the image of a

destination substantially and rapidly. Therefore, it is important for marketers to find out how they can influence the consumers.

In tourism research, DMO marketing influence has been linked to changes in the measured “destination image” – essentially: what people think of when they think of the destination. [9] categorized cognitive and affective attributes. Cognitive attributes include “knowledge about resources and physical attributes such as, tourist infrastructure, leisure and recreation, culture and history, etc.”, whereas affective attributes are made up of “feelings towards and emotions triggered by a destination, e.g. exotic, mystic, relaxing etc.” Due to the fact that the research of this paper is focused on images, the concept of “visual destination image”, which can be defined as “the image of a destination as formed through exposure to visual media” offers some important context, especially due to the fast rise of social media platforms, such as Instagram, which allows users to share their photos immediately and globally [10].

There is limited prior work in determining the perceived image of a destination through visual media, especially in the modern context of social networks. [11] presents a comprehensive literature review for this topic, noting the heterogeneity of chosen content sources, analysis methodologies and visual features considered. They conclude that both further research is needed and that this research field is lacking a standardized system for the evaluation of the visual destination image. [12] is the first reported publication analysing photos on social media, comparing UGC photos on Flickr and DMO Website photos for the country of Peru, and finding differences in several attributes presented by them. They also already noted that general frameworks to measure and compare visual destination image are needed. The literature review ends in 2015, thus missing more recent works. To the best of the authors’ knowledge, [10] is the first analysis of this type using Instagram photos, a social network which is nowadays more significant for destination marketing than Flickr. They asked whether exposure to visual UGC could affect a person’s destination image and suggested that certain, less expected or reinforced images could. To measure the perceived image, they used a slightly adapted and more extensive version of the cognitive attributes [9], arguing that focusing on the cognitive attributes and not the affective attributes is adequate for this purpose, due to the fact that [9] confirmed that “there is general agreement that the cognitive component is an antecedent of the affective component”. Furthermore, [13] stated that “in visual media annotation, the identification of the appearance of visual objects as representative of a cognitive attribute is more objective than the determination whether a certain affective component (e.g. relaxing, luxurious) is present in an image.”

The research of this paper will extend this to compare how different types of images may have different effects, as well as considering the effect that the source of the images may have.

3 Methodology

This paper aims to answer the research question “Does social media change the viewer’s perception of Mexico City as a tourist destination?” and furthermore the results are expected to provide valuable insights about which types of content are effective in terms of influencing perception.

In order to determine the effect of certain images on visual destination image, it is necessary to annotate these images. Annotation can be performed using automatic image annotation services, or manually. When performed manually, the annotation of each image is aimed at maximizing its value to a tourism provider, by concentrating on the characteristics of the destination that can be seen in the image [13]. An online survey via Google Forms was used as a quantitative research method to gather data regarding the destination image of Mexico City. The participants were divided into three independent groups, each of which were eventually exposed to a different set of images, in order to determine the effectiveness of the different types of content, in terms of influencing perceived destination image. The questionnaire measured the initial destination image, prior to seeing the images, through a set of questions based on the cognitive attributes [9]: natural resources, general infrastructure, tourist infrastructure, culture, history and art, political and economic factors and natural environment. Additionally, a further question was added regarding modern architecture (an attribute found to be relevant to social media images, yet missing from the original list).

After the initial destination image of each participant was determined, they were exposed to three different sets of images, based on which of the independent test groups they were assigned to. The first group viewed the gold standard data set, which are the 20 best of breed photos that represent Mexico City. For this purpose, a selection of 20 Instagram posts by Mexico City based photographer @tavoojasso were used, due to the high quality of the photos, as well as the possibility of enhanced trust in the source by consumers since the photographer doesn't benefit from Mexico City tourism. The second group was exposed to the 20 most recent (as of March 17, 2018) photos of Mexico City posted by the national DMO of Mexico (@visitmexico) on Instagram. This source could be perceived as less trustworthy, due to the fact that the sole purpose of the Instagram account is marketing and advertising the destination. The third and final independent test group viewed a random selection of 20 images from a Google Images search of "Mexico City". After each viewed image the participants were asked to evaluate its effect on their image of each dimension by deciding whether it had improved, remained the same or worsened since being exposed to the content. Each of these images were previously manually annotated based on the original cognitive attributes of destination image in order to be able to determine, which types of images are more or less effective in this respect. These attributes were slightly adapted, based earlier work [13], resulting in the use of vocabulary presented in Table 1.

After carefully viewing the images, all participants were then instructed to once again respond to questions regarding their perceived image of Mexico City and provide a rating for each of the dimensions mentioned above, in order to determine a change in image as a result of the exposure to the different data sets. Where significant changes were detected, the answers to questions about how the individual photos influenced destination image were available to help determine, which photos contributed to that change the most, based on the amount of "Better" votes they received, rather than "No Change" or "Worse" votes.

Table 1. Image annotation – visual features vocabulary

Natural resources	General infrastructure	Tourist infrastructure	Culture, history and art
Sun	Roads	Accommodation	Museum
Beach	Harbour	Restaurant	Historical Building
Landscape	Airport	Bars & Cafés	Monument
Water	Public	Tourist	Cinema & Theatre
Mountains	Transportation	Information	Concert
Desert	Taxi	Tours	Arts & Crafts
Plants & Flowers	Hospital	Shops	Food & Drink
Animals	Technology	Markets	Traditions
Trees			Religion
Political and economic factors	Natural environment	Leisure and recreation	Additional
Parliament	Urbanization	Theme Park	Modern Building
Bank	Cleanliness	Sport	Boating
Police (Safety)	Crowds	Zoo	Bicycle
Terrorism	Smog	Trekking	
Protests	Traffic	Adventure Sport	
Crime		Casino	
Conflict		Nightlife	

4 Results

A total of 56 participants were recruited in order to take part in the online survey. The first test group had 23 participants, the second group had 17 participants and the third group had 16 participants. They were mostly selected from the first author’s social circle, which is why 73% of the participants were between 18 and 24 years old. However, since this is also an age group which is highly represented on social media and specifically on Instagram, the participants are suitable for this research and are able to provide valuable insights relevant to the research question. According to a recent article, 71% of Americans aged 18 to 24 use Instagram, and 81% of these use it on a daily basis [14].

A Wilcoxon signed-rank test was used to analyse each attribute in order to be able to determine any significant changes based on the exposure of the participants to the different sets of images. At a significance level of 0.05, the test was performed as a two-tailed test with the null hypothesis being that the difference between the given ratings before and after being exposed to the images is not significant.

The results for each group are presented in a table which gives:

- **N** – the number of responses which indicated a change in destination image after exposure (known as “signed ranks” in the test),
- **W** – the test statistic from the Wilcoxon signed-rank test, and
- **Critical Value** for W at N for the test at significance level $p \leq .05$.

A significant result occurs when $W <$ the critical value. We do not use the z-value as it fits larger sample sizes ($n > 10$) and our average N (signed ranks) approximates 10

– half of the group samples have $N \leq 10$ – and thus the critical value of W may be used. Significant change is indicated for individual destination image attributes in the tables through the use of bold.

The test was performed using the data generated from the following 8 questions in the survey before and after exposure to the different data sets:

1. How likely are you to visit Mexico City in the next decade?
2. How would you rate your image of the natural resources (e.g. hours of sunshine, landscapes, water, plants & flowers, animals, trees) in Mexico City?
3. How would you rate your image of the general infrastructure (e.g. roads, airports, public transportation, hospitals, internet access) in Mexico City?
4. How would you rate your image of the tourist infrastructure (e.g. accommodation, restaurants, bars, cafés, tourist information, tours, shops, markets) in Mexico City?
5. How would you rate your image of culture, history and art (e.g. museums, historical buildings, monuments, cinema and theatre, arts and crafts, gastronomy, traditions, religion) in Mexico City?
6. How would you rate your image of political and economic factors (e.g. political stability, economic development, safety, crime) in Mexico City?
7. How would you rate your image of the natural environment (e.g. urbanisation, cleanliness, overcrowdedness, smog, traffic) in Mexico City?
8. How would you rate your image of modern architecture in Mexico City?

Group 1 – Instagram Photography

In this group, 20 Instagram posts by Mexico City based photographer @tavoojasso were selected, due to the high quality of the photos, as well as the possibility of enhanced trust in the source by consumers since the photographer does not benefit from Mexico City tourism (Table 2).

Table 2. Wilcoxon signed-rank test for Group 1 responses to photos

Group 1 responses	N	W	Critical value
Likelihood to visit	9	20	5
Natural resources	12	37	13
General infrastructure	14	0	21
Tourist infrastructure	13	13	17
Culture, history, art	11	24	10
Political & economic	16	10	29
Natural environment	17	2.5	34
Modern architecture	17	15	34

Group 2 – DMO Photography

In this group, the second independent test group was exposed to the 20 most recent (as of March 17, 2018) photos of Mexico City posted by the national DMO of Mexico (@visitmexico) on Instagram. This source could be perceived as less trustworthy, due to the fact that the sole purpose of the Instagram account is marketing and advertising the destination (Table 3).

Table 3. Wilcoxon signed-rank test for Group 2 responses to photos

Group 2 responses	N	W	Critical value
Likelihood to visit	7	11.5	2
Natural resources	10	12	8
General infrastructure	11	0	10
Tourist infrastructure	9	19	5
Culture, history, art	7	14	2
Political & economic	9	2.5	5
Natural environment	12	4	13
Modern architecture	14	5.5	21

Group 3 – Baseline: Google Images

In this group, the group viewed a random selection of 20 images from a Google Images search of “Mexico City”. This source can be considered a baseline for comparison since there is no human curation of the quality of the photos nor any promotional purpose to them; the selection is based purely on Google’s search algorithm (Table 4).

Table 4. Wilcoxon signed-rank test for Group 3 responses to photos

Group 3 responses	N	W	Critical value
Likelihood to visit	7	0	2
Natural resources	5	-	- (sample too low)
General infrastructure	11	0	10
Tourist infrastructure	7	0	2
Culture, history, art	8	3.5	3
Political & economic	10	3	8
Natural environment	12	0	13
Modern architecture	10	3.5	8

Comparison

Beginning with the cognitive attributes, for natural resources all three test groups returned insignificant change. This result is somewhat surprising, especially in Group 1, where 17 of the 20 images were annotated with at least one of the factors mentioned above. In comparison, Group 2 included 11 and Group 3 included 7 images annotated with at least one of the factors. However, it is important to mention that components of an image, such as sunshine, plants, trees, etc. are often not the main attraction of the photo. Image 1, from the first test group, for example, captures the Palacio de Bellas Artes (Palace of Fine Arts)¹. The square in front of the historical building is decorated with plants and flowers. Therefore, the image was annotated accordingly. Nevertheless,

¹ <https://www.instagram.com/p/BpSfWkoBVL2/>.

the Palace is obviously the main focus of the image, which possibly explains the insignificant result.

For general infrastructure, there was a significant improvement in all three test groups. In terms of the images that contributed to these improvements, Image 3 from Group 1 (a time-lapse shot of traffic among skyscrapers)² had the largest contribution of all 60 images with 74% of the 23 participants in Group 1 indicating that the photo improved their image of the general infrastructure in Mexico City.

In terms of the tourist infrastructure in Mexico City, which included accommodation, restaurants, bars, cafés, tourist information, tours, shops and markets, there was a significant improvement for Groups 1 and 3. Group 2, however, showed no significant improvement – the DMO channel! 50% of the participants in Group 3 pointed out that Image 3 improved their image of tourist infrastructure, although it was not annotated as such. It portrays arts and crafts, a historical building and a tradition, which are all annotations from the culture, history and art attribute.

Therefore, it seems that the borders of the dimensions in [2] are somewhat blurred and can be perceived differently by different people. Meanwhile, the knowledge of the participants that their content is intended for marketing purposes may have influenced them negatively – the opposite of the DMO's intentions.

Rather surprisingly, all three test groups showed no significant improvement regarding the image of culture, history and art in Mexico City. This dimension included factors such as, museums, historical buildings, monuments, cinema and theatre, arts and crafts, gastronomy, traditions and religion. At least one of these attributes was used to annotate 47 of the 60 images from the three groups. Especially historical buildings could be seen in a large amount of photos. An explanation for this result could be the fact that the participants of the survey already had a positive image of culture, history and art in Mexico City. The median rating given in the pre-exposure question was 2 for all three groups. Therefore, it may not have been possible for the photos provided to significantly improve the image in this dimension further.

On the contrary, all three groups showed a significant improvement in image of political and economic factors such as: political stability, economic development, safety and crime, despite the fact that none of the images were annotated with these factors. It seems, however, that the images were able to make Mexico City feel safer and possibly more economically developed, due to the friendly nature of the photos, as well as the modern buildings. For example, 41% of Group 2 implied that Image 3³, which showed modern buildings, improved their image of political and economic factors in Mexico City. In Group 1, on the other hand, the photo with the highest contribution at 39% was Image 18⁴, which shows a happy person in front of the Monumento a la Revolución. Both of these images contributed to improving the image of political and economic factors in Mexico City for different reasons. In Group 3 the contributions of the individual images were rather low at a maximum of 25%. Additionally, it is important to mention that unlike in the previous dimension, the median

² https://www.instagram.com/p/BgSZBYxF_Jx/.

³ <https://www.instagram.com/p/BfgtsuPjS1q/>.

⁴ <https://www.instagram.com/p/Bens7NlgjKW/>.

pre-exposure ratings for political and economic factors were significantly negative, and therefore the improvement as a result of viewing the photos was more feasible.

Similarly, all three sets of photos were also able to significantly improve the image regarding the natural environment (e.g. urbanisation, cleanliness, overcrowding, smog, traffic) in Mexico City. The median pre-exposure rating of all three groups was 4 where the ‘worst’ Likert scale rating was 5.

Finally, an additional dimension was added for modern architecture, due to the high amount of modern buildings in the images provided. Once again, all three test groups resulted in significant improvements regarding the image of modern architecture in Mexico City. With a median pre-exposure rating of 3 in all test groups, it is possible that the participants didn’t have a pre-existing image of modern architecture in Mexico City and therefore chose the mid-point on the Likert scale. Post exposure to the photos, the median rating in all three groups improved to 2. Furthermore, based on the extent of the image contributions, it seems that the participants were impressed by the modern buildings that Mexico City has to offer. For example, 87% of Group 1 implied that Image 3 (an office skyscraper) improved their image in the modern architecture dimension. This was the highest contribution of any photo in any category.

Table 5 summarizes the average rankings of the participants’ destination image of Mexico City (by Likert scale where 5 is the worst and 1 is the best) across the attributes before and after exposure to the photos for all three test groups. The table also includes the sum of the rankings pre- and post-exposure for each group, as well the average total improvement per group.

Table 5. Summary of results of average ranking of destination image attributes before and after exposure to the Instagram photos by group

	Group 1 (Best UGC - Instagram)		Group 2 (DMO - Instagram)		Group 3 (Random - Google Images)	
	Before	After	Before	After	Before	After
Natural resources	2.43	2.43	2.82	2.35	2.50	2.31
General infrastructure	3.39	2.39	3.71	2.29	3.25	2.25
Tourist infrastructure	2.61	2.09	2.29	2.18	2.38	1.88
Culture, history, art	2.09	1.91	1.82	1.82	2.38	1.75
Political, economic factors	4.04	3.17	4.35	3.53	4.38	3.31
Natural environment	3.96	2.57	3.94	3.06	3.69	2.44
Modern architecture	3.13	2.04	3.12	2.12	2.94	2.19
Total	21.65	16.6	22.05	17.35	21.52	16.13
Average ranking	3.09	2.37	3.15	2.48	3.07	2.30
Total average improvement	0.72		0.67		0.77	

All three groups started with a very similar average ranking regarding their opinion of Mexico City. However, the total average improvement of each group was also very similar with Group 3 performing the best at 0.77, followed by Group 1 at 0.72 and

finally Group 2 at 0.67. Therefore, according to this table the effects on destination image were very much alike across the groups regardless of the source of the photos provided, with the random selection of photos from Google seemingly slightly more effective than the UGC and DMO content from Instagram. This suggests Google already finds and ranks photos for destinations very well and that DMOs need to question the value of their own marketing channels when it may be more effective using professional user content to promote the destination.

Regarding the different characteristics, it is noticeable from the Table 5 provided above that where the pre-exposure rating was negative, the improvement was more significant, than where the pre-exposure rating was already rather positive. Especially “political and economic factors” and “natural environment”, which both started at a somewhat negative average rating of around 4 across the groups, significantly improved in every group. “Natural resources” and “culture, history and art”, on the other hand, were both groups with positive initial ratings of around 2. Here, there were insignificant results across all three test groups, as it was seemingly not possible to significantly improve the image of the participants any further. Therefore, it can be said that the pre-exposure image of the destination with regard to a certain destination characteristic, has an effect on the extent to which it can be influenced by photos, regardless of the source, as already suggested in [9].

In terms of the photos, it is necessary to highlight that certain images were effective at positively influencing destination image across a variety of characteristics. Especially Image 3 from Group 1 (footnote 2), Image 3 from Group 2 (footnote 3) and Image 4 from Group 3⁵, were noticeably effective across multiple characteristics in their respective groups.

In fact, Image 3 from Group 1 for example, was the highest contributing image in 4 of the 5 significant dimensions and the second highest contributing image in the fifth dimension, which therefore, seems to be an example of an ideal image for DMOs to promote the destination. However, all the images mentioned above performed especially well with regard to general infrastructure, political and economic factors, natural environment (with the exception of Image 3 from Group 2), as well as modern architecture. These were all characteristics where the participants had a mediocre to negative pre-exposure image of Mexico City. Furthermore, it is important to mention that all three images had the annotations “Modern Building” and “Trees” in common. It seems that both of these two features of the photos positively influence the perception of general infrastructure in the city. Especially the extent to which a city is modern seems to affect general infrastructure attributes, such as roads, hospitals and internet access, where modern is perceived as better. Political and economic factors may also be affected by the presence of modern buildings in images, as these may indicate better economic development for example. Additionally, when trees are featured in photos it seems to affect the image of the natural environment positively, making the city seem cleaner and less polluted. Finally, the availability of modern buildings is quite obviously beneficial to the modern architecture dimension. For Mexico City, in particular,

⁵ Photo of Museo Soumaya at <https://theculturetrip.com/north-america/mexico/articles/tour-mexico-city-10-famous-buildings/>.

where the four destination characteristics mentioned above are perceived as weaknesses by people who haven't been there, it is advisable for DMOs to use photos with similar features to Image 3 from Group 1, Image 3 from Group 2 and Image 4 from Group 3, to improve the overall perceived image of the city. The features prove effective for Mexico City, due to the fact that they are capable of improving a number of destination attributes which generally had a pre-exposure negative perceived image. We would suggest these as the most effective for the DMO to promote the destination.

5 Conclusion

To conclude, it can be acknowledged that the content provided in all three test groups was able to improve destination image. Therefore, the hypothesis that visual social media content can be used to improve destination image can be accepted. Furthermore, the user-generated content from Instagram, as well as the random images from Google, were more successful at improving overall perceived destination image than the UGC reposted by the DMO on Instagram. Nevertheless, the hypothesis that the gold standard set of images, i.e. UGC from Instagram, is more effective at improving destination image than other types of content cannot be accepted, due to the fact that the random selection of images from Google had a very similar, if not slightly better effect than the UGC.

In terms of the different characteristics used to measure overall destination image, which included natural resources, general infrastructure, tourist infrastructure, culture, history and art, political and economic factors, natural environment and modern architecture, it was noticeable that dimensions where the pre-exposure image was negative, were more likely to result in a significant improvement post exposure, than dimensions where the pre-exposure image was positive. For instance, there was a significant improvement in image regarding political and economic factors and the natural environment in Mexico City where the pre-exposure image was rather negative in each of the three test groups. Whereas the image of culture, history and art in Mexico City was already rather positive and could therefore not be improved significantly regardless of the source of the content provided.

Finally, it can be said that based on the image annotation analysis, the most effective images at influencing the overall destination image of Mexico City, i.e. over multiple destination characteristics, commonly featured modern buildings and trees. However, it is important to mention that these features are effective for Mexico City, due to the fact that they are capable of improving a number of destination characteristics, which generally have a negative perceived image. Therefore, other cities, which are perceived differently, may require different features in the images to improve overall destination image. For example, photos featuring modern buildings may not be as effective for a city like New York, which is known for its modern architecture, in terms of improving destination image.

It is important to also mention that the findings are based on a small sample ($n = 56$), so it cannot be directly assumed that they are representative for all Instagram

users. With a higher amount of participants at disposal the study may have provided different or at least more accurate results. Additionally, it must be acknowledged that a large fraction of the survey participants were from Austria or the UK, as well as that 73% of the participants were between 18 and 24 years old and 71% were students. Once again, a more demographically diversified sample may have provided different results. However, as mentioned in Sect. 4, the participants were perceived as capable of providing valuable insights due to the relevance of the topic to this demographic group. Finally, since the study was focused entirely on Mexico City, it is not certain that the results are generalizable for other destinations, where the pre-existing image is different. For example, one participant provided the following valuable feedback: “due to the fact that I had previously seen a documentary about the negative aspects of Mexico City, the photos weren’t really able to change my opinion.” Therefore, suggestions for further research include a study with a larger sample size and more demographic diversity to evaluate how visual social media content can influence a variety of destinations around the world to return more generalizable results. This would also allow researchers to determine destination image characteristics that are perceived as negative for a variety of cities and find out which features in photos can be used to improve the image. Hopefully such studies could also use the same image annotation model as the authors’, since in the current literature it proves difficult to compare results due to the heterogeneity of both the features and the methodologies used to analyse them.

Nevertheless, DMO-driven marketing in this study did not provably promote the destination more effectively than other sources used by online consumers – e.g. Google search or Instagram hashtags. This seems to imply that viewers perceive UGC as more meaningful or trustworthy coming from an unbiased source, but also that professional user content ranked by Google images seem to be more relevant. This also confirms prior research, which stated that the efforts of DMOs seem to be largely experimental and the extent to which these efforts are effective is unknown to DMOs, as they fail to differentiate themselves and to provide a unique benefit [3]. Therefore, DMOs must question the value of their own marketing and social media channels, when other channels may be more effective at improving the image of the destination. If they are unable to differentiate themselves from other channels with unique content, it may be more beneficial to rely on eWOM in the form of UGC as well as professional user content. DMOs could invest marketing effort in encouraging professional urban photographers to geo-tag their photos and add destination-related hashtags on Instagram as well as in linking to Websites with appealing photos of their destination as part of optimizing their search engine ranking for Web searches on the destination name.

Acknowledgements. This work is a summary of the Bachelor thesis of MODUL University Vienna student Denis Bernkopf under the supervision of co-author Asst. Prof. Dr. Lyndon Nixon. The full thesis is available from the MODUL University Vienna library. An abridged version of this paper has been published at TURITEC 2018.

References

1. Hudson S, Thal K (2013) The impact of social media on the consumer decision process: implications for tourism marketing. *J Travel Tour Mark* 30(1–2):156–160
2. Lange-Faria W, Elliot S (2012) Understanding the role of social media in destination marketing. *Tour Int Multidiscip J Tour* 7(1):193–211
3. Hays S, Page SJ, Buhalis D (2012) Social media as a destination marketing tool: its use by national tourism organisations. *Curr Issues Tour* 16(3):211–239
4. U.S. Department of State - Bureau of Consular Affairs (2017) Mexico travel warning. Travel.State.Gov: <https://travel.state.gov/content/travel/en/traveladvisories/traveladvisories/mexico-travel-warning.html>. Accessed 7 Dec 2017
5. Lonely Planet (2017) Danger & Annoyances. Lonely Planet: <https://www.lonelyplanet.com/mexico/mexico-city/safety>. Accessed 7 Dec 2017
6. Aebli A, Pagel S (2015) Are user-generated photos able to attract more attention? *E-rev Tour Res* 11(5/6):62–70
7. VisitMexico (nd) Instagram: <https://www.instagram.com/visitmexico/?hl=en>. Accessed 15 Mar 2018
8. Lim Y, Chung Y, Weaver PA (2012) The impact of social media on destination branding: consumer-generated videos vs destination marketer-generated videos. *J Vacat Mark* 18:197–205
9. Beerli A, Martín JD (2004) Factors influencing destination image. *Ann Tour Res* 31(3):657–681
10. Nixon L, Popova A, Önder I (2017) How instagram influences Visual Destination Image: a case study of Jordan and Costa Rica. In: ENTER2017 eTourism conference, Rome, Italy
11. Picazo P, Moreno-Gil S (2017) Analysis of the projected image of tourism destinations on photographs: a literature review to prepare for the future. *J Vacat Mark*, Nov 2017
12. Stepchenkova S, Zhan FZ (2013) Visual destination image of Peru: comparative content analysis of DMO and user-generated photography. *Tour Manag* 36:590–601
13. Nixon L (2018) Assessing the usefulness of online image annotation services for destination image measurement. In: ENTER2018 eTourism conference, Jönköping, Sweden
14. Smith A, Anderson M (2018) Social media use in 2018. Pew Research Center: <http://www.pewinternet.org/2018/03/01/social-media-use-in-2018/>. Accessed 17 Apr 2018



A Framework for Destination Image Analytics

Estela Marine-Roig^(✉), Eva Martín-Fuentes, and Berta Ferrer-Rosell

Department of Business Administration,
University of Lleida, Lleida, Spain
{estela.marine,eva,bertha.ferrer}@aegern.udl.cat

Abstract. In recent years there has been a tremendous growth of user-generated content. In the travel, tourism and hospitality fields, travel blogs, and later online travel reviews (OTRs), have proliferated. Many researchers have taken advantage of this abundant, spontaneous and freely accessible information source and have analysed OTRs to extract insights about attractions, hotels and restaurants to improve management and marketing policies. OTRs are tourist destination image (TDI) formation agents because they show the image perceived (and transmitted) by visitors and are consulted by prospective tourists. This research proposes a conceptual and methodological framework to analyse and measure TDI from textual and paratextual elements in OTRs. The model was applied on a random sample of a million OTRs (200,000 on Things to Do, 300,000 on Hotels, and 500,000 on Restaurants) written in English, between 2013 and 2017, by visitors of the Canary Islands.

Keywords: Destination image · Online travel review · Big data analytics
Tourist attraction · Hospitality · Canary islands

1 Introduction

The tourist destination image (TDI) is a key factor when a vacationer chooses a travel destination [1, 2]. In terms of tourist motivations, Dann [3] proposed the following path model:

Push motives(s) → Pull motive(s) → Decision where to go → Experience(s)

Within pull factors, destination attributes and type of facilities can be found, as well as formed negative/positive destination images [4]. Therefore, literature on destination images has been abundant in the past decades. It originally focused on the image of the city or the urban environment [5–7], but, soon after, studies specially dedicated to the TDI appeared [8–10]. Chon [11] formulated a review on publications that utilised TDIs and inferred positive relationships between a TDI and a traveller’s purchasing behaviour. The information sources that researchers have analysed are mainly visitor and resident surveys, plus in-depth interviews for destination stakeholders, in the case of city image [12], destination image [13], country image [14], or interregional image [15].

Concerning information sources utilised by users to plan their holidays, authors such as Gartner [16] have considered that destination marketing or management organisations (DMO) has a high market penetration, and that the opinions of former

visitors have little influence in the travel-related decision-making process. Today, the popularity of both information sources has reversed, as organic sources (received from individuals) are more widely consulted than induced sources (emanating from destination promoters). For instance, 2025 leisure travellers completed an online survey conducted with a nationally representative sample of adult Americans [17]. When asked “In the past 12 months, which of these Internet technologies or services have you used to help plan your leisure travel? (Select all that apply)”, they remarked: opinions of friends, colleagues, or relatives (45.6%), Facebook (33.3%), reviews of hotels (32.5%), reviews of restaurants or activities (30.8%) and travel reviews of destinations (29.6%). In another survey of 30,105 European respondents from different social and demographic groups [18], when asked “Which of the following information sources do you think are most important when you make a decision about your travel plans? (Read out - Max. 3 answers)”, they answered: recommendations of friends, colleagues or relatives (51%), followed by websites collecting and presenting comments, reviews and ratings from travellers (34%). In both surveys, organic sources were in first position, both proceeding from word-of-mouth marketing (WoM) and electronic WoM (eWoM). In the last case, traveller-generated content (TGC) and, in particular, online travel reviews (OTRs) stand out. For example, TripAdvisor (TA) currently hosts more than 660 million reviews and opinions, which can be freely consulted online by tourists, destination stakeholders, and researchers. This large volume of data cannot be treated manually and requires the application of big data technologies [19]. In the field of tourism and hospitality, there are numerous articles using OTRs as their main information source [20, 21], but studies on conceptual and methodological analysis frameworks of perceived (and transmitted) TDIs, through a massive quantity of OTRs (big data), are still scarce.

Thus, the aim of this study is to propose a theoretical framework to infer and measure TDI from information contained in the body and paratextual elements of OTRs, as well as to develop a methodology to collect, process and analyse hundreds of thousands of OTRs. The framework was applied to a random sample of one million TA OTRs written in English, between 2013 and 2017, by visitors to the Canary Islands, the most touristic region in the European Union by number of overnight stays [22].

2 Destination Image Through Online Travel Reviews

TDI has been given multiple definitions. For example, the image of a destination (or place) is the sum of beliefs, ideas and impressions that a person holds about it [1]. Lai and Li [23] gathered 45 TDI definitions that they considered valid according to certain criteria (tourism-specific, original and normative). They assessed that the most frequent core words were: impression (45%), perception (27%), belief (18%), idea (18%), representation (15%) and feeling (9%).

The TDI is a gestalt [24]. It is a holistic construct that is derived from both projected and perceived images, as well as from place identity and authenticity [25]. When analysing TDIs, most authors have used the tripartite classification of mental activities of cognition, affection and conation, proceeding from the field of psychology. This cognitive-affective-conative model has been used in different areas, such as city

image [6], destination image [26], and country image [27]. Therefore, destination images are formed by three distinctly different but hierarchically interrelated components: cognitive, affective and conative [16] (p. 193). However, there is a general agreement in literature that asserts that an overall or compound TDI is formed as a result of both cognitive and affective evaluations of that destination, and that the second is formed in function of the first [28, 29]. The conceptual framework proposed in this study (Fig. 1) is based on these two components of TDI, but inspired by Pocock and Hudson's [7] model, which was developed in the field of behavioural geography [30]. These authors defined two components of images similarly to the previous aspects: designative and appraisive.

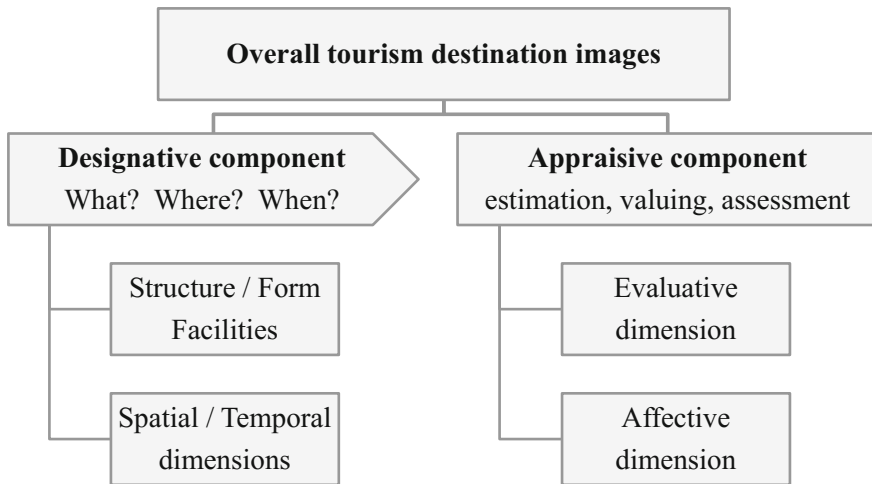


Fig. 1. Overall TDI components derived from Pocock and Hudson [7]

The first response component, the designative aspect, is informational in nature, concerned with description and classification –the basic “whatness” and “whereness” of the image. It is here that the mental map, concerned with basic properties such as distance, orientation, location or spatial variations, is best seen as a purveyor of the image. The appraisive aspect is one of appraisal or assessment. It incorporates evaluation, preference –the former including some general or external standards, the latter reflecting a more personal type of appraisal– and affection, which is the emotional response concerned with feeling, value and meaning attached to the perceived image [7] (p. 30). In this vein, a workable image requires, first, an identification of an element, which implies its recognition as a separable entity; then, the image must include the spatial or pattern relation of the element to the observer and to other elements; finally, this element must have some meaning for the observer, whether practical or emotional [5] (p. 9).

Furthermore, Lynch [5], in his seminal work, asserted that visitors are not simple spectators but are part of the city along with other participants; he considered that moving elements, such as people and their activities, are as important as tangible

heritage. It is in this sense that, in Fig. 1, “facilities” were added to include tourism-related activities and amenities. A temporal dimension was added because a constructed image is prone to change over time [31]. In short, the designative component of the proposed model responds to the questions: What is it? What does it offer (nature, history, art, fun, hospitality, etc.)? Where is it located? When is it perceived? The appraisive component must serve to measure the feelings towards or the meaning attaching to, or evoked by, the designative component, in terms of a standard assessment as well as good and bad feelings.

There has yet to be an agreement in literature about the most suitable attributes to measure the perceived TDI [29, 32–35] or the pull factors of a destination [4]. For the present study, a relevant classification is the Six As framework for the analysis of tourism destinations [36]: Attractions, Accessibility, Amenities, Available packages, Activities, and Ancillary services. Given that some of these items, such as available packages or ancillary services, are not object to online evaluation, the adopted classification is: attractions (landmarks, parks, museums, etc.), activities (tours, sightseeing, outing, etc.) and services (accommodation and catering facilities, transports, etc.).

OTRs are posts that visitors upload to a travel-related webhost where they share experiences and photographs, and give their opinions and assessments about the attractions they have visited, the activities in which they participated and the services they used at the destination. OTRs have a great importance in analysing perceived TDI because they contain freely accessible, spontaneous, first-hand information online that is not manipulated by third parties. OTRs are also part of projected TDI because they have a great dissemination and popularity amongst tourists before and during the trip. Thus, OTRs, as a significant part of TGC, can be included as unsolicited-organic TDI formation agents within Gartner’s [16] classification [37].

According to Marine-Roig [38], OTRs are composed of a body (text, photos, etc.) and some paratextual elements (attraction or service name, location, rating, category or type, etc.; review title, date, language, score, helpful votes, etc.; and reviewer’s profile with nickname, nationality, other reviews, badges, etc.). Paratextual elements can be TGC, WGC (webhost- or webmaster-generated content) or a combination of both. This richness of data enables the use of OTRs as a data source for the Fig. 1 model. The information about the attraction, activity or service along with the review date facilitates the analysis of the designative or cognitive component of a TDI. The score matches well with the evaluative dimension, and the title and writing body are extremely rich in qualifying adjectives and, thus, enables the measurement the affective dimension.

3 Materials and Methods

As a case study to check the proposed framework (Fig. 1), the Canary Islands have been selected because they are the most touristic region in the European Union in terms of nights spent in tourist accommodation establishments [22], with more than 100 million overnight stays in 2016. The territory has been divided into islands to which a 3-character label has been assigned: Gran Canaria (GrC), Tenerife (Ten), Fuerteventura (Fue), Lanzarote (Lan), La Palma (LaP), La Gomera (LaG), El Hierro (ElH), and island

La Graciosa (iGr). The method proposed for the collection and processing of data is an evolution of the methodology defined in [39] and detailed in [40], as explained below.

3.1 Webhost Selection, Data Collection, and Pre-processing

Applying the aforementioned method, TripAdvisor (TA) is the most indicated travel-related webhost, as a TGC source, to substantiate the case of study, with more than 3 million reviews and opinions on the Canary Islands. TA concentrates OTRs on attractions and activities in a Things-to-Do section [41]; OTRs on accommodation facilities in a Hotels section [42]; and OTRs on catering facilities in a Restaurants section [43].

Once the addresses of the useful webpages are identified, through following the hyperlinks of the initial pages [41–43], a website copier (<https://www.httrack.com/>) is configured with the necessary filters to avoid the download of superfluous pages. TA-branded sites are home to the world’s largest travel community of 456 million average monthly unique visitors (i.e. about 15 million different users every day). The download time depends on the local hardware and software, since TA has enough bandwidth to handle countless requests in near-real time.

To improve the efficiency of the method, the content mining of the webpages had changed. Instead of locating and removing negligible text blocs [40], HTML tags with useful text blocs were identified and extracted using a programme that allows search patterns. Afterwards, they were cleaned and organised in a database that was stored in CSV files (plain text and comma separate values). After that, a random sample of one million OTRs (200,000 on Things to Do, 300,000 on Hotels, and 500,000 on Restaurants) written in English, between 2013 and 2017 was extracted (Table 1).

Table 1. Online travel reviews on the Canary Islands per year and Island

	Ten	Lan	GrC	Fue	LaP	Gom	Hie	iGr
2013	27,826	24,700	13,974	9,752	413	376	36	7
2014	42,013	36,398	21,381	15,412	616	578	59	22
2015	77,322	62,271	37,359	28,635	1,719	938	102	52
2016	11,5182	83,979	57,613	40,626	2,016	1,476	142	55
2017	10,9757	83,432	60,812	38,928	2,404	1,437	125	55

Source: Random sample of one million OTRs written in English between 2013 and 2017

3.2 Analytics

Quantitative content analysis was based on Marine-Roig’s [37] algorithm to lessen the run-time. First, a list of compound nouns or composite words (e.g. Siam Park, not helpful, must see) and a black list, including most adverbs, conjunctions, determiners, prepositions and pronouns were composed. In the case of overlap, the algorithm’s execution thread gave priority to composite words. For example, “not helpful” (two

words) had priority over “not” (stop word) and over “helpful” (single keyword). In the case of overlap of two composite words, the first in the list had priority.

Once the frequency tables were generated, a thematic analysis was conducted by crossing frequency matrices with the lists by categories. The category with the greatest volume was affective keywords (some adjectives and recommendations), with two subcategories: good feelings and bad feelings. In this case study, lists from a previous work were used [44], extended with frequent typos (e.g. “dont miss”), misspellings (e.g. “dissappointed”) and slang words (e.g. “fab”) to calculate the percentage of affective keywords over the total of words (including stop words). The other categories were based on the codes, scores and classifications of TripAdvisor. To measure the evaluative dimension, two categories were used: positive scores (score+: Excellent and Very Good) and negative scores (score–: Poor and Terrible). The weighted average score in a scale of 0 to 10 was calculated (Excellent: 10; Very Good: 7.5; Average: 5; Poor: 2.5; Terrible: 0) to facilitate comparisons.

4 Results and Discussion

Concerning the spatial and temporal distribution of OTRs (Table 1), for attractions, hotels and restaurants alike, a great concentration of OTRs was observed in four of the eight islands. In addition, in the three cases during 2017, the growth trend of the quantity of OTRs decreased compared to previous years.

Tables 2, 3 and 4 (Attractions, Hotels and Restaurants) present the 10 most popular items for each section by number of OTRs, the island where they are situated, type and the weighted average score from 0 to 10. Table 5 shows the most frequent keywords with the number of occurrences and the percentage from the total words including stop words (count column).

Table 2. Things to Do in the Canary Islands with the most TripAdvisor online travel reviews

Attraction	Island	Type	OTRs	Score
Siam Park, Adeje	Ten	Water park	13107	9.02
Loro Parque, Puerto de la Cruz	Ten	Nature & Parks	7929	9.06
Timanfaya National Park, Tinajo	Lan	Nature & Parks	5523	8.97
Palmitos Park, Maspalomas	GrC	Nature & Parks	5329	8.69
Marina Rubicon, Playa Blanca	Lan	Marinas	4532	8.68
Playa de Maspalomas, Maspalomas	GrC	Beaches	2701	8.67
Rancho Texas Park, Puerto del Carmen	Lan	Theme parks	2588	8.94
Playa del Duque, Costa Adeje	Ten	Beaches	2105	8.70
Volcan El Teide, Tenerife	Ten	Nature & Parks	1869	8.44
Pieros Music Cafe, Caleta de Fuste	Fue	Bars & Clubs	1860	6.65

Source: Random sample of 200,000 OTRs written in English between 2013 and 2017

Table 3. Hotels in the Canary Islands with the most TripAdvisor online travel reviews

Hotel	Island	Type	OTRs	Score
Paradise Park Fun Lifestyle Hotel	Ten	4* accom.	2432	8.31
Sandos San Blas Nature Resort & Golf	Ten	5* accom.	2399	8.59
Barcelo Teguisse Beach - Adults only	Lan	4* accom.	1848	8.75
Barcelo Corralejo Bay	Fue	4* accom.	1838	8.98
Sol Arona Tenerife	Ten	3* accom.	1815	6.78
Barcelo Santiago	Ten	4* accom.	1726	8.05
Gran Melia Palacio de Isora Resort & Spa	Ten	5* accom.	1627	8.38
Costa Sal Villas and Suites	Lan	3* accom.	1597	9.36
Hesperia Lanzarote	Lan	5* accom.	1580	8.18
BlueBay Lanzarote	Lan	3* accom.	1525	7.06

Source: Random sample of 300,000 OTRs written in English between 2013 and 2017

Table 4. Restaurants in the Canary Islands with the most TripAdvisor online travel reviews

Restaurant	Island	Type	OTRs	Score
Hard Rock Cafe, Playa de las Americas	Ten	American	4234	7.98
Fado Rock Steak House, Caleta de Fuste	Fue	Steakhouse	4080	8.90
Bianco Restaurant, Playa de las Americas	Ten	Italian	2021	8.55
Cafe La Ola, Puerto del Carmen	Lan	Spanish	1966	8.02
Harriet's Tea Room, Costa Adeje	Ten	British	1876	8.95
Waikiki Beach Club, Corralejo	Fue	Seafood	1874	7.08
Aberdeen Steakhouse, Caleta de Fuste	Fue	European	1603	6.15
15, Caleta de Fuste	Fue	Mediterranean	1566	8.92
El Maestro, Costa Teguisse	Lan	Mediterranean	1543	8.33
El Toro Bravo, Corralejo	Fue	Steakhouse	1529	7.79

Source: Random sample of 500,000 OTRs written in English between 2013 and 2017

4.1 Designative Component of the TDI

Regarding territorial distribution, Tables 2, 3 and 4 show that the most popular attraction, restaurant and hotel on the Canary Islands in terms of number of OTRs are on the island of Tenerife, which is the most visited island in this archipelago. Gran Canaria is the second island in number of the tourist arrivals, but it is striking that only two attractions on this island appear amongst the most commented Things to Do on TripAdvisor; no hotels or restaurants on this island are in the top ten in terms of the number of OTRs.

The most commented attractions on the Canary Islands were parks (nature, water or theme parks), and only two beaches were amongst the top ten things to do. This shows the type of tourism this destination offers, not only based on sun and beach, but also

Table 5. Most frequent keywords and percentage of total words including stop words

Rank	Things to Do		Restaurants		Hotels		Count	Percent	Count	Percent
	Keyword	Count	Keyword	Count	Keyword	Count				
01	great	117,614	food	455,437	hotel	451,230	1.05291	451,230	0.91601	
02	day	85,761	good	319,684	staff	228,017	0.73907	228,017	0.46288	
03	good	78,775	great	272,387	good	225,616	0.62973	225,616	0.45801	
04	place	52,165	restaurant	212,874	room	213,617	0.49214	213,617	0.43365	
05	time	51,961	service	211,779	great	198,286	0.48961	198,286	0.40253	
06	beach	48,193	staff	202,158	pool	196,195	0.46736	196,195	0.39828	
07	park	46,666	place	160,977	food	179,791	0.37216	179,791	0.36498	
08	visit	44,258	friendly	151,092	clean	142,870	0.34931	142,870	0.29003	
09	really	43,571	lovely	140,669	holiday	135,815	0.32521	135,815	0.27571	
10	nice	43,072	excellent	130,245	lovely	132,053	0.30111	132,053	0.26807	
11	trip	41,974	nice	128,886	just	130,477	0.29797	130,477	0.26487	
12	just	40,817	meal	119,553	nice	117,665	0.27639	117,665	0.23886	
13	amazing	40,254	best	110,144	stay	117,520	0.25464	117,520	0.23857	
14	back	40,119	visit	100,476	day	109,157	0.23229	109,157	0.22159	
15	see	39,855	back	98,543	rooms	105,711	0.22782	105,711	0.21460	
16	worth	39,033	really	96,155	time	102,708	0.22230	102,708	0.20850	
17	lovely	37,174	just	95,536	friendly	102,331	0.22087	102,331	0.20773	
18	food	33,580	menu	86,968	back	101,797	0.20106	101,797	0.20665	
19	went	33,444	time	84,479	stayed	100,261	0.19531	100,261	0.20353	
20	best	33,073	recommend	73,861	area	98,665	0.17076	98,665	0.20029	
21	experience	32,593	night	72,930	bar	98,119	0.16861	98,119	0.19918	
22	fun	32,083	went	71,200	week	92,323	0.16461	92,323	0.18742	
23	staff	31,443	amazing	66,021	really	86,611	0.15263	86,611	0.17582	

(continued)

Table 5. *(continued)*

Rank	Things to Do		20,125,364		Restaurants		43,254,893		Hotels		49,260,416	
	Keyword	Count	Percent	Keyword	Count	Percent	Keyword	Count	Percent	Keyword	Count	Percent
24	bar	29,732	0.14773	steak	65,380	0.15115	beach	81,572	0.16559			
25	recommend	28,566	0.14194	delicious	61,462	0.14209	excellent	76,621	0.15554			
26	fantastic	27,750	0.13789	bar	60,825	0.14062	location	74,581	0.15140			
27	friendly	26,696	0.13265	fantastic	60,014	0.13874	place	73,989	0.15020			

Source: Random sample of one million TripAdvisor OTRs (200,000 T2D; 300,000 Hot; 500,000 Res) written in English between 2013 and 2017

based on product diversification; moreover, the Planning of the Insular Territory of Tenerife has already proposed the need to offer new products apart from sun and beach [45]. It is worth noting that the most commented attractions received more than 13,000 comments, whilst the tenth most commented attraction, only had 1,860 reviews. The top ten most commented hotels are those with 4 and 5 stars; only two 3-star hotels in Lanzarote are listed as the most popular in terms of OTRs.

Amongst the most commented restaurants, the type of cuisine is very diverse (American, Italian, Spanish, British, etc.). None of them are amongst the traditional restaurants on the Canary Islands called “Guachinche”. Spanish cuisine is represented in only one of the most popular restaurants, which suggests that most visitors to the Canary Islands are not motivated by its gastronomy, since food tourism is related to the search for experiences on local identity and authenticity [46, 47].

4.2 Appraisive Component of the TDI

Regarding average scores, Table 2 shows that all attractions are above 8 minus one. The exception was an attraction categorised as bars and clubs, with a score of only 6.65 in Fuerteventura. The most positive average perception was for the parks, as the two best-rated nature and water parks were in Tenerife, followed by a national park and a theme park, both in Lanzarote. Table 3 shows the average ratings of the most commented hotels of the islands. Interestingly, the most popular hotel in terms of OTRs with the best score was a 3-star hotel in Lanzarote, followed by two hotels with 4 stars. The first 5-star hotel rated was in Tenerife and had the fourth highest position amongst the most popular hotels on the Canary Islands. Lastly, Table 4 shows that the best-rated restaurant was in Tenerife, which offers British cuisine. The second-best rated restaurant offers Mediterranean cuisine and was located in Fuerteventura. It is also worth noting that the worst scored restaurant was also located in Fuerteventura (6.15) and offers European food.

Figure 2 serves as a summary of the most frequent keywords of each section (drawn from Table 5) by integrating words transmitting good and bad feelings, as well as, integrating the scores into two categories of scores (score+ and score-). It shows that, although the most popular restaurants in terms of number of reviews analysed in this study were, in general, highly rated, they were on average worse rated (8.36) than things to do (8.8) but better than hotels (7.71), which were the worst rated on average. Interestingly, the highest positive affective percentage of keywords was in restaurants with 5.56%, followed by things to do and hotels. The highest percentage of negative keywords was also in restaurants followed by hotels and things to do (0.72 and 0.65).

Figure 2 shows that although the most popular restaurants in terms of number of reviews analysed in this study are, in general, very good rated, they are on average worse rated (8.36) than things to do (8.8) but better than hotels (7.71), which are the worst rated on average. Interestingly, the highest positive affective percentage of keywords is in restaurants with 5.56%, followed by things to do and hotels. The highest percentage of negative keywords is also in restaurants followed by hotels and things to do (0.72 and 0.65).

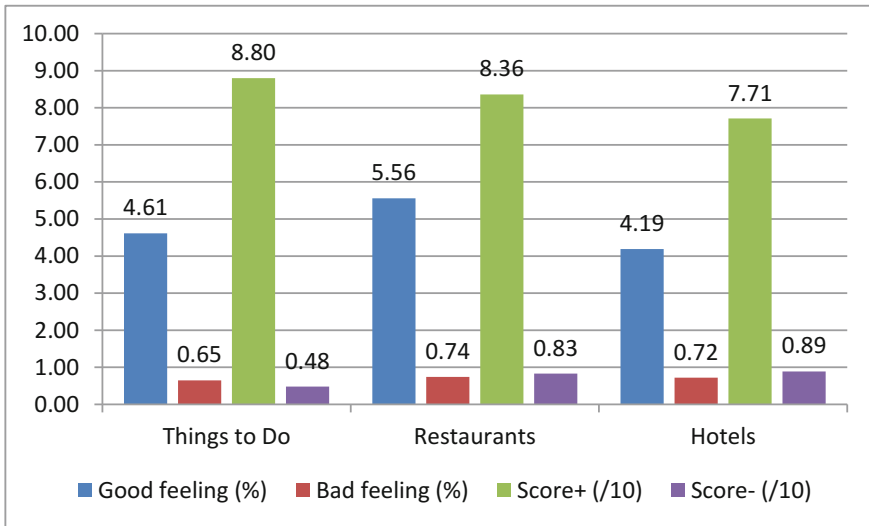


Fig. 2. Measures of the TDI evaluative and affective dimensions. Note: Good feeling Things to Do 4.61 means that 4.61% of all words are positive affective keywords; Score– Restaurants 0.83 means that 8.3% of all scores are Poor or Terrible

5 Concluding Remarks

From a theoretical perspective, the main contribution of this study is the preliminary adaptation of a conceptual framework [7], defined more than 40 years ago and developed in the field of Human Geography, to analyse and measure TDI from TGC and, more specifically, OTRs. Nevertheless, it is necessary to further study the model and the related literature. In addition, the nature of the TDI varies with individuals [48]. There is a great consensus that visitors' socio-demographic and psychological characteristics, such as nationality, gender and age, affect the perceived TDI; however, researchers have exhibited contradictory results. Instead, by working with big data, these variables become almost neutralised and results are closer to an average perception of TDI. The aggregation of hundreds of thousands of opinions, on a lot of destination attractions, activities and facilities, given spontaneously by numerous visitors from dozens of countries, allows the measurement of the perceived TDI as a whole.

From an empirical point of view, the proposed research framework has a large scope of application. The proliferation of TGC at a world level seems unending. For instance, TripAdvisor hosts more than 660 million opinions and comments – covering about 7.7 million experiences, restaurants, accommodations and airlines – and continues to grow. Furthermore, OTR paratextual elements allow multiple segmentations per: type of attractions, activities or services; categories or themes; destinations, territorial brands or whole regions; days, months, years or seasons; reviewer's language, nationality or preferences; etc. The measurement of the TDI through a unified procedure for all types of OTRs allows one to formulate trends and compare different

segments or items with each other. In any case, other studies on TDI of the Canary Islands should be reviewed to compare results.

The main limitation of the method is given by the impossibility to construct mutually exclusive and exhaustive categories, as a computer programme cannot perceive ironies, paradoxes, ambiguities, misspellings, typos, etc. For example, the adjectives “unreal” and “tremendous” have an extremely positive connotation in informal American English. Other words cannot be considered if they have a double sense (e.g. “romantic”: feeling vs. Romanticism). In any case, the classification errors are minimized, making iterative checking on residual untrustworthy texts and checking manually incorrect results. The lexicon used for sentiment analysis, which consists of some hundreds of positive and negative adjectives [44], has allowed a very high percentage of correct classification for good and bad feelings. In future works, we intend to use this framework to analyse the contribution of OTRs to the TDI proceeding from traditional accommodation (e.g. TripAdvisor) in comparison with OTRs on peer-to-peer accommodations (e.g. AirBnb). Moreover, future studies should expand upon the reasons for why some attractions or destinations receive more reviews than others, by relating this to the tourist policies of the destination.

Acknowledgements. The authors are pleased to acknowledge the support of the Spanish Ministry of Economy, Industry and Competitiveness (Grant id.: TURCOLAB ECO2017-88984-R and TIN2015-71799-C2-2-P). Authors also acknowledge the support of the Catalan Government for the accreditation as Recognised Research Group TURESCO (2017 SG4 49) and the University of Lleida (Grant id.: 2017-TR265).

References

1. Crompton JL (1979) An assessment of the image of Mexico as a vacation destination and the influence of geographical location upon that image. *J Travel Res* 17:18–23. <https://doi.org/10.1177/004728757901700404>
2. Matejka JK (1973) Critical factors in vacation area selection. *Arkansas Bus Econ Rev* 6:17–19
3. Dann GMS (2014) Why, oh why, oh why, do people travel abroad? Creating experience value in tourism. CABI, Wallingford, pp 48–62
4. Uysal M, Li X, Sirakaya-Turk E (2008) Push-pull dynamics in travel decisions. In: Pizam A (ed) *Handbook of hospitality marketing management*. Elsevier Ltd., Oxford, UK, pp 412–439
5. Lynch K (1960) *The image of the city*. The MIT Press, Cambridge, MA
6. Rapoport A (1977) *Human aspects of urban form*. Pergamon Press, Oxford, UK
7. Pocock D, Hudson R (1978) *Images of the urban environment*. Macmillan, London, UK
8. Gunn CA (1972) *Vacationscape: designing tourist regions*. Bureau of Business Research, University of Texas, Austin, TX
9. Hunt JD (1975) Image as a factor in tourism development. *J Travel Res* 13:1–7. <https://doi.org/10.1177/004728757501300301>
10. Mayo EJ (1973) Regional images and regional travel development. Travel and tourism research association fourth annual conference. University of Utah, Salt Lake City, pp 211–217

11. Chon K-S (1990) The role of destination image in tourism: a review and discussion. *Tour Rev* 45:2–9. <https://doi.org/10.1108/eb058040>
12. Gilboa S, Jaffe ED, Vianelli D et al (2015) A summated rating scale for measuring city image. *Cities* 44:50–59. <https://doi.org/10.1016/j.cities.2015.01.002>
13. Kotsi F, Pike S, Gottlieb U (2018) Consumer-based brand equity (CBBE) in the context of an international stopover destination: perceptions of Dubai in France and Australia. *Tour Manag* 69:297–306. <https://doi.org/10.1016/j.tourman.2018.06.019>
14. Lindblom A, Lindblom T, Lehtonen MJ, Wechtler H (2018) A study on country images, destination beliefs, and travel intentions: a structural equation model approach. *Int J Tour Res* 20:1–10. <https://doi.org/10.1002/jtr.2148>
15. Gim T-H (2018) Tourist satisfaction, image, and loyalty from an interregional perspective: an analysis of neighboring areas with distinct characteristics. *Sustainability* 10: Article 1283. <https://doi.org/10.3390/su10041283>
16. Gartner WC (1993) Image formation process. *J Travel Tour Mark* 2:191–215. https://doi.org/10.1300/J073v02n02_12
17. Analysts (2018) The state of the American traveler, vol. 27. Destination Analysts, San Francisco, CA
18. Eurobarometer (2016) Flash Eurobarometer 432: preferences of Europeans towards tourism. European Commission, Brussels, Belgium
19. Li J, Xu L, Tang L et al (2018) Big data in tourism research: a literature review. *Tour Manag* 68:301–323. <https://doi.org/10.1016/j.tourman.2018.03.009>
20. Hlee S, Lee H, Koo C (2018) Hospitality and tourism online review research: a systematic analysis and heuristic-systematic model. *Sustainability* 10: Article 1141. <https://doi.org/10.3390/su10041141>
21. Martin-Fuentes E, Fernandez C, Mateu C, Marine-Roig E (2018) Modelling a grading scheme for peer-to-peer accommodation: stars for Airbnb. *Int J Hosp Manag* 69:75–83. <https://doi.org/10.1016/j.ijhm.2017.10.016>
22. Eurostat (2018) Tourism. In: Eurostat regional yearbook. Publications Office of the European Union, Luxembourg, pp 139–150
23. Lai K, Li X (2016) Tourism destination image: conceptual problems and definitional solutions. *J Travel Res* 55:1065–1080. <https://doi.org/10.1177/0047287515619693>
24. Um S, Crompton JL (1990) Attitude determinants in tourism destination choice. *Ann Tour Res* 17:432–448. [https://doi.org/10.1016/0160-7383\(90\)90008-F](https://doi.org/10.1016/0160-7383(90)90008-F)
25. Marine-Roig E (2015) Identity and authenticity in destination image construction. *Anatolia An Int J Tour Hosp Res* 26:574–587. <https://doi.org/10.1080/13032917.2015.1040814>
26. Dann GMS (1996) Tourists' images of a destination - an alternative analysis. *J Travel Tour Mark* 5:41–55. https://doi.org/10.1300/J073v05n01_04
27. Roth KP, Diamantopoulos A (2009) Advancing the country image construct. *J Bus Res* 62:726–740. <https://doi.org/10.1016/j.jbusres.2008.05.014>
28. Baloglu S, McCleary KW (1999) A model of destination image formation. *Ann Tour Res* 26:868–897. [https://doi.org/10.1016/S0160-7383\(99\)00030-4](https://doi.org/10.1016/S0160-7383(99)00030-4)
29. Beerli A, Martín JD (2004) Factors influencing destination image. *Ann Tour Res* 31:657–681. <https://doi.org/10.1016/j.annals.2004.01.010>
30. Wakabayasi Y (1996) Behavioral studies on environmental perception by Japanese geographers. *Geogr Rev Japan, Ser B* 69:83–94. <https://doi.org/10.4157/grj1984b.69.83>
31. Tasci ADA, Holecek DF (2007) Assessment of image change over time: the case of Michigan. *J Vacat Mark* 13:359–369. <https://doi.org/10.1177/1356766707081012>
32. Echtner CM, Ritchie JRB (1991) The meaning and measurement of destination image. *J Tour Stud* 2:2–12

33. Gallarza MG, Saura IG, García HC (2002) Destination image. Towards a conceptual framework. *Ann Tour Res* 29:56–78. [https://doi.org/10.1016/S0160-7383\(01\)00031-7](https://doi.org/10.1016/S0160-7383(01)00031-7)
34. Jenkins OH (1999) Understanding and measuring tourist destination images. *Int J Tour Res* 1:1–15. [https://doi.org/10.1002/\(SICI\)1522-1970\(199901/02\)1:1%3c1:AID-JTR143%3e3.0.CO;2-L](https://doi.org/10.1002/(SICI)1522-1970(199901/02)1:1%3c1:AID-JTR143%3e3.0.CO;2-L)
35. Kim H, Richardson SL (2003) Motion picture impacts on destination images. *Ann Tour Res* 30:216–237. [https://doi.org/10.1016/S0160-7383\(02\)00062-2](https://doi.org/10.1016/S0160-7383(02)00062-2)
36. Buhalis D (2000) Marketing the competitive destination of the future. *Tour Manag* 21:97–116. [https://doi.org/10.1016/S0261-5177\(99\)00095-3](https://doi.org/10.1016/S0261-5177(99)00095-3)
37. Marine-Roig E (2017) Measuring destination image through travel reviews in search engines. *Sustain* 9: Article 1425. <https://doi.org/10.3390/su9081425>
38. Marine-Roig E (2017) Online travel reviews: a massive paratextual analysis. In: Xiang Z, Fesenmaier DR (eds) *Analytics in smart tourism design*. TV. Springer, Cham, pp 179–202. https://doi.org/10.1007/978-3-319-44263-1_11
39. Marine-Roig E, Clave SA (2015) A method for analysing large-scale UGC data for tourism: application to the case of Catalonia. In: Tussyadiah I, Inversini A (eds) *Information and communication technologies in tourism 2015*. Springer, Cham, pp 3–17. https://doi.org/10.1007/978-3-319-14343-9_1
40. Marine-Roig E, Anton Clavé S (2016) A detailed method for destination image analysis using user-generated content. *Inf Technol Tour* 15:341–364. <https://doi.org/10.1007/s40558-015-0040-1>
41. TripAdvisor (2018) Things to do in canary Islands. https://www.tripadvisor.com/Attractions-g187466-Activities-Canary_Islands.html. Accessed 1 Jan 2018
42. TripAdvisor (2018) Canary Islands hotels. https://www.tripadvisor.com/Hotels-g187466-Canary_Islands-Hotels.html. Accessed 1 Jan 2018
43. TripAdvisor (2018) Restaurants in canary Islands. https://www.tripadvisor.com/Restaurants-g187466-Canary_Islands.html. Accessed 1 Jan 2018
44. Marine-Roig E, Ferrer-Rosell B (2018) Measuring the gap between projected and perceived destination images of Catalonia using compositional analysis. *Tour Manag* 68:236–249. <https://doi.org/10.1016/j.tourman.2018.03.020>
45. Oreja Rodríguez JR, Parra-López E, Yanes-Estévez V (2008) The sustainability of island destinations: tourism area life cycle and teleological perspectives. The case of Tenerife. *Tour Manag* 29:53–65. <https://doi.org/10.1016/j.tourman.2007.04.007>
46. Ellis A, Park E, Kim S, Yeoman I (2018) What is food tourism? *Tour Manag* 68:250–263. <https://doi.org/10.1016/j.tourman.2018.03.025>
47. Daries N, Cristobal-Fransi E, Ferrer-Rosell B, Marine-Roig E (2018) Maturity and development of high-quality restaurant websites: a comparison of Michelin-starred restaurants in France, Italy and Spain. *Int J Hosp Manag* 73:125–137. <https://doi.org/10.1016/j.ijhm.2018.02.007>
48. Phelps A (1986) Holiday destination image - the problem of assessment. An example developed in Menorca. *Tour Manag* 7:168–180. [https://doi.org/10.1016/0261-5177\(86\)90003-8](https://doi.org/10.1016/0261-5177(86)90003-8)



Identification of Competing Destination Brand: The Case of Okinawa Island

Kenshi Nakaima, Elena Marchiori, and Lorenzo Cantoni^(✉)

webatelier.net Lab and UNESCO Chair in ICT to develop and promote sustainable tourism in World Heritage Sites, USI – Università della Svizzera italiana (Switzerland), Lugano, Switzerland
{nakaik, elena.marchiori, lorenzo.cantoni}@usi.ch

Abstract. In the field of destination branding, some researchers have conducted comparative studies for the development of the customer-based brand equity measurement. Since brand equity is a relative measure, it is required to compare a brand to another to measure its effectiveness. However, the selection process of destinations for the comparison has been highly depending on the subjectivity of researchers. This study proposes to use of online travel reviews to identify a pair of similar destinations addressing what tourists have talked about the destinations by aiming at contributing to developing a reliable brand equity measurement. The study takes Okinawa (Japan) as a case in the destination brand category of “island resort destination”, and the result indicates that Corsica (France) is the most similar destination among nine European destinations. Future research should develop scale items and test the reliability and the validity of them using the two destinations identified in this study.

Keywords: Customer-based brand equity · Destination branding
Place branding · External validity · UGC

1 Introduction

The field of destination branding has been seeking a reliable measurement of destination brand equity [1]. Developing a questionnaire with scale items is one of the prospective methods and a series of authors have been developing the scale items that aims at properly measuring the brand equity of destinations [2–5]. However, as the brand equity is a relative measure, it has to be measured with respect to at least another brand [6]. This means developed scale items have to be tested in multiple destinations and show the statistically valid generalizability. Although there have been a few trials to test the brand equity in multiple destinations [3], the results have not shown compelling results to ensure the external validity [1]. However, the present study addresses the detail in the procedure of the measurement development. The specific point of concern is the reasoning of the pairs of comparisons. A myriad of authors has provided the reason for selecting the destinations in their research, but it is difficult to deny that these selections of destinations in the literature depend heavily on the subjectivity of the authors. It is reasonable to assume that this is due to the time constraint and the fact that the most straight-forward way to address the issue of the external validity of place

brand equity measurement is to actually develop a measurement and test it by investigating its psychometric property using structural equation modeling (SEM). However, as [1] argues, “comparisons of brand equity among place (or destination) brands need to be ontologically valid, as they should compare brands that are indeed comparable” (p. 253). Fortunately, thanks to the development in the information and communication technology, nowadays it is much easier to approach the perception of consumers than before, as consumers aggressively monitor brands by writing reviews online about how their experiences were with the brands and the reviews are read by other peer consumers as a key influence for their purchase decisions [7]. By addressing a large number of online travel reviews (OTRs), this study aims at finding similarity and difference of destinations, which leads up to the identification of the most similar brand that can be compared in future research. The study sheds a light on Okinawa (Japan) as a case in the destination brand category of “island resort destination” and compare with other destination brands that are generally recognized as resort destinations in Europe. As OTR provides valuable insights about tourists’ perception of their tourism experience in a destination [8, 9], this study regards OTR as the collection of their perceived experience in the destinations. Accordingly, the method of this study addresses the similarity and dissimilarity of the perceived tourism experience and eventually concludes the destination which offers the most similar experience to the reference of the case, Okinawa, as the right destination for comparison. Therefore, the research questions were formulated as follows:

RQ1: Among nine destinations in Europe, which island destination does offer the most similar experience as Okinawa does, based on OTR?

RQ2: What type of experience does the most similar destination offer its tourists?

2 Literature Review

2.1 The Constructs of Destination Brand Equity

Aaker [10] and Keller [11] claim that the brand equity is perceived in the mind of consumers and they named it Customer-Based Brand Equity (CBBE). A series of authors claim that a brand equity from customers’ perspective is composed of brand awareness, brand image, brand quality, and brand loyalty dimensions [12, 13]. In Fig. 1, an example of the CBBE model in the context of destination branding developed by Konecnik and Gartner [2] is illustrated.

Although there are still discussions of what are the constructs of the brand equity, researchers are trying to measure these constructs using scale items and attempt to objectively quantify the brand equity [1].

2.2 Application of the CBBE Model

There have been a few works that applied the CBBE model into multiple places, but the most prominent work so far is the study done by [3] comparing Las Vegas and Atlantic City as gambling destinations. They developed the scale items on their own and

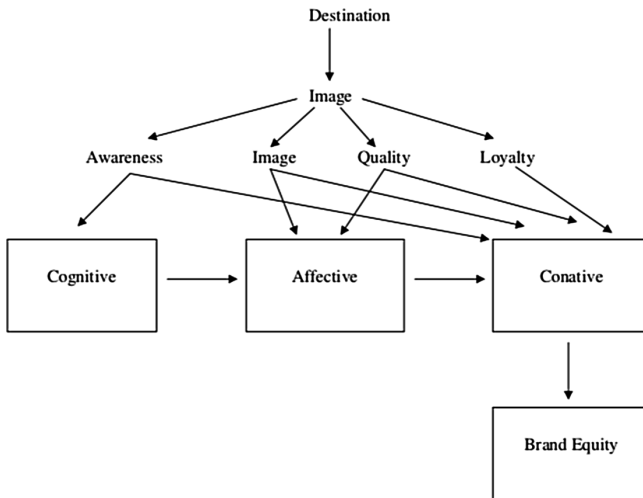


Fig. 1. An example of the CBBE model developed by [2]

pre-tested its validity and reliability before they conducted the online survey for those who have visited Las Vegas and/or Atlantic City. As a result, they [3] concluded that “Multi-sample structural equation modeling testing revealed that the alternative model was largely invariant for Las Vegas and Atlantic City” (p. 226). Although the scale items are to be tested in other settings for establishing external validity, this is a good example indicating the applicability of the CBBE model to multiple destinations. However, [3] also noted that “sample-specific measurement items should be developed when the customer-based brand equity applies across the different destination environments” (p. 226). This means that the scale items developed in this study should not be used for non-gambling destinations, but the scale items should be developed based on the characteristics of the destinations one wants to assess. Based on the literature reviews on the existing approaches in the past, [1] proposed three criteria to select places for comparison to test the measurement for ensuring external validity. The criteria are:

- Comparable territorial scale, e.g., city vs city, region vs region.
- Different spatial-cultural contexts offering at least a certain degree, e.g., located at different places and/or different cultural-sphere.
- Comparable types of place product or service offering.

Hence, successors who aim at developing a measurement for destination brand equity can follow these criteria when they select the destination to compare with. However, it is difficult to affirm related studies in the literature have met all of the criteria. The comparison of Las Vegas and Atlantic City by [3] does meet two of them which correspond with the first one with comparable territorial scale and comparable type of place product or service offering, as they clarified the two destinations have similar entertainment and gambling facility [3]. However, the pair does not meet the second criterion in line with the classification of a different culture in this study,

because both destinations belong to the United States, which belongs to the area of Americas, based on the classification of five continental regions provided by the United Nations Statistics Division [14], although one can potentially argue that there are several sub-cultures within a country, in this case, east and west. Tasci [5] tested the CBBE model in five cities in the United States, New York City, Miami, Orlando, Las Vegas, and Tampa. This selection can be problematic based on the criteria mentioned above since it is difficult to assume Tampa and Las Vegas offer very similar offerings as specified in the third criterion. Furthermore, the selection of these cities does not meet the second criterion regarding the spatial-cultural sphere. For one reason, all of the cities belong to the United States, although one can argue that these cities are dispersed within the territory. However, even if the scope of the different culture is narrowed down to state-wise, Miami, Orlando, and Tampa belong to Florida, and share several features in common as a place such as warm weather. This study selects the destinations to compare following the criteria proposed by [1].

3 Methodology

This study sets TripAdvisor.co.uk as the source of the data as it is the largest online travel community in the world as of September 2018. It provides “661 million reviews and opinions covering the world’s largest selection of travel listings worldwide – covering approximately 7.7 million accommodations, airlines, experiences, and restaurants” [15]. In addition to this, this study only analyzes the reviews written in English due to the language ability of the author. This indicates that the data in this study tends to reflect more opinions, and ideas from English speakers and tends to be referred more by English speakers than the speakers of other languages.

Sample: First, in line with the three criteria given by [1], 10 European island destinations, Corsica, Crete, Gran Canaria, Island of Capri, Jersey, Madeira, Majorca, Rhodes, Santorini, and Tenerife were listed as first candidates for the comparison with Okinawa. These islands were listed based on the ranking that TripAdvisor published as the most popular island destinations in Europe in 2017. This page of the ranking was an active link (<https://www.tripadvisor.co.uk/TravelersChoice-Islands-cTop-g4>) as of December 2017. However, the algorithm and the criteria for the ranking done by TripAdvisor is not publicly disclosed. However, Jersey was excluded from the objects to analyse as Jersey belongs to the United Kingdom and it might be too familiar as an island resort destination to many reviewers given that the data is extracted from TripAdvisor.co.uk.

Data collection: As a data collection method, parsehub, version 54.0.1 (64-bit) for Mac computer was utilized in order to extract the reviews. Parsehub is a web scraping software which is available free of charge (upgraded functionalities require a certain amount of cost) and it allows a user to build a set of commands to extract the information from a number of websites. No information that leads to an identification of user profile was collected. Any pictures that reviewers posted on their OTR were not extracted. The number of collected data by destination is presented in Table 1 below.

Table 1. Collected data by each destination

Destination	# of Reviews written in English (2017)
Corsica	710 reviews
Crete	10,491 reviews
Gran Canaria	11,286 reviews
Island of Capri	2,363 reviews
Madeira	9,118 reviews
Majorca	11,928 reviews
Okinawa	1,627 reviews
Rhodes	7,485 reviews
Santorini	10,662 reviews
Tenerife	14,736 reviews
Total	80,406 reviews

The dataset consists of total 80,406 reviews which were written in English and in 2017. After the data were collected, several pre-processing steps were operated on the raw data. All characters were transformed into lower cases, all numbers, emoticons, punctuations, and stopwords were removed. In this study, in addition to general stopwords (which is the default list on tm package of R), a list of custom stopwords was developed specifically to this case study. It is important to note that some words, which can be meaningful in a different setting were also registered as stopword such as “beach”. This is because of the nature of island resort in the sense that all destinations have beaches as an important part of their attractions in common thus the word hardly has discriminative power in the dataset. After removing the specified stopwords, all texts were lemmatized. Lemmatization is the process of removing inflectional ending of a word or normalize the word to its dictionary form [16]. For example, words such as “dive”, “dives”, “dived” and “diving” become a dictionary form “dive” thus all of them were treated as one word though all process after this operation.

3.1 Criteria for the Keyword Extraction and Generation of Themes

For the next step, keywords were extracted by attraction types. Attraction types refer to the categorization of every property listed on each destination page, which classified and assigned by TripAdvisor. In the context of island destination, 12 attraction types were considered as the subjects for analysis and extracted from TripAdvisor.co.uk. They are “Outdoor Activities”, “Nature & Parks”, “Tours”, “Water & Amusement Parks”, “Zoos & Aquariums”, “Boat Tours & Water Sports”, “Sights & Landmarks”, “Nightlife”, “Shopping”, “Concerts & Shows”, “Museums”, “Food & Drink”. From each attraction type, top 50 relatively frequent words were extracted, and they were put in a table that stores total 500 frequent words. For the next step, the categories that represent a specific type of tourism experience in the destinations were created based on these frequent keywords in the table using thematic analysis. For example, frequent words “dive” and “snorkel” were classified into a newly created category “Outdoor_Water”, because these keywords signify the activities in the water outside.

Keywords “dance”, “music” and “concert” were classified as an experience theme “Entertainment”. After this process, 10 discriminant themes of travel experience were generated namely, “Animal”, “Entertainment”, “Food_Drink”, “Landmark”, “Museum”, “Nature_Scenery”, “Outdoor_Land”, “Outdoor_Water”, “Shopping”, and “Water_Park”. In order to code sentences from the obtained data, KH Coder version 3. Alpha. 13 g [Perl 5.14.2., Perl/Tk 804.03] was used in this study. KH Coder is a text mining software which is available free of charge. As KH Coder allows a user to code texts based on the customized coding scheme, some keywords were added combined with Boolean operators to refine the coding process. For example, keyword “swim” can be in sentences, that go “swimming along the coast” and “a turtle swimming in a tank of the aquarium”. These two sentences should be classified in two different themes although they include exactly the same keyword. In order to code correctly, the coding scheme was set as: (swim & coast), so the former sentence classified into the theme “Outdoor_Water” and the latter does not go in the theme.

4 Results

4.1 Tourism Experience Themes

Table 2 shows the result of automatic coding by KH Coder.

It is important to note that coded items in Table 2 are not mutually exclusive, in other words, the same sentence from a review can be classified into multiple themes because one sentence can represent multiple themes. As Table 2 is based on absolute frequencies, it is not yet fairly comparable which destination highly associate with certain experience theme. To minimize the effect of absolute frequencies, correspondence analysis was run in the next step.

4.2 Results of the Correspondence Analysis Between Destinations and Tourism Experience Themes

Correspondence analysis is used to visualize the association of cases and variables in a cross-tabulation [17]. As Table 2 contains 10 destinations and 10 experience themes, there was a demand to reduce dimensions to interpret which destinations highly associate with certain experience themes. Before running a correspondence analysis, a Pearson’s chi-square test (with 95% confidence level) was conducted on Table 2, following the conventional procedure before applying correspondence analysis [18]. The chi-square test was conducted with Rstudio and the result is shown below:

$$\text{Chi-squared value} = 38741, \text{ df} = 81, \text{ p-value} < 0,001$$

After the association between the destinations and the themes was proven to be statistically significant, a correspondence analysis was conducted. As a result, total nine dimensions were identified as shown in Table 3.

As [18] notes, “Eigenvalues correspond to the amount of information retained by each axis” (para. 21). Thus, the first-dimension accounts for approximately 52.2% and

Table 2. The result of Automatic Coding by KH Coder

Water_Park	15	13	336	408	329	612	21	176	133	2,047
Shopping	225	62	1,450	1,927	1,301	2,197	369	1,119	926	1,962
Outdoor_Water	2,128	199	2,376	2,197	1,511	1,960	1,252	2,003	5,580	1,916
Outdoor_Land	184	103	1,084	665	876	929	55	916	1,609	1,067
Nature_Scenery	688	92	869	715	3,264	992	266	483	4,295	621
Museum	23	44	1,437	302	580	372	119	430	586	152
Landmark	149	66	1,125	579	635	2,433	331	1,378	1,154	352
Food_Drink	581	231	4,733	4,276	3,957	4,644	459	2,741	8,646	4,589
Entertainment	203	37	1,739	3,722	1,090	2,747	50	1,503	1,447	2,868
Animal	26	29	1,149	1,956	1,567	1,199	696	313	75	5,444
Capri		Corsica	Crete	Gran Canaria	Madeira	Majorca	Okinawa	Rhodes	Santorini	Tenerife

Table 3. The Result of correspondence analysis

Dimension	Percentage of variance	Cumulative percentage
dim 1	52.16	52.16
dim 2	19.86	72.02
dim 3	12.17	84.20
dim 4	6.37	90.57
dim 5	5.01	95.57
dim 6	3.32	98.89
dim 7	0.83	99.72
dim 8	0.28	99.99
dim 9	0.01	100.00

the second dimension explains around 19.9% of the total variance. In order to determine how many dimensions to include in the interpretation of the output, the quality of representation was checked using the indicators of squared cosine. Squared cosine represents the strength of the association between rows and a particular axis [18]. The higher the value of squared cosine, the stronger the association between the row point and the specific axis. Table 4 presents the squared cosine of each dimension across the destinations. It is important to note that squared cosines after third dimensions were excluded since they are relatively very small values and does not considerably affect the representation of the visualization as the proportions of variance were small. If the sum of the first two dimensions is close to one, it means the row point is well-represented in the bi-plot [18].

Table 4. Table of squared cosine

Dimension	Dim 1	Dim 2	Dim 3
Capri	0.413	0.115	0.442
Corsica	0.544	0.002	0.015
Crete	0.023	0.263	0.029
Gran Canaria	0.363	0.098	0.009
Madeira	0.099	0.304	0.415
Majorca	0.034	0.696	0.001
Okinawa	0.001	0.088	0.550
Rhodes	0.105	0.745	0.066
Santorini	0.847	0.076	0.014
Tenerife	0.871	0.111	0.002

It is noticeable that Okinawa has a very low association with the first and second dimension as the sum of the first two dimensions is only 0.089, while it is highly associated with the third dimension with 0.55 of squared cosine. Hence, it is reasonable to assume that the first two dimensions might not represent the characteristics of

Okinawa well. Since this case study sets Okinawa as the reference, the quality of representation of Okinawa should be improved. In order to do so, the third dimension was included in further analysis and visualization. Returning to Table 3 that shows the eigenvalues of each dimension, the third dimension shows 12.17% of variance explained. If it was added to the first two dimensions, this means that the total variance explained is 84.2%.

4.3 Results of the 3D Visualization of the Destinations and Experience Themes Correspondence

Figure 2 shows the visualization of the three dimensions with the destinations and the experience themes. The circle points in the graph (Fig. 2) represent each destination, while the squared points indicate each theme of the tourism experience. It is noticeable that Tenerife is positioned far away from other destinations and highly associated with the two themes of experience, “Water_Park” and “Animal”.

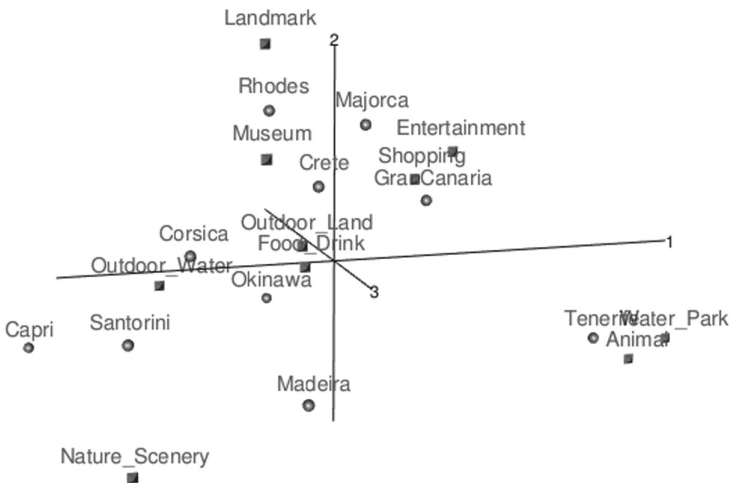


Fig. 2. The visualization of three dimensions

Figure 2 provides certain insights that Okinawa might be close to Corsica, Santorini or Corsica. However, it is not very clear to distinguish which destination is the closest to Okinawa. In order to find that out, distance calculation was conducted using Euclidean distance. This is following the notion that, in the visualization of correspondence analysis, the Euclidian distance between the row points can be estimated as the chi-square distance of corresponding row profiles. The coordinates of three dimensions of the plot were acquired by using FactMineR package in Rstudio and shown below as Table 5. It is important to note that the acquired distances are based on the three dimensions and excluded the other six dimensions.

Table 5. Coordinates of three dimensions

	Dim 1	Dim 2	Dim 3
Capri	-0.6568	-0.3460	-0.6793
Corsica	-0.3368	0.0194	-0.0558
Crete	-0.0567	0.1928	0.0637
Gran Canaria	0.2451	0.1273	-0.0381
Madeira	-0.1454	-0.2547	0.2975
Majorca	0.0725	0.3259	0.0132
Okinawa	-0.0284	-0.2199	-0.5496
Rhodes	-0.1316	0.3508	-0.1041
Santorini	-0.5073	-0.1518	0.0645
Tenerife	0.7010	-0.2498	-0.0310

Table 6 shows the result of distance calculation. As Table 6 indicates, Corsica is the closest to Okinawa with 0.629 of Euclidian distance. Next section discusses the interpretation of the findings. This means that Corsica has the most similar proportion of experience themes to that of Okinawa.

Table 6. Euclidean distance between the row points on three dimensions visualization

Tenerife	1.508	1.072	0.883	0.592	0.908	0.853	0.895	1.029	1.216	0
Santorini	0.783	0.270	0.567	0.809	0.443	0.753	0.782	0.650	0	1.216
Rhodes	1.045	0.393	0.242	0.443	0.727	0.237	0.731	0	0.650	1.029
Okinawa	0.654	0.629	0.740	0.676	0.856	0.790	0	0.731	0.782	0.895
Majorca	1.210	0.516	0.192	0.268	0.682	0	0.790	0.237	0.753	0.853
Madeira	1.106	0.486	0.513	0.641	0	0.682	0.856	0.727	0.443	0.908
Gr. Can.	1.204	0.592	0.325	0	0.641	0.268	0.676	0.443	0.809	0.592
Crete	1.097	0.350	0	0.325	0.513	0.192	0.740	0.242	0.567	0.883
Corsica	0.790	0	0.350	0.592	0.486	0.516	0.629	0.393	0.270	1.072
Capri	0	0.790	1.097	1.204	1.106	1.210	0.654	1.045	0.783	1.508
Destination	Capri	Corsica	Crete	Gr. Can.	Madeira	Majorca	Okinawa	Rhodes	Santorini	Tenerife

5 Conclusion

Results of this study revealed that Corsica is the destination which offers the most similar experience as Okinawa does among nine selected destinations. Although the difference is quite minor, Corsica is the most similar destination to Okinawa in terms of the ratio of the tourism experience themes. Moreover, Corsica demonstrated it has a relatively high association with “Outdoor_Water” which represents many forms of outdoor activities around water such as diving and snorkeling. Although it is not a strong association Corsica also have an association with “Food_Drink”. Some managerial implications can be derived from this study in particular for the establishment of

external validity of destination brand equity measurement. As this study proposes, Corsica and Okinawa should be the set of destinations for a future research to develop and test the measurement of the CBBE for destination branding practice. The scale items should be developed specifically for the pair of destinations following the argument by [19] and tested by utilizing SEM as many other scholars attempted [2–5, 20]. Furthermore, it is a suitable method to benchmark competitors in the same destination brand category and it helps a DMO narrow down what theme of experience the DMO should or should not contain in their message to attract tourists. Based on the case study, communication strategy of Okinawan DMO should attempt to differentiate their message from that of Corsica to attract European tourists, because both tend to offer relatively similar tourism experience such as activities related to “Outdoor_Water”. Although this experience theme is a competitive advantage Okinawa has, it might not have the differentiating power in the mind of potential European tourists as they have an alternative destination in Europe. Therefore, it is advised to convey an additional attractiveness beside the experience theme of “Outdoor_Water”. It is crucial to note that this study analyzed only the texts in the reviews without including other factors such as the visitors’ origin market, their travel motivation and so on. Therefore, the conclusion is a broad and heuristic perception of the destinations that can become a general input for prospective travelers, although the detail of the perception might be slightly more diverse depending on visitors’ origin market, their travel motivation, and others. However, given that the aim of this study is to contribute to the development of scale items that measure the destination brand equity, the focus was the general perception of the destinations. It is not practical, for example, to have scale items for visitors’ origin of country A, country B, and country C, because in practice, in a destination, there are visitors from various countries.

References

1. Leicht T (2016) Establishing external validity for consumer-based place brand equity scales: mission impossible or a matter of approach? In: Melewar TC, Dinnie K, Fona C, Dennis C (eds) Conference proceedings of inaugural conference of the international place branding association. Middlesex University, London, pp 248–256
2. Konecnik M, Gartner WC (2007) Customer-based brand equity for a destination. *Ann Tour Res* 34(2):400–421
3. Boo S, Busser J, Baloglu S (2009) A model of customer-based brand equity and its application to multiple destinations. *Tour Manag* 30(2):219–231
4. Yuwo H, Ford J, Purwanegara M (2013) Customer-based brand equity for a destination (CBBETD): the specific case of Bandung City, Indonesia. *Organ Mark Emerg Econ* 4(1):8–22
5. Tasci AD (2018) Testing the cross-brand and cross-market validity of a consumer-based brand equity (CBBE) model for destination brands. *Tour Manag* 65:143–159
6. Lassar W, Mittal B, Sharma A (1995) Measuring customer-based brand equity. *J Consum Mark* 12(4):11–19
7. Mauri AG, Minazzi R (2013) Web reviews influence on expectations and purchasing intentions of hotel potential customers. *Int J Hosp Manag* 34(1):99–107

8. Govers R, Go F (2009) Place branding: Glocal, virtual and physical identities, constructed, imagined and experienced. Palgrave Macmillan, Basingstoke
9. Marchiori E, Cantoni L, Fesenmaier DR (2013) What did they say about us? Message cues and destination reputation in social media. In: Cantoni L, Xiang Z (eds) Information and communication technologies in tourism 2013. Springer, Heidelberg, pp 170–182. https://doi.org/10.1007/978-3-642-36309-2_15
10. Aaker DA (1996) Building strong brands. The Free Press, New York
11. Keller KL (2012) Strategic brand management building, measuring and managing brand equity, 3rd edn. Pearson Education Limited, England, Edingburgh Gate
12. Aaker DA (1991) Managing brand equity. The Free Press, New York
13. Yoo B, Donthu N (2001) Developing and validating a multidimensional consumer-based brand equity scale. *J Bus Res* 52(1):1–14
14. United Nations Statistics Division (nd) Standard country or area codes for statistical use (M49). <https://unstats.un.org/unsd/methodology/m49/>. Accessed 7 Sep 2018
15. TripAdvisor (nd) About TripAdvisor. <https://tripadvisor.mediaroom.com/us-about-us>. Accessed 7 Sep 2018
16. Manning CD, Raghavan P, Schütze H (2017) Introduction to information retrieval. Cambridge University Press, Delhi
17. Greenacre M, Blasius J (1994) Correspondence analysis in the social sciences: recent developments and applications. Academic Press, New York
18. Kassambara A (2017) CA - Correspondence Analysis in R: Essentials. <http://www.sthda.com/english/articles/31-principal-component-methods-in-r-practical-guide/113-ca-correspondence-analysis-in-r-essentials/>. Accessed 10 July 2018
19. Sartori A, Mottironi C, Corigliano MA (2012) Tourist destination brand equity and internal stakeholders: an empirical research. *J Vacat Mark* 18(4):327–340
20. Pike S, Bianchi C, Kerr G, Patti C (2010) Consumer-based brand equity for Australia as a long-haul tourism destination in an emerging market. *Int Mark Rev* 27(4):434–449

Tourist Experience



Exploring a Travel Diary that Promotes Wellbeing – Synergy Between Oral and Visual Narratives of Memorable and Meaningful Experiences

C. K. Bruce Wan^(✉)

School of Design, The Hong Kong Polytechnic University, Hong Kong, China
bruce.wan@polyu.edu.hk

Abstract. This paper showcases an exploratory study of the creation of a travel diary to facilitate the expression and reminiscences of memorable and meaningful moments using the traveller's digital footprints. Currently, personal technologies are widely used to capture these moments and the travel diary seems to be an ideal place to consolidate footprints from diverse sources. In this study, the researcher interviewed participants, asked them to share their memorable and meaningful travel experiences, and then instructed them to use their photos to create a paper-based visual diary. This study adopted a Labovian approach to compare the oral narratives with the visual diaries. Based on the results, the researcher makes recommendations regarding the future design of travel diary platforms.

Keywords: Travel diary · Memorable and meaningful tourism experience
Co-design, prototyping · Oral and visual narrative · Traveller wellbeing

1 Introduction

Travel is a highly experiential human activity in which emotion and active engagement contribute significantly to the creation of memorable and meaningful travel experiences (MMEs). These experiences can be considered to be vivid and explicit autobiographical memories that arise from remarkable individual life events characterized by high emotional involvement and frequent rehearsal [1]. Travel journeys allow travellers to put aside their daily routines and immerse themselves in the world of the extraordinary. Travellers often use smartphones and other personal devices to capture these experiences, which yield digital footprints, and then share them via social media platforms [2]. Digital images and videos are the primary digital footprints that travellers deliberately create to capture their MMEs. While these footprints can be shared instantly via social media platforms, they also serve as personal memorabilia for savouring these delightful and remarkable life moments. Apart from sharing their digital footprints through social media, other savouring activities such as diary keeping [3] can enhance people's degrees of happiness and thereby promote individual wellbeing [4], including personal growth and self-expression, problem solving, stress reduction, and critical thinking.

Despite the abundance of platforms that allow travellers to publish their digital footprints, surprisingly little research has been conducted on how these platforms might help travellers to narrate their MMEs. Although exploring the potential for conceptualising these platforms requires a human-centred (ethnographic) approach [5], this study opted for the creation of paper-based diaries and observe how participants narrated their MMEs using their digital footprints. The results can be used to guide future designs of these digital platforms.

2 Literature Review

Narratives and storytelling are effective ways for capturing travellers' experiences from an idiosyncratic perspective [6]. Despite the vividness and high emotional involvement of flashbulb memories, these memories are not especially accurate [1]. Therefore, digital footprints can play a role in substantiating their narratives. However, to date, there has been scant research on how these footprints can be used to create narratives that promote reminiscing of MMEs [7].

The term 'digital footprint' refers to the trail of data travellers create either passively or actively over the course of their journeys [8]. Passive digital footprints comprise data that is created without the travellers' knowledge, for example, GPS, record of Internet activities, etc. Active digital footprints, on the other hand, comprise data created deliberately by the travellers over the course of their journeys, for example, photos, videos, and online social interactions. These footprints are considered as one of the major sources of user-generated content to be used in social online platforms and review sites. Current tourism studies reported in the literature have mostly investigated how this content is used by travellers to share their remarkable moments with their communities [2], identify potential business opportunities [9], and identify traveller behaviours and motivations [10]. Very few studies have explored how this user-generated content might encourage personal reflection and introspection. Nevertheless, a body of literature in positive psychology [11] highlights the fact that savouring one's past can foster individual wellbeing. Hence, helping people to savour their MMEs could prolong their feelings of happiness long after their journeys have ended [cf., 12].

Thus, more than a simple recording of these experiences, the travel diary should encourage positive reminiscences of MMEs in various ways: by the active involvement in capturing them (e.g., taking a photo of a remarkable experience); by editing the digital footprints collected (e.g., creating a story of that experience); by sharing the story (e.g., share fleeting moments via social media platforms); and by reviewing the diary over time (e.g., savouring the experience through the digital memorabilia). Arguably, the travel diary has the potential to support these types of savouring activities and thereby promote human flourishing.

Given the potential of using a travel diary to support travellers' abilities to share and reminisce about their MMEs, facilitating the creation of their comprehensive travel diaries is essential for unleashing their potential to do so. Thus, this study explores how travellers create personal narratives of their MMEs with the digital footprints they generated during their travels. The diary created by the traveller then becomes an item of memorabilia that aggregates the remarkable experiences to be shared and savoured

at some later date. In so doing, the oral narrative can be used as a reference for comparison with the visual content.

The goal of this study is to understand the difference between how MMEs are recounted and the ways they are expressed through the creation of a visual diary. The differences between the oral narrative and the visual diary are identified with respect to MMEs by the examination of two aspects of storytelling: 1. the difference between oral and visual narratives of the same experience (i.e., MME) and 2. the creation of a means (i.e., paper prototype) to facilitate MME documentation and expression by travellers through the creation of a visual diary.

3 Methodology

3.1 Understanding the Narrative Structure of MMEs

This study employed a co-design approach because the participants created their travel journals using the paper prototype tool created by the research team. Here, co-design refers to collective creativity (i.e., creativity that is shared by two or more people) as it is applied throughout the design process [13]. As such, the paper-based journal is a product of this collective creativity. Within a design process, the paper prototype is regarded as a generative tool that enables participants to create a visual narrative in which the quality of expression goes beyond the verbal [13]. Before creating their journals, participants were invited to talk about their experiences. These oral narrative sessions not only allowed participants to refresh their stories, but also allowed the research team to collect the participants' oral narratives for future analysis.

Narrative analysis has been used in a number of tourism studies to capture tourism experiences through storytelling [14]. The most popular of these are holistic and categorical analysis [15] and structural narrative analysis [16]. Since the goal of this study is to examine the difference between oral and visual narratives of the same experience, we adopted the Labovian narrative analysis [16], which is a structural narrative model that consists of six storytelling elements:

- **Abstract:** a summary of the story;
- **Orientation:** the context of the story: time, place, behavioural situation and people involved;
- **Complicating action:** sequence of actions regarding what happened. As the core story component, a story may consist of multiple complication sections;
- **Evaluation:** elaboration and explanation of why the narrative is worth telling;
- **Resolution:** the way the story ends;
- **Coda:** narrator returns to the present time of the narration by indicating that the story has ended.

MMEs are a matter of subjective interpretation and the evaluation of what was felt and perceived, which Labov [16] regarded as the most important element in a narrative. In this study, the Labovian approach was used to effectively identify important narratives in a transcript, reveal the specific structure of individual narratives [17], and facilitate a comparison of the oral narrative and visual diary of a particular event.

3.2 Developing the Paper Prototype

For the paper prototype, a comparative analysis of current digital diary platforms was conducted to generate a list of features that would support participants to create a travel diary. The research team opted for a paper prototype because it allows participants to freely express themselves without any technical constraints or usability issues. Also, it offers a cost-effective way to explore user experience in the design process. The prototype referenced three categories of online diaries and social media platforms. The first consists of digital diaries (Fig. 1, upper left), including the applications Journi (<https://www.journiapp.com/>) and Day one (<https://dayoneapp.com/>). Diary features, such as reminders, counters, and connections with other platforms, encourage users to develop a journaling habit as well as to savour the diaries they have created. These platforms have also developed themes that specifically target tourism. For instance, they have features that allow users to enter flight information and collect stamps from each country they visited. When these applications are installed in personal devices, they aggregate other potentially valuable data for the diary, for example, weather information, distance travelled, itinerary and the like.

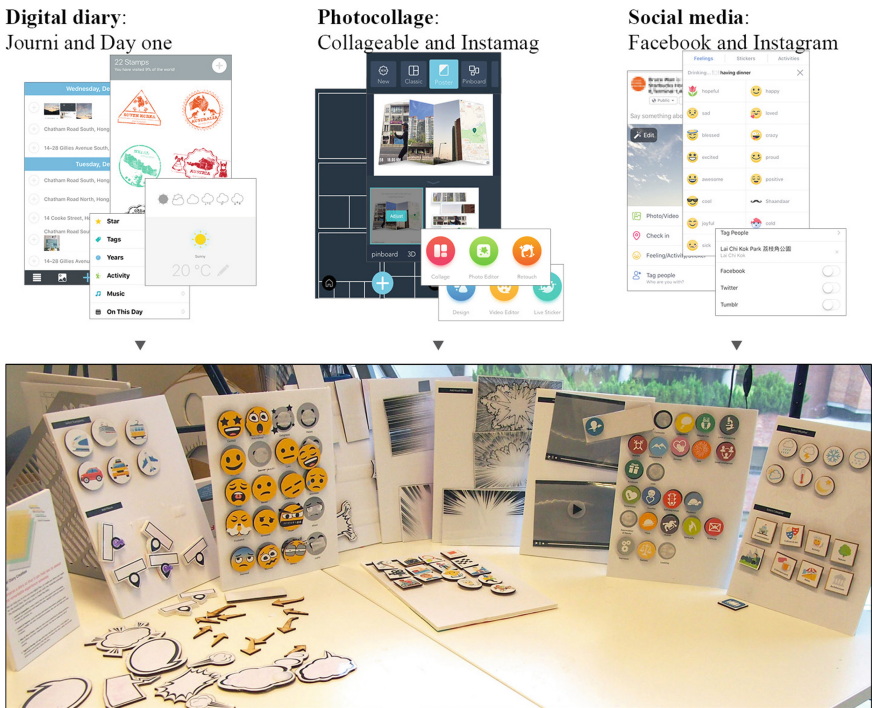


Fig. 1. Paper prototyping tool.

The second category consists of applications that allow users to create narratives using visual content, and photographic images in particular (Fig. 1, upper middle). Applications in this category include Collageable (<http://filtterra.net/>) and Instamag

(<https://fotoable.com/>). These applications enrich the traveller's visual storytelling by offering features that allow users to co-create with their photos via artistic filters, grids, thematic templates and the like. Here, the term co-creation refers to the “enactment of interactional creation across interactive-system environments (afforded by interactive platforms), entailing ageing engagements and structuring organizations” [18]. Once created, the collage can then be used in a journal or shared on a social media platform. The third category includes social media platforms (Fig. 1, upper right) such as Facebook (<https://www.facebook.com/>) and Instagram (<https://www.instagram.com/>). While these platforms include features that focus on online social interactions, such as the Like button, emoticons, and comments, they also allow users to express themselves both visually and textually.

A guide was provided to help participants compose their narratives with the stated goal being: “compose a diary that helps you to savour this remarkable experience over time”. Also, this guide outlined the steps to be taken to inspire participants to make the best use of the prototype components: 1. layout and composition, 2. content and features, 3. effect and tone of voice, and 4. tagging and sharing. Lastly, a set of stationery was provided to ensure that participants were able to freely express themselves using both text and images. Overall, the final prototyping tool was designed to facilitate diary creation in three ways: 1. aggregating and guiding the structure of the narrative, 2. enriching the visual storytelling and 3. encouraging self-expression. The final diary prototyping tool (Fig. 1, bottom) was composed of the key features derived from these three categories.

3.3 Participant Recruitment and Data Collection

Data collection was conducted in three steps: participant recruitment, collection of MMEs, and the creation of travel diaries. A purposive sampling method was selected since, to be suitable, participants must have had travel experiences that were particularly memorable and meaningful to them. Furthermore, the participants were expected to provide photos, souvenirs, and other digital footprints they had created that relate to their experiences. Participants were recruited through poster announcements around a university campus and social media platforms. A total of 19 individuals (12 female and 7 males) responded to the recruitment request but only 15 ultimately participated in this study. Of the four disqualified participants, two could not provide digital footprints, and two did not attend the journal creation workshop. The final study comprised 15 individuals (11 female and 4 male), with an age range of 18–54 years, all of whom were Chinese. Although bias may exist, the focus of the study was on exploring differences in oral and visual experiential recounts.

The MMEs were collected via phone interviews and content was targeted that focused on anecdotes relating to their experiences during their travel journeys. Interviews were conducted in the native language of the participants and the stories collected from the participants were transcribed. During the diary creation workshop, the participants were asked to validate the correctness of the transcripts. Participants were then invited to create a travel diary that highlighted their MMEs using the digital footprints they had generated during their journeys in such a way that the diary would support their reminiscences of these moments. The footprints mainly comprised

photographs that had been printed prior to the diary creation workshop. Each workshop lasted for 60–90 min and the process was video recorded for later review by the research team, if needed (Fig. 2).



Fig. 2. Some components of the workshop (left) and a workshop participant in action (right).

Members of the research team played two roles: facilitators who assisted and encouraged participants to create their diaries and observers who collected data and conducted post-workshop interviews. The workshops were conducted in three steps: First, participants were invited to confirm the content of the transcript that had been obtained from the phone interviews conducted prior to the workshop. Then, the paper prototyping tool was introduced to the participants and, after a briefing session, a research team member assisted the participants to create their diaries with reference to their oral narratives. Lastly, participants were asked in post-workshop interviews to share how the travel diary might help them to reminisce about their experiences.

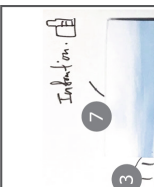


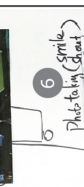


4 Data Analysis

Next, the structure and content of the oral narratives (i.e., interviews) were compared with those of the visual diaries created by the participants (i.e., during the diary creation workshop). Labov's six basic storytelling components served as an effective framework for analysing the oral narratives of the participants. This analysis comprised three parts. In the first, the structures of the oral narratives were compared to those of the visual diaries. Secondly, based on those comparisons, three common patterns were identified in the visual diaries and oral narratives. Lastly, participant feedback regarding the diary creation was summarized. In the following sections, these findings are discussed and representative examples provided.

4.1 Comparison of Oral Narratives and Visual Diaries

First, the diary created by Tony is showcased (Table 1), because he used the diary contents and elements in different ways to support his visual storytelling. Labovian

Table 1. Tony's travel diary

Tony's travel diary - a trip to the south of taiwan Excerpts of interview (Tony)	Comparison of oral narrative and visual diary	The Visual diary
<p>The story happened last year (2016) when I was traveling with three other friends to Tainan (in the south of Taiwan).</p> <p>Since this was our first visit to Tainan, we decided to hire a car with a guide (driver) who could bring us to visit various places.</p>	<p>1 background of his trip. However, this part was not elaborated upon in the diary.</p> <p>2 <i>[Orientation]</i> He further described the background as the abstract element of the experience. Without any photo of the driver, he decided to draw a picture of him.</p>	
<p>The experience was remarkable because of our cultural differences. We felt overwhelmed by the hospitality of the driver!</p>	<p>3 <i>[Abstract]</i> This abstract provided a snapshot of the experience and explained why the story was worth telling. He decided to put the driver at the center of the diary with the title "overwhelmed travel".</p>	
<p>During the journey, he kept introducing us to different scenic spots, whereas we had expected a more relaxed journey.</p>	<p>4 <i>[Complicating action & Evaluation (externals)]</i> The experience began with moments of unexpected frustration. He did not document this aspect in his diary.</p>	
<p>The driver seemed to have a strong emotional attachment to mountains. He repeatedly urged us to visit a mountain that was a special landmark of the region. He was very disappointed when he realized that the mountain was covered in fog that day.</p>	<p>5 <i>[Complicating action]</i> Tony further elaborated upon the experience he had with the driver. The photo at bottom-left is one of the places the driver took him to have a view of the mountain.</p>	
<p>His reaction was funny to me because I had never seen someone behave like that. We were also frustrated when he urged us to take touristie photos...</p>	<p>6 <i>[Evaluation (externals)]</i> The driver exhibited other odd behaviors which he found confusing. Again, he did not explicitly mention this in the diary.</p>	
<p>Ultimately, we found our driver to be funny! Despite his over-enthusiasm, he made good suggestions by bringing us to a museum on that rainy day. This trip allowed me to reflect on what type of tourist I wanted to be.</p>	<p>7 <i>[Evaluation & resolution]</i> Tony appreciated the driver's good intention despite the odd experiences. His appreciation was expressed with the "thumbs-up" icon. The trip helped him to reflect on his own identity as a tourist, but he did not mention this in the diary.</p>	

structural analysis was utilized to identify common patterns in the two diaries and to compare the similarities and differences in the oral and visual narratives. Tony had mixed feelings about an over-enthusiastic tourist guide. In the diary narrative, his hand-drawn tourist guide occupied the central space, with photos of scenic spots placed on both sides. Excerpts from the interview transcript helped the research team to

appreciate the differences between oral narratives and visual diaries. The transcript was coded in Labovian terms to highlight the structure and content of their experiences. The oral narratives included the six core elements that, in Labovian terms, are considered essential to storytelling (i.e., abstract, orientation, complicating action, evaluation, result, and coda). Compared with other diaries (Fig. 3), which are richer in terms of the components used (e.g., with more visual effects and emoticons), Tony’s visual diary was more “descriptive”.

4.2 Pattern 1 - Limited Passage on Introduction and Reflection

Next, we identified three recurring patterns in the oral narratives and visual diaries created by the participants. First, most of the visual diaries contained very limited passages relating to the Labovian elements of abstract, orientation, result and coda. However, these elements were present in most of the oral narratives. For example, the participant Shirley explained why she decided to travel to Japan (Fig. 3, left):

In August 2016, I travelled to Japan for the first time. I had always wanted to visit Japan but was undecided about which city to go to... After an extensive information search, I chose Kyoto—a historical city that has preserved its authentic Japanese architecture—because traditional craftsmanship may disappear someday... (excerpt from Shirley’s interview)

Furthermore, she admitted that she had had little knowledge of traditional Japanese architecture and her visits to historic shrines and temples during this trip gave her the opportunity to appreciate this art. Notably, she was amazed by the ingenious craftsmanship of the Kiyomizu-dera Temple (as documented in her diary). This trip triggered her interest in discovering and appreciating traditional craftsmanship as a leisure hobby.

4.3 Pattern 2 - Storytelling Focused on Complicating Actions and Evaluations

The second pattern identified was the intertwined relationship between complicating actions and the evaluation of these actions. Using Labov’s six narrative components, we found the complicating actions (e.g., highlights and turning points) to be primarily reflected in the photos provided by the participants for the workshop. In the visual diaries, evaluations (e.g., emoticon and dialogs) were superposed onto these photos. In contrast with the oral narrative, which is highly sequential [17], the visual diaries created by the study participants were collages of their remarkable experiences, although many narratives were arranged sequentially. For example, Jackie used all her journal space to describe an incident that occurred during her cultural exchange trip and left no room for the provision of any context of the incident (Fig. 3, middle). Kelly also described her graduation trip to Germany (Fig. 3, right).



Fig. 3. Shirley's temple journey (left), Jackie's cultural exchange trip (middle), Kelly's graduation trip (right),

I made friends with a Taiwanese at the hostel where I was staying... we visited the highest peak Zugspitze and have become close friends since. I enjoyed the gorgeous scenery but was challenged by acrophobia. I learned how to overcome my fears thanks to her encouragement! It was a valuable lesson for me. (excerpt from Kelly's interview)

Kelly's visual diary consists of remarkable moments that include her climb up the mountain, her victory over fear, and enjoyable moments with her new friend. She used emoticons, tags and annotations to enrich her narrative. However, compared with her oral narrative, the visual diary lacked the same level of detail regarding her perceived experiences.

4.4 Pattern 3—Creating New Elements for Storytelling

In creating a visual diary, the participant must provide photos and other memorabilia related to the remarkable events experienced. However, not every participant had these elements at hand, especially when these experiences were fleeting. Dorothy (Fig. 4, left), for instance, decided to draw the travel mates with whom she had had a remarkable experience. Karen highlighted the pulsating heart of the glass frog she found intriguing (Fig. 4, middle). Janet, on the other hand, made use of emoticons to create characters representing the people involved in her story (Fig. 4, right). Her MMEs related to the language barrier she had encountered in the south of Italy, where she found there to be a significant cultural difference from other English-speaking countries:

I realized that they (the Italians) speak very little English! One of my memorable experiences was when I was looking for a bus stop to go to the train station. We tried to ask a guard nearby, but this was in vain. Finally, we took a taxi, but the driver spoke very little English... (excerpt from Janet's interview)



Fig. 4. Excerpts from Dorothy's diary (left), Karen's diary (middle), and Janet's diary (right).

To illustrate her frustration, she created three characters and highlighted the situation with emoticons and dialog boxes. The participants were found to be creative in making use of the resources at their disposal when they perceived a need to create new elements (e.g., characters) for their storytelling.

4.5 Participant Feedback

In the post-workshop interviews, the researcher was interested in answers to two key questions: 1. How do participants deal with the digital footprints they created during their journeys? 2. In what sense can the creation of a diary help them to savour their experiences?

To answer the first question, most of the participants reported that they usually make little if any extra effort to organise their photos and videos, with the exception of Janet who reported that she thoroughly enjoys the photo collage creation process (with applications like Instamag, mentioned earlier) because this allows her to incorporate contextual information with her images. Other participants, in contrast, mostly use popular social media platforms such as Facebook and Instagram for social sharing. However, participants were more creative and reflective when they considered the potential use of the diaries they had created, likely because the diaries enabled them to create a larger narrative space that included contextual information, sequences of events, and the emotions they experienced. Three outcomes were mentioned by the participants: gratitude and celebration, self-reflection, and future planning.

Participants expressed a deep sense of gratitude and celebration when reviewing their journeys, with the contents of their diaries reflecting the hospitality of their hosts, locals with whom they had interacted, and the friendships they had created. The second aspect, self-reflection, meant that participants were able to share how the MMEs documented in their diaries changed their attitudes, worldview, or self-awareness. More than simply reminiscing, a few participants also reported that the diary would inspire them to plan their future journeys because it helped them to preserve the vividness of their memories.

5 Discussion

This study explored how individuals convey remarkable travel experiences through the creation of visual diaries as compared with oral narratives. The results provide insights for conceptualizing personal technologies that support travellers in capturing and reminiscing about their remarkable moments. A body of literature [11] has highlighted the fact that savouring our past can foster personal wellbeing. Therefore, this study explores how travellers reconstruct their experiences using the digital footprints they had created. Study participants were invited to share their MMEs and to create visual travel diaries that illustrated these experiences, using the digital footprints they had created by photo, video, or other means during their journeys. A Labovian approach was used to analyse the oral narratives and compare the structures and contents of the visual diaries. The results suggest that the visual diary can complement oral narratives, thereby enriching the digital footprints with emoticons, tags, visual effects, dialog boxes and the like to facilitate user self-expression. However, the visual diaries are also relatively fragmented and not easily understood if not accompanied by the oral narrative.

Compared with oral narratives, the participants' visual diaries mostly focused on specific moments in which the attention of the observer is primarily drawn to the photos. However, greater elaboration and detail were provided in the oral narratives. Furthermore, visual narratives seem to be more effective in conveying an overall appreciation (or impression) of the remarkable experiences (i.e., peak experience) encountered by the travellers. The visual diary also allows users to annotate their photos, and thus to transform the images and create visual compositions that enrich the narrative. Moreover, when photos were lacking, some users opted to create their own visual content (e.g., create characters, drawings, and diagrams). However, a few components were missing in these visual diaries, as compared with the oral narratives, i.e., the abstract, orientation, result and coda elements. Whereas the abstract and orientation elements provide information that help people to appreciate the context of the diary, the result and coda elements provide anchors by describing how the experiences had changed the lives of the narrators. Despite the associated positive potential, creating a travel diary is not yet a current practice.

Based on these findings, diary designs must motivate and engage travellers in the creation of their diaries, for example, through gamification by which design strategies leverage people's innate desire for self-expression, self-reflection and celebration. Furthermore, diary designs are recommended that integrate components and guide people to structure their narratives, provide background information and situational context and facilitate reflection on the overall experience.

6 Conclusion and Limitations

With the widespread adoption of personal devices, digital footprints have become the main memorabilia that capture the remarkable experiences of travellers in their journeys. A travel diary can encourage people to "connect the dots" of their lives and thereby better appreciate these moments. The findings from this study suggest that

personal technologies should be designed to engage, motivate and guide users to structure their narratives with digital footprints so that they can better share and savour their unique journeys.

Since MMEs are idiosyncratic and co-design workshops are very time-consuming, this study was restricted with respect to acquiring a larger sample size. Moreover, the digital footprints in this study included only active digital footprints (i.e., photos, videos and maps). Recommendations for future study include the exploration of design strategies that can trigger traveller engagement and thereby facilitate their construction of more holistic and comprehensive MME narratives.

Acknowledgements. The author would like to thank all those who participated in this study. The study is supported by The Hong Kong Polytechnic University (Project no.: 1-ZE6B).

References

1. Talarico JM, Rubin DC (2003) Confidence, not consistency, characterizes flashbulb memories. *Psychol Sci* 14:455–461. <https://doi.org/10.1111/1467-9280.02453>
2. Wang D, Park S, Fesenmaier DR (2011) The role of smartphones in mediating the touristic experience. *J Travel Res* 51:371–387. <https://doi.org/10.1177/0047287511426341>
3. Jose PE, Lim BT, Bryant FB (2012) Does savoring increase happiness? A daily diary study. *J Posit Psychol* 7:176–187. <https://doi.org/10.1080/17439760.2012.671345>
4. Hiemstra R (2001) Uses and benefits of journal writing. *New Dir Adult Contin Educ* 2001:19. <https://doi.org/10.1002/ace.17>
5. Tussyadiah IP (2014) Toward a theoretical foundation for experience design in tourism. *J Travel Res* 53:543–564. <https://doi.org/10.1177/0047287513513172>
6. Moscardo GM (2017) Stories as a tourist experience design tool. In: Fesenmaier DR, Xiang Z (eds) *Design science in tourism*. Springer, Cham, pp 97–124
7. Pudliner BA (2007) Alternative literature and tourist experience: travel and tourist weblogs. *J Tour Cult Chang* 5:46–59. <https://doi.org/10.2167/jtcc051.0>
8. Önder I, Koerbitz W, Hubmann-Haidvogel A (2016) Tracing tourists by their digital footprints. *J Travel Res* 55:566–573. <https://doi.org/10.1177/0047287514563985>
9. Akehurst G (2009) User generated content: the use of blogs for tourism organisations and tourism consumers. *Serv Bus* 3:51–61. <https://doi.org/10.1007/s11628-008-0054-2>
10. Tussyadiah IP, Park S, Fesenmaier DR (2011) Assessing the effectiveness of consumer narratives for destination marketing. *J Hosp Tour Res* 35:64–78. <https://doi.org/10.1177/1096348010384594>
11. Kurtz JL (2018) Savoring: a positive emotion amplifier. In: Dunn DS (ed) *Positive psychology : established and emerging issues*. Routledge/Taylor & Francis Group, pp 46–60
12. Nawijn J, Marchand M A, Veenhoven R, Vingerhoets AJ (2010) Vacationers happier, but most not happier after a holiday. *Appl Res Qual Life* 5:35–47. <https://doi.org/10.1007/s11482-009-9091-9>
13. Sanders EB-N, Stappers PJ (2008) Co-creation and the new landscapes of design. *CoDesign* 4:5–18. <https://doi.org/10.1080/15710880701875068>
14. Mura P, Sharif SP (2017) Narrative analysis in tourism: a critical review. *Scand J Hosp Tour* 17:194–207. <https://doi.org/10.1080/15022250.2016.1227276>
15. Lieblich A, Tuval-Mashiach R, Zilber T (1998) *Narrative research: reading, analysis, and interpretation*. Sage Publications, Thousand Oaks

16. Labov W, Waletzky J (1967) Narrative analysis: oral versions of personal experience. *Essays Verbal Vis. Arts* 4–37
17. Riessman CK (2005) *Narrative Analysis. Narrative memory & everyday life*. University of Huddersfield, Huddersfield, pp 1–7
18. Ramaswamy V, Ozcan K (2018) What is co-creation? An interactional creation framework and its implications for value creation. *J. Bus. Res.* 84:196–205. <https://doi.org/10.1016/j.jbusres.2017.11.027>



Co-creating “Mindful” Holiday Resort Experience for Guests’ Digital Well-Being

Uglješa Stankov¹(✉) and Viachaslau Filimonau²

¹ Faculty of Sciences, Department of Geography, Tourism and Hotel Management, University of Novi Sad, Novi Sad, Serbia

ugljesa.stankov@dgt.uns.ac.rs

² Faculty of Management, Bournemouth University, Bournemouth, UK

vfilimonau@bournemouth.ac.uk

Abstract. With the ICT proliferation and related issues that follow people in everyday lives, commitment to digital well-being is becoming a preoccupation of technology providers as well as of users. As a form of a defence mechanism, the practices of so-called “mindfulness”, as a process of bringing a certain quality of attention to moment-by-moment experiences, are becoming an important tool for achieving well-being in digitally led-lives, from work to leisure activities. While technology providers are already offering some generic solutions, the answer of traditional hospitality industry is still missing. However, mindfulness practices within holiday resorts, as places that provide hedonic and regenerative experiences, represent a good ground for guests to reflect on their ICT dependence. To this end, this paper offers a discussion on the inputs for the co-creation of mindful experiences in holiday resorts that could lead to improved digital well-being of guests.

Keywords: Mindfulness · Digital well-being · Co-creation · Holiday resort Guest experience

1 Introduction

Within the digital-led lives consumers that are overwhelmed with multiple technological devices and services increasingly face the issues of information overload [1], choice overload [2] or technostress [3]. This holds important repercussions for consumer (digital) well-being. For example, gaming addiction has even become officially recognized as a type of mental health disorder by the World Health Organization [4].

The issue of information and communication technology (ICT) prevalence during vacation experiences is also recognized in tourism studies where there is evidence that ICT devices, either owned by the consumer or offered by the service provider, can consume too much of guest attention, thus jeopardizing the enjoyment of leisure vacation experience [5]. In particular, smartphones have changed the communication landscape in the hospitality sector as they have become ubiquitous [6]. The growing number of hotel guests nowadays own multiple devices and use them consecutively when searching travel information and booking, as well as during vacations [7],

however, compared to other devices, smartphones are the most portable, versatile and accessible from virtually anywhere [8] including almost all possible scenarios of hotel experience. For some consumers, the solution for technology prevalence rests in complete disconnection from technology [9]. For example, so-called “digital detox” facilities and silent retreats [10] or other “niche” types of the hotel industry’s offers, such as spa & wellness, rural hotels or “slow” hotels that are underpinned by the idea of technological disconnection, and where the over-use of ICT can detrimentally affect the core hotel experience [11]. It can be argued that going on holiday, as a short discontinuity in normal lives with the goal of achieving hedonic or regenerative outcomes, is one of the rare opportunities for people to reflect on and to evaluate one’s personal relationship with ICTs. There is evidence that inability to use technology for maintaining social relationships can impose additional stress on holidays [12]. This should alarm tourists and prompt them to rethink if they have a healthy relationship with technology.

Although the dangers of ICT are present, consumers are not just passive recipients left on their own devices to cope with the problem. In parallel, consumers have developed the mechanisms and adopted the lifestyles to deal with the pressures of modern life [13]. Further, the rise of well-being movement, expansion of positive psychology, or growing practices of mindfulness, in particular, prove that consumers can play an active role in the quest for a happier and healthier life [14]. Contemporary psychology adopted mindfulness as “an approach for increasing awareness and responding skilfully to mental processes that contribute to emotional distress and maladaptive behaviour” [15, 23]. Even the European Travel Commission recognized mindfulness as one of the main drivers of changing consumer lifestyles that will impact travel in Europe [16]. Within tourism research, two concepts of mindfulness are discussed - the concept of socio-cognitive mindfulness [17–21] and the concept of meditative mindfulness. The latter concept has been derived from the Eastern notion of mindfulness adopted for Western therapeutic studies [22–25]. Because of the booming popularity of the mindfulness mediation movement [26], this latter concept is the focus of this research.

In relation to well-being and ICT usage, a new goal is set for digitally-led life – the achieving of digital well-being. The term digital well-being describes a wide framework that “looks after personal health, safety, relationships and work-life balance in digital settings; enables acting safely and responsibly in digital environments; manage digital stress, workload and distraction; uses digital media to participate in political and community actions; uses personal digital data for well-being benefits; acts with concern for the human and natural environment when using digital tools; and balances digital with real-world interactions appropriately in relationships” [27]. As such, and similar to the traditional understanding of subjective well-being, digital well-being cannot be created solely relying on individual capabilities (mindfulness or other) as other factors, such as the external environment, also play a role. Digital well-being is therefore not an exclusively individual responsibility [27, 28]. Similarly, Gui, Fasoli and Carradore [29] state that digital well-being is a state obtainable not only by the individual personal

skills, but also is a broader, societal characteristic that determines the norms and establishes the patterns of behaviour. The society in this regard is understood as actors that have the power to affect the level of digital consumption. This includes providers of ICT solutions who should offer support [30] to co-create digital well-being together with its consumers.

Although there is a growing number of studies that discuss mindfulness in the context of tourism [23], there are no clear directions for practitioners on how to employ the related knowledge built to date in achieving specific business goals, such as for co-creation of digital well-being for tourists. Until recently, most of the ICT companies and service providers did not put much attention into rethinking their responsibility of creating digital well-being, as they were directed only by profits earned from ICT use. However, there were calls to raise consumer awareness of the problem of addictive technology [31] that were facilitated by some movements that caught attention of the media, such as the “National Day of Unplugging” [32] or the later “Time Well Spent” movement [33]. The new Android operative system is equipped with capabilities to help people achieve the balance with technology usage, the business move which is actually based on consumer requests [34] or Windows 10’s “Focus Assist” mode that hides notifications in order to reduce distractions [35]. These attempts are designed for general consumers. On the other side, in many cases, hospitality companies strive to offer “total” experiences [36] where an added value comes from the combination of products and services designed for specific purposes of achieving hedonic and regenerative outcomes among the guests. Obviously, hospitality providers cannot change technology or guest behaviours, but they can rethink the responsibility they hold on this matter and try to offer a new added value for guests in the form of a new type of experiences that will consider digital well-being as an important component. To this end, this piece aims to candidate and explore the mindfulness practices as applied in a very specific area – the holiday resort experiences. In addition to hotel experiences, holiday resort experience combines recreation, sports, entertainment and other amenities and activities, usually at large and attractive locations with the goal of offering total leisure vacations [37]. This physical and organizational context of holiday resorts, coupled with hedonic and regenerative guest motivations and averagely longer duration of stays allow enough room for formal introduction of mindfulness practices, comparing to other types of hotel experiences.

To date, there have been no proposals on how to employ the mindfulness practices in co-creating experiences that are beneficial for digital well-being within traditional holiday resorts. Thus, this piece primarily examines practical perspectives of introducing mindfulness to guests to address the issues raised by digitally-led lives immanent to holiday experiences. The main arguments are based on the market changes induced by the well-being agendas and the management paradigm of co-creation that brings together companies and customers to create value through interaction [38]. Adopting pragmatism as a research philosophy and employing a systematic thinking approach, the authors of this paper propose and elaborate upon possible strategic and tactic measures and advocate for further empirical examination of “mindful” holiday resort experience co-creation.

2 The Rise of Mindfulness

With the introduction of Mindfulness-Based Stress Reduction (MBSR) therapy much of interest turned towards the clinical applications, such as management of chronic pain [39]. Later developments showed the various fields of application, so Kabat-Zinn [40] describes mindfulness as a process of bringing a certain quality of attention to moment-by-moment experience.

Mindfulness is not about changing the experience, rather it is about acknowledging the experience (instead of fighting or ignoring it), with a certain openness, and later moving the attention back, towards the present moment [15]. Therefore, a two-component model of mindfulness includes: the self-regulation of attention so that it is maintained on immediate experience (thereby allowing for increased recognition of mental events in the present moment) and adopting a particular orientation towards one’s experiences in the present moment (an orientation that is characterized by curiosity, openness and acceptance) [15, 41]. Shapiro et al. [42] posit three components (axioms) of mindfulness: Intention, Attention, and Attitude (IAA), based on the definition of mindfulness given by [43], as paying attention (Attention) in a particular way (Attitude): on purpose (Intention), in the present moment, and non-judgmentally.

Among different mindfulness-based psychotherapeutic interventions, MBSR and mindfulness-based cognitive therapy (MBCT) [44] stress out “mindful” activities in everyday life such as they emphasize sitting and walking meditation and yoga practices when participants focus attention on a particular stimulus, such as breath, body sensations during a particular period of time in order to achieve so-called everyday mindfulness [45]. To this end, self-help movements and media have popularized mindfulness as a potential solution to everyday problems [46, 47].

There is a growing number of research and initiatives that explore the relationship between the contemplative dimension of life and the digital world, from “contemplative computing” presented by [48], “positive computing” [49] to the well-known Google’s programmes for digital workers [50]. In terms of digital well-being, awareness is one of the most important, first steps in recognizing the problematic relations with technology usage. For example, when people were questioned about the amount of time they thought they had spent on smartphone applications, it turned out that most were underestimating how long they spent on their phones [51]. Thus, in order to act, consumers first must see the problem clearly [51]. According to Levy [50] people can become more self-aware of these states of mind and body when using ICT and that realisation can actually lead to act to achieve greater attentiveness, physical well-being and emotional balance. Furthermore, there are evidences to prove the positive influence of mindfulness practices on the well-being of workers if applied in a multitasking digital environments [50, 52, 53]. Finally, the well-known benefits of mindfulness practices, such as improved cognitive abilities, reduced anxiety, stress and depression, improved immune functions, less desire for material gain, less judgments, more compassion and sympathy [22, 54], to mention a few, give enough evidence to consider it a viable approach for achieving digital well-being [55].

3 The Framework for Co-creating Mindful Holiday Resort Experience

As seen in some niche offer examples [10, 56], achieving digital well-being is based on limiting the use of technology within resort experience. Alternatively, an active partnership between traditional holiday resorts and guests can be proposed that actually could rely on technology, together with other supportive measures, as reminders or “entry points” to get back to resort experiences and enjoy the benefits of digital well-being during the vacation. In this case, holiday resorts take the role of educators and facilitators of mindfulness and engage the consumer to recognize their own responsibilities for digital well-being.

Depending on innovative business strategies of holiday resorts, the mindfulness context can be seen as a short-term investment in staff, infrastructure and service, or in the redesign of existing ones; or as a long-term strategy to provide supportive environments that will help guests in achieving digital well-being on hotel premises and educate them to adopt similar practices in everyday life. With this in mind, Table 1 lists a number of the soft and hard measures that present some of the holiday resort inputs that can help in creating mindfulness experiences.

Table 1. Propositions of soft and hard input measures to support holiday resort mindful co-creation

Soft	Hard measures
<ul style="list-style-type: none"> • Notifications and labelling • Gamification of mindfulness trough hotel animation • Adding mindfulness practices to existing well-being programs • Deliberate change of routines • Price friction for prolonged internet use • Employees familiar with mindfulness practices 	<ul style="list-style-type: none"> • Mediation places • Voluntary mindful “no internet” zones • “Hotel for gadgets” • Calm technology • Ambient intelligence • Biophilic design

Soft inputs for mindful holiday resort experiences could rely on various types of reminders (in textual or graphical forms and for purposes such as mindful walking, eating, exercising, etc.) with the intention of stopping addicting habits of checking the smartphones, for example. These reminders can be embedded into hotel labelling or be integrated into hotel apps or other digital ways of communication. For example, there is research to measure effects of so called “mindfulness applications” that aim to help people to become mindful [57–59]. It is essential to make a clear reference to the way in which notifications are employed. In that way, the notifications can support a dialogue, maintain transparency, provide access and show risks and benefits in order to make successful integration for co-creation of experiences [60]. This is also relevant for hard measures, discussed later.

Some existing resort offers that include meditation or similar practices can be enriched with mindfulness medication. Through the gamification within the hotel animation, mindfulness practices can be presented to different age groups in a fun and

easy-to-grasp ways. Gratifications of mindfulness practices (for example, the amount of time spent not using a smartphone) within hotel animation can be incentivized via, for example, price discounts, loyalty points, vouchers for mindfulness trainings or similar. At the same time, some price frictions when using ICT can be considered. For example, an option can be considered for voluntarily accepted increase in price if more time is spent on the holiday resort’s Wi-Fi network. Guests could choose this option if they anticipate that this will be the best way for them to control the time spent on their smartphones.

Finally, resort staff well-educated in mindfulness practices [53, 61] is of essence, as they can give more detailed information on the practices or even serve as an example. They can further create “change of scripts” [62] by deliberately staging change of routines in resort experiences in order to catch attention of consumers and prompt it in the desirable direction.

Hard measures imply creating supportive physical environments that promote mindfulness practices. Despite the different settings in which mindfulness practices can occur, a little work has been done to test whether some spaces work better than the others, but in general design, there is a lot of research to test the influence of space on people’s well-being [63]. However, within the design professions, there is a growing interest in theorizing, testing and measuring the effect of space and place on people’s well-being. The mediation (silence, reflection) corners or rooms and libraries packed with generic literature and books and magazines on mindfulness, with a clear reference to digital well-being, can be the most evident intervention in this regard. These places can also be equipped with artefacts that support “present moments”. For example, there are suggestions for adopting design qualities that would support bare attention to the present moment, that can be integrated with daily life activities and have aesthetics for non-judgmental acceptance [see 57]. The “Internet free” zones in hotels where guests will voluntarily enter go in line with the previous interventions. Safes for gadgets (“Hotel for smartphones”) could be a fun alternative too.

Despite the obvious measures in built environments, resorts could think of employing the ICT solutions that require rethinking the human-computer interactions that limit the consumption of guest attention, such as calm technology [64–66] or ambient intelligent technology that are sensitive and responsive to the presence of people [67]. In this case, the need for mindfulness interventions is much lower as these approaches already leave enough room for digital well-being. Finally, biophilia [68] and the biophilic design, that is based on humanity’s innate affinity for the natural world is now considered for built environments [69] and even to convey information within ICT services [70]. This can be employed in order to benefit digital well-being of guests [71].

In the case of holiday resorts, the responsibilities of ICT usage rest within both hotel guests and hotel management [72]. In this context, experience providers are enablers, but the main effort in directing guests’ attention is with guests themselves. Thus, the guest input into co-creation of mindful holiday resort experiences will be directly related to their level of engagement to co-create in this matter [72–74]. When applied to hospitality demand, the well-being interventions based on mindfulness practices should be designed with consideration of people’s beliefs, affective states and lifestyles, and should be flexible to meet the needs of different guests, and expectations

about use [75]. Most importantly, the mindfulness interventions in holiday resorts have to relate to the main guests' motives for achieving digital well-being. That can be grounded on hedonic motives, which focuses on happiness and pleasure; and the eudaimonic motives, which focuses on meaning and self-realization [76].

4 Challenges and Further Research Directions

For holiday resort managers, attention management and ICT usage in holiday resort experiences is an important research direction. This should include both ICT solutions owned by guests and provided by hotels. These should be evaluated from the viewpoint of guests' attention. Thus, co-creation of mindful experiences can be seen as the resort sector's response to the growing demand for addressing the issue of digital well-being of guests. Furthermore, hoteliers should consider the relation between ICT design and co-creating digital well-being. Research can start by looking at a broad set of methods of human-computer interactions and interaction design [77, 78]. Here, more research is needed on the subject, such as calm technology or ambient intelligence [66].

Collecting empirical evidence of the effectiveness of mindfulness practices within holiday resort experience is an important goal to achieve. In general, there are many challenges related to maintaining consistency with meditative mindfulness while applying psychological research methods [79]. In order to avoid the danger of becoming another fuzzy approach, further empirical examination of the feasibility of adopting mindfulness in resort experiences is needed. More specifically, more research encompassing examples of its use is required, indicating how the different types of resorts can benefit from the broader adoption of this approach. In particular, the costs of mindfulness should be evaluated in an organizational context, especially from the perspective of the implementation costs. The lack of sufficient ICT budget and the burden of maintaining existing ICT infrastructure are still the main frictions that affect the rollout of current hotel technology [80].

For academics, this piece offers a new area for research, mostly related to the issues of the guest's level of engagement in mindfulness and digital well-being during holidays. There is evidence that, for some tourists, the cognizance of deleterious effects of smartphone usage during vacation will not necessarily translate their habits into the mindful use of technologies [5]. Mindfulness is now becoming a "common currency" [75, 81], however, when offered to mass tourism consumers, it might be seen as still an unfamiliar practice, or it can even be classified as a New Age practice and the mass tourism consumer may be repelled to this type of product labelling as a result [82]. This can even be the case for some sub-segments within the consumer groups that consider themselves the mindfulness practitioners. For example, in the case of New Age-oriented special interest travel [83] the sector of hospitality, Poulston and Pernecky [84] argue that, while the hotel industry is generally well placed to address the needs of mainstream tourists, it may not be still ready for the New Agers who may seek more supportive places for their beliefs and practices, but who, at the same time, sometimes refuse this labelling. These potential dissonances are some of the major concerns that need to be addressed by holiday resorts in order to create and include mindfulness practices into their day-to-day, mainstream offerings.

5 Concluding Remarks

The specific responsibilities of holiday resorts for providing support in achieving digital well-being of their guests during vacation experiences are more pronounced when comparing with the responsibilities of ICT providers to the general public in everyday life. Holiday resorts offer total experiences and therefore they should count in all the dangers that could distract the guests from achieving a desirable outcome of their stay. This is not just an ethical question or question of sustainability for holiday resorts [22, 41], but also an excellence question of profitability as the effect of unsatisfactory experiences is directly reflected in the level of profit. To this end, mindfulness practice as a growing trend in the well-being movement can be a viable option for engaging guests in co-creation practices for achieving digital well-being.

Acknowledgements. This paper is part of an ongoing research project No. 142-451-2795/2018-01 financed by The Provincial Secretariat for Higher Education and Scientific Research, Provincial Government, Autonomous Province of Vojvodina, Republic of Serbia.

References

1. Rodriguez MG, Gummadi K, Schoelkopf B (2014) Quantifying information overload in social media and its impact on social contagions. In: Adar E, Resnick P, Choudhury M De, et al (eds) Proceedings of the eighth international AAAI conference on weblogs and social media. AAAI Press, Palo Alto, pp 170–179
2. Park J-Y, Jang SS (2013) Confused by too many choices? Choice overload in tourism. *Tour Manag* 35:1–12. <https://doi.org/10.1016/j.tourman.2012.05.004>
3. Lee Y-K, Chang C-T, Lin Y, Cheng Z-H (2014) The dark side of smartphone usage: psychological traits, compulsive behavior and technostress. *Comput Human Behav* 31:373–383. <https://doi.org/10.1016/j.chb.2013.10.047>
4. WHO (2018) Gaming disorder. <http://www.who.int/features/qa/gaming-disorder/en>. Accessed 25 Aug 2018
5. Ayeh JK (2018) Distracted gaze: problematic use of mobile technologies in vacation contexts. *Tour Manag Perspect* 26:31–38. <https://doi.org/10.1016/J.TMP.2018.01.002>
6. Kim HH, Law R (2015) Smartphones in tourism and hospitality marketing: a literature review. *J Travel Tour Mark* 32:692–711. <https://doi.org/10.1080/10548408.2014.943458>
7. Ukpabi DC, Karjaluoto H (2017) Consumers’ acceptance of information and communications technology in tourism: a review. *Telemat Informatics* 34:618–644. <https://doi.org/10.1016/J.TELE.2016.12.002>
8. Murphy HC, Chen M-M, Cossutta M (2016) An investigation of multiple devices and information sources used in the hotel booking process. *Tour Manag* 52:44–51. <https://doi.org/10.1016/J.TOURMAN.2015.06.004>
9. Dickinson JE, Ghali K, Cherrett T, et al (2014) Tourism and the smartphone app: capabilities, emerging practice and scope in the travel domain. *Curr Issues Tour* 17:84–101. <https://doi.org/10.1080/13683500.2012.718323>
10. Lippe-McGraw J (2017) Where to go for a silent retreat—condé nast traveler. <https://www.cntraveler.com/story/silent-retreats-are-the-latest-in-digital-detox-vacations>, last accessed 2018/01/24

11. Li J, Pearce PL, Low D (2018) Media representation of digital-free tourism: a critical discourse analysis. *Tour Manag* 69:317–329. <https://doi.org/10.1016/J.TOURMAN.2018.06.027>
12. Paris CM, Berger EA, Rubin S, Casson M (2015) Disconnected and unplugged: experiences of technology induced anxieties and tensions while traveling. In: Tussyadiah I, Inversini A (eds) *Information and communication technologies in tourism 2015*. Springer International Publishing, Cham, pp 803–816
13. Brown KW, Kasser T (2005) Are psychological and ecological well-being compatible? The role of values, mindfulness, and lifestyle. *Soc Indic Res* 74:349–368. <https://doi.org/10.1007/s11205-004-8207-8>
14. Wilson J (2016) Selling mindfulness: commodity lineages and the marketing of mindful products. In: Purser RE, Forbes D, Burke A (eds) *Handbook of mindfulness*. Springer, Cham, pp 109–119
15. Bishop SR, Lau M, Shapiro S et al (2006) Mindfulness: a proposed operational definition. *Clin Psychol Sci Pract* 11:230–241. <https://doi.org/10.1093/clipsy.bph077>
16. ETC (2016) *Lifestyle trends & tourism: how changing consumer behaviour impact travel to Europe*. Brussels
17. Moscardo G (2017) Exploring mindfulness and stories in tourist experiences. *Int J Cult Tour Hosp Res* 11:111–124. <https://doi.org/10.1108/IJCTHR-11-2016-0108>
18. Moscardo G (2009) Understanding tourist experience through mindfulness theory. In: Kozak M, Decrop A (eds) *Handbook of tourist behaviour: theory and practice*. Routledge, New York, pp 99–115
19. Rubin SD, Lee W, Morris Paris C, Teye V (2016) The influence of mindfulness on tourists' emotions, satisfaction and destination loyalty in Fiji. In: TTRA annual international conference proceedings: advancing tourism research globally. Travel and Tourism Research Association, Whitehall
20. Frauman E, Norman WC (2004) Mindfulness as a tool for managing visitors to tourism destinations. *J Travel Res* 42:381–389. <https://doi.org/10.1177/0047287504263033>
21. Dutt C, Ninov I (2015) Tourists' experiences of mindfulness in Dubai, United Arab Emirates (UAE). *J Travel Tour Mark* 33:1195–1212. <https://doi.org/10.1080/10548408.2015.1107521>
22. Lengyel A (2015) Mindfulness and sustainability: utilizing the tourism context. *J Sustain Dev* 8:35. <https://doi.org/10.5539/jsd.v8n9p35>
23. Chen I-L, Scott N, Benckendorff P (2017) Mindful tourist experiences: a Buddhist perspective. *Ann Tour Res* 64:1–12. <https://doi.org/10.1016/J.ANNALS.2017.01.013>
24. Chen I-L (2015) *An exploration of mindfulness and its experiential benefits: Taiwanese backpackers in Australia*. The University of Queensland
25. Chen I-L, Benckendorff P, Scott N (2014) Tranquillity from mindful travel experiences in Australian destinations. In: Scott N, Weaver D, Becken S, Peiyi D (eds) *G20 First East-West dialogue on tourism and the Chinese dream*. Griffith University, Goalden Coast, pp 11–14
26. Purser RE (2018) Critical perspectives on corporate mindfulness. *J Manag Spiritual Relig* 15:105–108. <https://doi.org/10.1080/14766086.2018.1438038>
27. Beetham H (2016) What is “digital wellbeing”? <http://design-4-learning.blogspot.com/2016/03/what-is-digital-wellbeing.html>. Accessed 8 Aug 2018
28. Nansen B, Chakraborty K, Gibbs L, et al (2012) Children and digital wellbeing in Australia: online regulation, conduct and competence. *J Child Media* 237–254. <https://doi.org/10.1080/17482798.2011.619548>
29. Gui M, Fasoli M, Carradore R (2017) Digital well-being. developing a new theoretical tool for media literacy research. *Ital J Sociol Educ* 9:155–173. <https://doi.org/10.14658/pupj-ijse-2017-1-8>

30. Grisseman US, Stokburger-Sauer NE (2012) Customer co-creation of travel services: the role of company support and customer satisfaction with the co-creation performance. *Tour Manag* 33:1483–1492. <https://doi.org/10.1016/J.TOURMAN.2012.02.002>
31. Alter AL (2018) *Irresistible: the rise of addictive technology and the business of keeping us hooked*. Penguin Books, London
32. Foot K (2014) The online emergence of pushback on social media in the United States: a historical discourse analysis. *Int J Commun* 8:1313–1342
33. Center for Humane Technology (2018) The problem. <http://humanetech.com/problem>. Accessed 25 Aug 2018
34. Samat S (2018) Android 9 pie: powered by AI for a smarter, simpler experience that adapts to you. <https://blog.google/products/android/introducing-android-9-pie/>. Accessed 20 Aug 2018
35. Huculak M (2018) How to use the Windows 10 April 2018 update’s focus assist feature to reduce distractions. <https://www.windowscentral.com/how-use-focus-assist-reduce-distractions-windows-10-april-2018-update>. Accessed 04 Sept 2018
36. Gyi D, van Erp J, Hekkert P, McDonagh D (2004) The branded hotel: an educational experience. In: McDonagh D, Hekkert P, van Erp J, Gyi D (eds) *Design and emotion*. Taylor & Francis, New York, pp 74–78
37. Mill RC (2008) *Resorts: management and operation*. Wiley, Hoboken
38. Galvagno M, Dalli D (2014) Theory of value co-creation: a systematic literature review. *Manag Serv Qual An Int J* 24:643–683. <https://doi.org/10.1108/MSQ-09-2013-0187>
39. Kabat-Zinn J (1982) An outpatient program in behavioral medicine for chronic pain patients based on the practice of mindfulness meditation: theoretical considerations and preliminary results. *Gen Hosp Psychiatry* 33–47
40. Kabat-Zinn J (2013) *Full catastrophe living (revised edition): using the wisdom of your body and mind to face stress, pain, and illness*. Bantam Books, New York
41. Fischer D, Stanzus L, Geiger S et al (2017) Mindfulness and sustainable consumption: a systematic literature review of research approaches and findings. *J Clean Prod* 162:544–558. <https://doi.org/10.1016/J.JCLEPRO.2017.06.007>
42. Shapiro SL, Carlson LE, Astin JA, Freedman B (2006) Mechanisms of mindfulness. *J Clin Psychol* 62:373–386. <https://doi.org/10.1002/jclp.20237>
43. Kabat-Zinn J (1994) *Wherever you go, there you are mindfulness meditation in everyday life*. Hachette Books, New York
44. Segal ZV, Williams JMG, Teasdale JD (2012) *Mindfulness-based cognitive therapy for depression*. Guilford Press, New York
45. Thompson BL, Waltz J (2007) Everyday mindfulness and mindfulness meditation: overlapping constructs or not? *Pers Individ Dif* 43:1875–1885. <https://doi.org/10.1016/J.PAID.2007.06.017>
46. Siegel RD (2010) *The mindfulness solution: everyday practices for everyday problems*. The Guilford Press, New York
47. Colier N (2016) *The power of off: the mindful way to stay sane in a virtual world*. Sounds True, Boulder
48. Pang AS-K (2013) *The distraction addiction: getting the information you need and the communication you want without enraging your family, annoying your colleagues, and destroying your soul*. Little Brown and Company, New York
49. Calvo RA, Peters D (2015) Introduction to positive computing: technology that fosters wellbeing. In: *Proceedings of the 33rd annual ACM conference extended abstracts on human factors in computing systems—CHI EA’15*. ACM Press, New York, pp 2499–2500
50. Levy DM (2016) *Mindful tech: how to bring balance to our digital lives*. Yale University Press, New Haven

51. Gonzalez R (2018) The research behind Google's new tools for digital well-being. <https://www.wired.com/story/the-research-behind-googles-new-tools-for-digital-well-being/>. Accessed 09 Sept 2018
52. Brooks S, Hawkey K, Canadian Human-Computer Communications Society AW, Ostergren M (2012) The effects of mindfulness meditation training on multitasking in a high-stress information environment. In: Proceedings of graphics interface 2012. Canadian Information Processing Society, Toronto, pp 45–52
53. Reb J, Narayanan J, Ho ZW (2015) Mindfulness at work: antecedents and consequences of employee awareness and absent-mindedness. *Mindfulness* (N Y) 6:111–122. <https://doi.org/10.1007/s12671-013-0236-4>
54. Ludwig DS, Kabat-Zinn J (2008) Mindfulness in medicine. *JAMA* 300:1350–1352. <https://doi.org/10.1001/jama.300.11.1350>
55. Chen I-L, Scott N, Benckendorff P (2017) Well-being benefits from mindful experiences. In: Scott N, Jun G, JianYu M (eds) *Visitor experience design*. CABI, Wallingford, pp 175–188
56. Emek M (2014) Digital detox for the holidays: are we addicted? In: Proceeding of international conference on tourism transport & technology ICTTT2014. The Brunel University, London
57. Zhu B, Hedman A, Li H (2017) Designing digital mindfulness: presence-in and presence-with versus presence-through. In: Proceedings of the 2017 CHI conference on human factors in computing systems—CHI'17. ACM Press, New York, pp 2685–2695
58. Mani M, Kavanagh DJ, Hides L, Stoyanov SR (2015) Review and evaluation of mindfulness-based iPhone apps. *JMIR Mhealth Uhealth* 3:e82. <https://doi.org/10.2196/mhealth.4328>
59. Howells A, Ivtzan I, Eiroa-Orosa FJ (2016) Putting the “app” in happiness: a randomised controlled trial of a smartphone-based mindfulness intervention to enhance wellbeing. *J Happiness Stud* 17:163–185. <https://doi.org/10.1007/s10902-014-9589-1>
60. Prahalad CK, Ramaswamy V (2004) Co-creation experiences: the next practice in value creation. *J Interact Mark* 18:5–14. <https://doi.org/10.1002/dir.20015>
61. Marianetti O, Passmore J (2009) Mindfulness at work: paying attention to enhance well-being and performance. In: Lindley A (ed) *Oxford handbook of positive psychology and work*. Oxford University Press, Oxford, pp 189–200
62. Campos AC, Mendes J, do Valle PO, Scott N (2016) Co-creation experiences: attention and memorability. *J Travel Tour Mark* 33:1309–1336. <https://doi.org/10.1080/10548408.2015.1118424>
63. Porter N, Bramham J, Thomas M (2017) Mindfulness and design: creating spaces for well being. In: 5th International health humanities conference on creative practices for improving health and social inclusion, Sevilla 2016. Universidad de Sevilla, Vicerrectorado de Investigación, Sevilla, pp 199–209
64. Brown JNA (2016) Getting excited about “calm technology”. In: Brown JNA (ed) *Anthropology-based computing*. Springer, Cham, pp 23–34
65. Case A (2015) *Calm technology: principles and patterns for non-intrusive design*. O'Reilly Media Inc, Sebastopol
66. Stankov U, Filimonau V, Slivar I (2018) Calm ICT design in hotels: a critical review of applications and implications. *Int J Hosp Manag*
67. Alizadeh S, Kanis M, Veenstra M (2012) Using ambient intelligence to support tourism. In: Spink AJ, Grieco F, Krips OE, et al (eds) *Proceedings of measuring behavior 2012*. Utrecht, pp 515–519
68. Wilson EO (1984) *Biophilia*. Harvard University Press, Cambridge
69. Terrapin Bright Green (2014) *14 Patterns of biophilic design: improving health and well-being in the built environment*. New York; Washington

70. Riaz A, Gregor S, Lin A (2018) Biophilia and biophobia in website design: Improving internet information dissemination. *Inf Manag* 55:199–214. <https://doi.org/10.1016/J.IM.2017.05.006>
71. Van Gordon W, Shonin E, Richardson M (2018) Mindfulness and nature. *Mindfulness* (N Y) 1–4. <https://doi.org/10.1007/s12671-018-0883-6>
72. Harkison T (2018) The use of co-creation within the luxury accommodation experience—myth or reality? *Int J Hosp Manag* 71:11–18. <https://doi.org/10.1016/J.IJHM.2017.11.006>
73. Sarmah B, Kamboj S, Rahman Z (2017) Co-creation in hotel service innovation using smart phone apps: an empirical study. *Int J Contemp Hosp Manag* 29:2647–2667. <https://doi.org/10.1108/IJCHM-12-2015-0681>
74. Kamboj S, Gupta S (2018) Use of smart phone apps in co-creative hotel service innovation: an evidence from India. *Curr Issues Tour*. <https://doi.org/10.1080/13683500.2018.1513459>
75. Laurie J, Blandford A (2016) Making time for mindfulness. *Int J Med Inform* 96:38–50. <https://doi.org/10.1016/J.IJMEDINF.2016.02.010>
76. Hartwell H, Hemingway A, Fyall A et al (2012) Tourism engaging with the public health agenda: can we promote “wellville” as a destination of choice? *Public Health* 126:1072–1074. <https://doi.org/10.1016/j.puhe.2012.08.013>
77. Goodwin K (2009) *Designing for the digital age: how to create human-centered products and services*. Wiley, Indianapolis
78. Nielsen L (2013) *Personas—user focused design*. Springer, London
79. Baer RA (2011) Measuring mindfulness. *Contemp Buddhism* 241–261. <https://doi.org/10.1080/14639947.2011.564842>
80. HT (2017) 2017 Lodging technology study—frictionless hotels: enabling the omni-experience. <https://hospitalitytech.com/2017-lodging-technology-study-frictionless-hotels-enabling-omni-experience>. Accessed 07 Sept 2018
81. Norman A, Pokorny JJ (2017) Meditation retreats: spiritual tourism well-being interventions. *Tour Manag Perspect* 24:201–207. <https://doi.org/10.1016/J.TMP.2017.07.012>
82. Pernecky T, Poulston J (2015) Prospects and challenges in the study of new age tourism: a critical commentary. *Tour Anal* 20:705–717. <https://doi.org/10.3727/108354215X14464845878237>
83. Attix SA (2002) New age-oriented special interest travel: an exploratory study. *Tour Recreat Res* 27:51–58. <https://doi.org/10.1080/02508281.2002.11081220>
84. Poulston J, Pernecky T (2014) Customizing new-age hospitality: an exploratory study of Sedona. *Hosp Soc* 4:9–30. https://doi.org/10.1386/hosp.4.1.9_1



Blended Tourism Experiencescape: A Conceptualisation of Live-Streaming Tourism

Zhiming Deng^(✉), Pierre Benckendorff, and Jie Wang

UQ Business School, The University of Queensland, Brisbane, Australia
z.deng@business.uq.edu.au

Abstract. Live-streaming has become popular worldwide as digital solutions provide ever creative opportunities to bring activities in life that were previously impossible. Travel is one of the most favourable activities on live-streaming. Live-streaming tourism (LST) recognised as a distinct information and communication technology (ICT) phenomenon. However, research in LST remains under-explored. This study sheds light on live-streaming tourism, to develop a systematic review on live-streaming tourism, and propose the blended tourism experiencescape model to address the absence of live-streaming tourism from a theoretical perspective. The future research directions and agenda are also provided.

Keywords: Blended tourism experience · Live-streaming tourism
Digital technology

1 Introduction

In the year of 2045, when much of humanity uses the virtual reality software OASIS to escape the desolation of the real world, orphaned teenager Wade Watts discovers clues to a hidden game within the program that promises the winner full ownership of the OASIS. This synopsis describes the plot of the science fiction film *Ready Player One* directed by Steven Spielberg. Spielberg presents a future scenario of technology-obsessed lives that satisfies human desires not only from the perspective of entertainment but also social expectations. In contemporary society, technology is increasingly embedded in everyday life, enhancing the way individuals interact and experience the world around them. But there's a larger transformation at play—a shift beyond digital into in era where tech is built into every single interaction [1].

As digital encounters infiltrate the entirety of touristic journey, the spectrum of technological engagement results in the emergence of the multi-tasking digital tourist. Tourists are able to produce, consume and interact with tourism destinations and other stakeholders through a growing number of digital solutions [2], virtual reality [3–5], augmented reality [6, 7] and artificial intelligence [8]. Among these technologies, live-streaming increasing in popularity, particularly among younger consumers.

Live-streaming refers to the medium of recording audio and video in the real-time [9]. In 2007, echoing elements of the 1998 film *The Truman Show*, Justin Kan founded

Justin.tv to broadcast his life 24/7 and popularised the term 'life casting'. Since then, many live-streaming platforms have been developed. In practice, live-streaming has become popular across a range of application, including education, gaming, and TV shows. A typical live stream involves a streamer/broadcaster who uploads real-time video and audio content including video games, talent performance, daily life, or whatever the streamer expects to share. In terms of live-streaming tourism, it allows anyone to launch a stream or watch someone else travelling from a thousand miles away. Viewers to some extent can experience what the live-streamer experiences.

The growth of live-streaming has led to a number of recent academic studies focused on describing live-streaming in the form of empirical studies [10, 11] or exploring specific phenomenological applications, such as usage intention [12, 13], or source credibility and motivation [11]. However, the study of live-streaming is relatively new and the research to date has been limited. As [14] noted, 'sociological, psychological and philosophical theorisation are called for'. In the tourism context, live-streaming remains under-explored despite the growing practice of sharing travel experience using live-streaming platforms. An increasing number of digital solutions, such as live-streaming provides ever creative opportunities for engaging with tourism, we have witnessed significant changes in the ways in which we are able to produce, consume and interact with tourism destinations. In this way, live-streaming tourism serves the needs of multi-tasking 'smart tourists' who are seeking blended tourist experiences.

This conceptual paper aims to bridge this research gap by providing a theoretical and systematic understanding of live-streaming tourism that will be used to develop a research agenda. The discussion focuses on three important tenets of live-streaming. Firstly, live-streaming is not merely a specific medium form of communication that creates assemblages of human and mechanic agencies [9], it also rapidly reshapes daily life, and society as a whole. Secondly, digital devices and infrastructure (e.g. live-streaming) facilitate a transcendence and fusion of boundaries, cultures and identities [15]. For example, tourists seek greater immersion into destinations through live-streaming to experience tourism destinations, rather than engagement with superficial materialities. Thirdly, building upon some insights from geographers into social practice [16], live-streaming tourism as a social practice, could be considered as a collection of filming, performing, live-streaming in travel, to stimulate social positions and identities performed [17].

Following these tenets, it is proposed that live streaming tourism can be defined as a vicarious form of sociotechnical tourism characterised by real time visual production and consumption of blended experiences. Transcending the limitations of previous works on live-streaming, this study, mobilises nuanced insights into how live-streaming is rationally assembled to produce and consume tourism destinations at every stage of tourist travel. In doing so, this paper begins by identifying what the system of live-streaming looks like, which forms the theoretical foundations for a live-streaming tourism framework. Future research ideas are discussed before presenting a conclusion.

2 Dimensions of Live-Streaming Tourism

Live broadcasting was limited traditionally to television stations. However, the era of Web 2.0 has opened access to this visual storytelling form to social media or business platforms. ‘Live-streaming’ as a medium of video and audio recording, reflecting insights of prospective or actual experiences to deeper reflective constructions and representations of experience. Initially, live-streaming was used as a tool for sharing exciting or contentious events, but in its current form is enables public broadcast of life alongside a shared channel. In an increasingly mobile world, live-streaming has become a social phenomenon appreciated for its authentic and interactive attributes. There are different types of live-streaming including such as game streaming, talent shows and life-casting. Streamers of various types attract viewers with their appearance, performance and conversations, in exchange for both mental satisfaction, self-esteem and monetary returns. Live-streaming makes a variety of content available with the click of a button [18] via adaptive media platforms and content delivery networks to distribute and deliver the serendipity [19].

Live-streaming tourism is an important development in the evolution of tourism experiences. It is argued that live-streaming allows destinations and experiences to be created, consumed and shared in ways that are fundamentally different from other visual media in tourism context (Table 1). Reflecting on Löfgren [20] conceptualisation of travel as a cultural laboratory where tourists indulge in practices of daydreaming and mind-travel, the proliferation of live-streaming creates closer synergies between travel and everyday practice [21].

Table 1. Tourism visual media comparison

	Photography	Videography	Live-streaming
Presence	Low	Medium	High
Time	Pre-recorded	Pre-recorded	Real-time/archived
Space	Virtual	Virtual	Blended
Performance	Raw/Edited	Edited	Unedited
Authenticity	Contrived	Contrived	Staged authenticity
Storytelling	Static	Scripted	Spontaneous
Social interaction	Asynchronous	Asynchronous	Synchronous

Contemporary travellers are not just on the road but also on the phone, online and on screen [22]. These emerging dynamics of visual practice renegotiate the interactions between tourists and places and establish live-streaming tourism as a travel phenomenon that is a *simultaneous, immediate, social and vicarious form of sociotechnical tourism*. These features support multisensory engagement with destinations and tourist experience before, during and after travel.

Live-streaming in tourism has evolved from several recent developments and useful insights can be gained by considering this new phenomenon from a number of different perspectives. First, the act of travelling has long been intertwined with the use of visual

media from images to videos and immersive technology. The diffusion of immersive technologies such as live-streaming offers the potential to further extend the visual representation of travel. A common goal of live-streaming applications is to transport viewers to the place that is far away from physical and geographical being to experience an environment as though it were real. Live-streaming is one manifestation of Bauman [23]'s paradox of 'modern sociality', by affording various ways of being together on the move or far apart. The feeling of 'almost being there' increases immersion and engagement and enables viewers to be virtually involved in the 'surroundings' via a digital lens. The 'transportation' of viewers can be measured by the level of presence experienced by viewers. As Diamond [24] recognises, performance art is a notoriously sensory practice, and often requires the audience to be able to smell, feel, and taste the experience.

Second, a special characteristic of live-streaming tourism is the notion of time. Time and space are important dimensions through which to conceptualise the transformation of informational capitalism. The distinctiveness of live-streaming derives from its real-time nature. In contrast to other visual media commonly used in tourism, viewers can watch what a live-streamer is doing at the tourism destination in real-time. Viewers can watch what the live-streamer is experiencing during their travels. Much like real tourism experience, production and consumption are inseparable when viewing a live stream of a tourism experience. Live streamed tourism video lacks a finite start and end time. Rather than a static file, it is a stream of data that the server passes on down the line to the browser and is often adaptive. On the other hand, live-streaming is efficient and rich in meaning, allowing viewers to share moments by curating their viewing schedule, picking and choosing the video content they want to consume from a range of publishers, networks and formats [25]. The notion of time can also be examined from the perspective of the live-streamer. As Zou [26] noted, leisure time becomes work time for live-streamers as the process of live-streaming occurs in an interactive and collaborative environment where live streamers are constantly contributing content and value. However, the real-time nature of live-streaming means that these performances cannot be edited after the performance in the same way photographers or video bloggers might select, filter and manipulate content after it is captured. These temporal differences create an opportunity for further research in a tourism context.

Third, Agger [27] proposes that the advent of smartphones creates a different mobility of time, "iTime", that fundamentally alters "the pre-internet boundaries between public and private, day and night, work and leisure". Live-streaming tourism not only brings about a technological change in communication and interaction, but an ensemble of shifting and fluid experiences in time and space. Reflecting on Oldenburg [28]'s conceptualisation of third places as informal public spaces where people engage in sociability to form and maintain communities, destinations experienced via live-streaming could be regarded as virtual or online third places. The activities organised around people nearby or joining location-based virtual groups, eventually turn all spaces into objects of social production. As Harvey and Braun [29] posit, social constructions of space and time often "changes to accommodate new material practices of social reproduction, new ways of assigning values". Bridging the real world between

live-streamer and audience to create blended spaces that enable the vicarious consumption of travel experiences therefore offers another avenue for further research.

Fourth, some live-streamers imagine themselves as online influencers and celebrities [30]. Their inner needs for self-entertainment and yearning for self-esteem are intricately intertwined with interactions, compliments from their fans (viewers) or even materialistic desires, such as virtual gifts [31]. In contrast to game streaming, live talent streaming, and life-casting streaming, touristic live-streaming can be viewed as a performing art insofar as it entails the sharing of tourism experience as daily life such as visiting heritage sites, exploring top ranked restaurants, or strolling around the city. During this process, live streamers monitor their own performance, appearance and bodily demeanour. Therefore, live-streaming tourism creates new realities as live streamers experiment with place and identity and use digital technologies as an avenue for self-expression and self-presentation [32]. In some ways, live streamers may be seen as a subculture of tech-savvy performers who are experimenting at the edge of technological innovation. Alternatively, live-streamers can be understood as emblematic of emerging forms of technology-based sociality that characterise contemporary life more generally. Existing literature dealing with identity and performativity in other contexts therefore offers a rich landscape for studying live-streaming tourism.

Fifth, and related to the third point above, live-streaming raises questions about the nature of authenticity because of the format is ultimately different from edited videos or photos. Golan and Martini [33] unedited raw feeds as one of the most distinctive features of live-streaming [34] examined theatre performances that were live streamed to cinemas and found that close-ups that showed the raw emotions of performers added an element of authenticity for lives-stream audience but at the same time the authenticity of sound in the theatre contributed to authenticity for audience members who were physically present at the theatre. In the case of live tourism streaming aspects, such as the use of camera angles capture what was happening in real-time on the ground, as well as the interactive and social environment that forms part of the touristic experience. The output of the live-streaming video, however, is not like photography or videography, where the selection and manipulation of visual frames and sound can result in content that may feel contrived. Arguably, while live streamers still exercise some discretion over what scenes to capture, the lack of post-production editing means that live streams are more likely to capture authentic events, objects, places and people [35, 36]. Following Maccannell [35], there is an opportunity to explore whether live streams are more likely than other visual media to be perceived as representations of backstage settings or perhaps as a form of staged authenticity.

Sixth, live-streaming across the tourism activities are becoming a space of storytelling. It has been recognised that as *homo narrans*, telling stories is the essential part of human nature [37]. Lambert [38] observes that storytelling plays a central role in the power of technology, consisting of text and images. More so, others like Coleman and Crang [39] point out that tourism can be demonstrated as storytelling, chatting, swapping anecdotes, and competitive tales. In other words, good storytelling contributes to 'proper pleasure', which is essential for the digital ecosystem that create

value by generating its own services, relationships, and experiences. Then this value is therefore captured directly by the community. If a live-streamer can tell a sufficiently appealing and interesting story, viewers gain additional meaning and insight [40]. In a live-streaming tourism context, a key question is whether the real-time unedited nature of the media results in storytelling that is improvised and spontaneous rather than scripted.

Finally, live-streaming tourism undermines the social identification of human interactions, as it stages and fashions a ‘performing self’. Proposed by Horton and Wohl [41], the theory of Para-social Interaction (PSI) has been used to understand the sense of mutual awareness and relationship between television personalities and viewers. Recent studies have already extended this notion from mass media into online and social media contexts [42, 43]. PSI and other theories of social interaction offer a fertile space for studying the social dimensions of live-streaming. Rather than the conventional one-way transmission of live TV, a sense of para-social interaction can be triggered in the live-streaming via two-sided communication [44]. Viewers/audiences on the streamer’s channel can comment and communicate with each other via text-based chat room functions. Viewers are drawn to the unique content of a particular stream, and enjoy interacting with and participating in the communities that are built around individual live streamers. Live stream communities form around a shared identity drawn from the stream’s content and the shared experiences of its participants. The live streamer also engages in dialogues and interactions with viewers while visiting the destination, which essentially takes the form of a virtual forum where live streamers can perform for an audience and interact with them in real time. Live-streaming is likely to facilitate hybrid or blended tourism experience whereby viewers watch the stream but are also able to participate in the experience by ‘directing’ live streamers in the destination. Recognition toward this as ‘co-presence’ [45], which has become essential for both live-streamers and viewers to have a blended experience and spaces in virtual environment and physical environment.

3 Conceptualising Live-Streaming Tourism

Contemporary travellers are not just on the road but also on the phone, online and on screen [22]. These advances tourist experience in the way that how the nature of tourism revolutionised as a process rather than a destination in the future. To facilitate the discussion, a conceptual framework is proposed in Fig. 1 to illustrate the components of the live-streaming tourism. The components of live-streaming tourism have been systematically discussed above, the proposed conceptual model developed here reflects the elements of live-streaming tourism from the perspective of live-streamers’ as well as ‘live-streaming tourists’, who play an essential role in viewing live-streaming and consuming live-streaming tourism related products. In the proposed model, particular importance is placed in blended experiences.

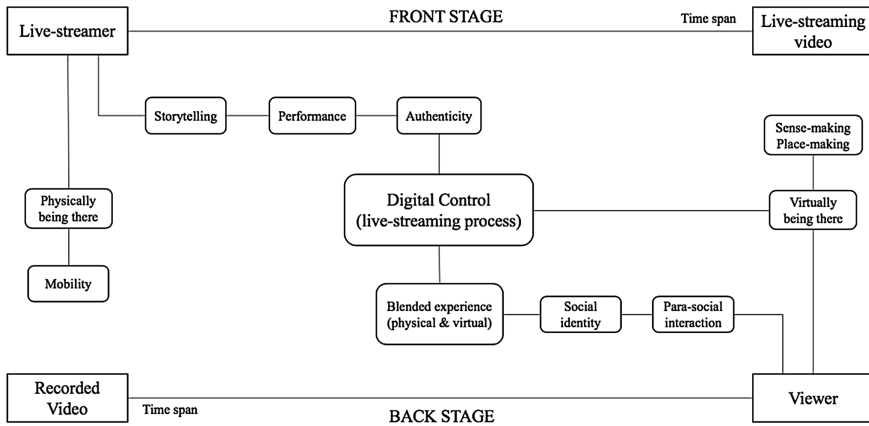


Fig. 1. Blended tourism experiencescape model (created by the authors)

Instead of being passive actors, live-streamers are powerful and influential experiential practitioners who perform an important role in the production and consumption of touristic pleasure [46]. Therefore, anthropological understandings of authenticity may be imbued with decisions about framing and staging to fit specific tourist narratives. While viewers as live-streaming tourists become active agents of “doing”, they also act as co-mediators by interacting and communicating with live-streamers in real-time. Thus, live-streaming tourists are not non-representational others, but able to absorb blended ways of seeing and engaging in day-dreaming or mind travel [21].

4 Discussion of Future Live-Streaming Tourism Research

The systematic review suggests that live-streaming tourism provides a wealth of exciting research opportunities for future research. Table 2 provides a broad, but by no means exhaustive, overview of some of the research opportunities that emerge from the discussion and conceptual framework. The table proposes research topics, conceptual foundations and broad methodological approaches for each of the aspects of live-streaming tourism explored in this paper. Empirical research is needed to test theoretical assumptions and further develop the key concepts identified in this paper. Consequently, it is not the intention here to provide a neatly framed research agenda, but rather to present a set of reflections and thoughts to display potential methods to help study those research topics.

Specifically, from the technological practice perspective, the focus on the centrality of immersive technology, such as VR or AR has shaped tourist participation in tourist experience [3] beyond other mediators (e.g. photo and video). Live-streaming differs from VR, AR, photography and videography, and future studies could examine this distinctiveness by considering aspects such as time, space or presence.

From the social practice perspective, live-streaming facilitates different social practices such as performativity, storytelling, authenticity, and para-social interaction.

Table 2. Live-streaming tourism research agenda

Aspect	Research topics	Conceptual foundation	Methodology
Immersive technology	Multisensory experience Market opportunities Sustainable tourism Tourist behaviour	Virtual presence Sense-making Sustainability	Questionnaire Interview Experimentation
Time	Visual media comparisons Work-leisure interactions Perceptions of time	iTime Leisure theories Digital elasticity	Interview Questionnaire Experimentation
Space	Blended spaces Vicarious experiences Virtual community	Hybrid servicescapes Environmental psychology Third place Place-making	Interview Scenario- Experimentation
Performativity	Online influencers Virtual gifts Performance styles Visual and auditory elements	Identity Self-presentation Self-congruity Motives Self-concept Social Representations	Interview Observation Psychophysiology Ethnography
Authenticity	Perceptions of authenticity	Staged authenticity Hyperreality/simulacra Tourist Gaze	Interview Visual autoethnography
Storytelling	Digital storytelling Storytelling styles Emotional responses	<i>Homo narrans</i> Semiotics Narrative Arcs Cognitive Appraisal Theory Flow theory	Interview Observation Narrative Analysis
Social interactions	Blended experiences Value co-creation Co-presence Audience interaction	Para-social Interaction Social Identity Theory Co-creation Theory Social facilitation	Netnography Interviews

As Hu et al. [12] noted, para-social interaction and self-congruity can affect viewers' engagement in live-streaming. Further, among these identified social aspects, authenticity has been the central for tourism research. More precisely, live-streaming tourism raises questions about authenticity. It is important to highlight that future research is needed to explore how authenticity can be constructed in live-streaming tourism. Overall, as a starting point for conceptualising live-streaming tourism, this paper reveals a wealth of potential opportunities for research or researchers in the related area of inquiry.

5 Conclusion

To sum up, live-streaming in tourism context constitutes an intriguing phenomenon of how sophisticated technologies have mobilised, aestheticised and digitalised contemporary tourist experiences, with easy access to a playfulness, immediacy, simultaneity and sociality experience via a digital lens.

This paper shed light on the conceptualisation of live-streaming phenomenon in tourism context. More precisely, this study unpacks the dimension of presence, time, space, performance, authenticity, storytelling, and social interaction of live-streaming tourism. Based on the identification of dimensions, the paper proposed the blended tourism experiencescape model to demonstrate a dynamic understanding of live-streaming tourism. As a consequence, this study emphasises the need on exploring some major research aspects and topics for further research.

References

1. Li Y, Hu C, Huang C et al (2017) The concept of smart tourism in the context of tourism information services. *Tour Manag* 58:293–300
2. Gretzel U, Sigala M, Xiang Z et al (2015) Smart tourism: foundations and developments. *Electron Mark* 25:179–188
3. Tussyadiah IP, Wang D, Jung TH et al (2018) Virtual reality, presence, and attitude change: empirical evidence from tourism. *Tour Manag* 66:140–154
4. Tussyadiah IP, Wang D, Jia CH (2017) Virtual reality and attitudes toward tourism destinations. In: *Information and communication technologies in tourism 2017*. Springer, Cham, p 229–239
5. Schegg R, Stangl B (2017) Information and communication technologies in tourism 2017. In: *Proceedings of the international conference in Rome, Italy*. Springer
6. Jung TH, Tom Dieck MC (2017) Augmented reality, virtual reality and 3D printing for the co-creation of value for the visitor experience at cultural heritage places. *J Place Manag Dev* 10:140–151
7. Tussyadiah IP, Jung TH, Tom Dieck MC (2018) Embodiment of wearable augmented reality technology in tourism experiences. *J Travel Res* 57:597–611
8. Ivanov SH, Webster C (2017) The robot as a consumer: a research agenda
9. Thorburn ED (2014) Social media, subjectivity, and surveillance: moving on from occupy, the rise of live streaming video. *Commun CritAI/Cult Stud* 11:52–63
10. Aniroh K, Hanum L, Ariyanto AaG (2018) The effectiveness of YouTube live streaming as digital learning media in tourism and guiding
11. Todd PR, Melancon J (2018) Gender and live-streaming: source credibility and motivation. *J Res Interact Mark* 12:79–93
12. Hu M, Zhang M, Wang Y (2017) Why do audiences choose to keep watching on live video streaming platforms? An explanation of dual identification framework. *Comput Hum Behav* 75:594–606
13. Lin C-Y, Chen H-S (2018) Personalized channel recommendation on live streaming platforms. *Multimed Tools Appl* 1–17
14. Burrell G, Morgan G (2017) *Sociological paradigms and organisational analysis: elements of the sociology of corporate life*. Routledge
15. Quinn R (2017) *Guns, germs & steel: the fate of human societies*. Macat Library

16. Page SJ, Hall CM (2014) *The geography of tourism and recreation: environment, place and space*. Routledge, space
17. Bærenholdt JO, Haldrup M, Urry J (2017) *Performing tourist places*. Routledge
18. Ma KJ, Xu J, Nair R et al. (2015) Method and system for live streaming video with dynamic rate adaptation. In: Google patents
19. Rubin VL, Burkell J, Quan-Haase A (2010) Everyday serendipity as described in social media. *Proc Am Soc Inf Sci Technol* 47:1–2
20. Löfgren O (2002) *On holiday: a history of vacationing*. University of California
21. Scarles C (2009) Becoming tourist: renegotiating the visual in the tourist experience. *Environ Plan D Soc Space* 27:465–488
22. Eriksson N, Fabricius S (2015) Young-elderly travellers as potential users and actual users of internet with mobile devices during trips. In: *Conference on e-Business, e-Services and e-Society*. Springer, p 24–35
23. Bauman Z (2013) *Liquid modernity*. Wiley
24. Diamond E (2015) *Performance and cultural politics*. Routledge
25. Recktenwald D (2017) Toward a transcription and analysis of live streaming on Twitch. *J Pragmat* 115:68–81
26. Zou S (2018) Producing value out of the invaluable: a critical/cultural perspective on the live streaming industry in China. *Triple C: communication, capitalism & critique*. *Open Access J Glob Sustain Inf Soc* 16:805–819
27. Agger B (2011) iTime: labor and life in a smartphone era. *Time Soc* 20:119–136
28. Oldenburg R (1997) Our vanishing third places. *Plan Comm J* 25:6–10
29. Harvey D, Braun B (1996) *Justice, nature and the geography of difference*. Blackwell, Oxford
30. Marwick AE (2013) *Status update: celebrity, publicity, and branding in the social media age*. Yale University Press, New Haven
31. Scheibe K, Fietkiewicz KJ, Stock WG (2016) Information behavior on social live streaming services. *J Inf Sci Theory Pract* 4:6–20
32. Van House NA, Davis M, Takhteyev Y et al. (2004) The social uses of personal photography: methods for projecting future imaging applications. *University of California, Berkeley, Working Papers* 3:2005
33. Golan O, Martini M (2017) Religious live-streaming: constructing the authentic in real time. *Inf Commun Soc* 1–18
34. Mueser D, Vlachos P (2018) “Almost like being there?” a conceptualisation of live-streaming theatre. *Int J Event Festiv Manag*
35. Maccannell D (1973) Staged authenticity: arrangements of social space in tourist settings. *Am J Sociol* 79:589–603
36. Tiberghien G, Bremner H, Milne S (2017) Performance and visitors’ perception of authenticity in eco-cultural tourism. *Tour Geogr* 19:287–300
37. Kellert SR (2012) *Building for life: designing and understanding the human-nature connection*. Island Press, Covelo
38. Lambert J (2013) *Digital storytelling: capturing lives, creating community*. Routledge
39. Coleman S, Crang M (2002) *Tourism: between place and performance*. Berghahn Books
40. Bosangit C, Hibbert S, McCabe S (2015) “If I was going to die I should at least be having fun”: travel blogs, meaning and tourist experience. *Ann Tour Res* 55:1–14
41. Horton D, Richard Wohl R (1956) Mass communication and para-social interaction: observations on intimacy at a distance. *Psychiatry* 19:215–229
42. Labrecque LI (2014) Fostering consumer–brand relationships in social media environments: the role of parasocial interaction. *J Interact Mark* 28:134–148

43. Chung S, Cho H (2017) Fostering parasocial relationships with celebrities on social media: implications for celebrity endorsement. *Psychol Mark* 34:481–495
44. Dibble JL, Hartmann T, Rosaen SF (2016) Parasocial interaction and parasocial relationship: conceptual clarification and a critical assessment of measures. *Hum Commun Res* 42:21–44
45. Kraut RE, Gergle D, Fussell SR (2002) The use of visual information in shared visual spaces: informing the development of virtual co-presence. In: *Proceedings of the 2002 ACM conference on Computer supported cooperative work*. ACM, pp 31–40
46. Zhao Q, Chen C-D, Cheng H-W et al (2018) Determinants of live streamers' continuance broadcasting intentions on twitch: a self-determination theory perspective. *Telemat Inform* 35:406–420

Service Robots and Service Automation



Understanding Self-service Technology in Hotels in China: Technology Affordances and Constraints

Chun Liu^(✉) and Kam Hung

School of Hotel and Tourism Management, The Hong Kong Polytechnic University, Hong Kong, Hong Kong
spring.liu@connect.polyu.hk, kam.hung@polyu.edu.hk

Abstract. Although self-service kiosks are prevalent in banks and airports, their presence in hotels is far behind. Understanding what hotels can do with self-service technology (SST) can offer valuable references for hoteliers and remedy the academic void regarding hotels' application of SST. Thereby, this research conducted four focus group discussions followed by fifteen in-depth interviews to explore the potential opportunities and how hotels would be held back when applying SST, based on Technology Affordances and Constraints Theory (TACT). The findings revealed that by applying SSTs, hotels can save cost, increase efficiency, improve hotel image and enhance customer experience. Self-service technology constraints consist of decreasing customer-to-hotel communication, requiring the ability of customer, and failing to satisfy customer needs. The availability of affordances and constraints are dynamic and related to the interaction between SSTs and hotels. The conceptual framework enriches the knowledge of SSTs and provides supports for TACT.

Keywords: Self-service technology · Hotel · Affordance · Constraint

1 Introduction

Given its advancement, technology has been the major emphasis in business improvement [1]. Service automation is regarded as one of the top ten trends in hotel technology [2]. Self-service technology (SST) is adopted to facilitate service and positively contribute to service automation by allowing customers to create a service without direct employee's involvement [3–5]. The evolution of high technologies has generated the appearance of diversified SSTs with the application at different levels of society [6]. Examples of such SSTs include self-check-in kiosks, mobile check-in applications, automatic teller machine, and automatic vending machines.

Trade press and social media posts played up innovative technologies [7]. Plausible contributions of SSTs have been reported, including saving labour and cost, heightening efficiency, decreasing variation of quality, and improving customer experience and loyalty [8–11]. These merits of technologies are valued by firm managers [12]. Although mass media speak highly of SSTs, the application of SSTs in hotels is a relatively new phenomenon, and the knowledge on it is scant [13, 14].

Given the embryonic state, this study aims to deeply explore the opportunities SSTs afford to hotels and the simultaneous downsides, under the instruction of Technology Affordances and Constraints Theory (TACT). To achieve this objective, a combined qualitative approach was employed (focus group and in-depth interview) to explore hoteliers' opinions on the affordances and constraints of SSTs for hotels. The combination of qualitative methods provides convincing, in-depth and novel insights into this issue [15]. A clear understanding of the affordances and constraints of SSTs can help hoteliers better reach the degree to which SSTs deserve investment and provide insights for decisions on service delivery channel strategy (SSTs and service employee). In addition, this study enriches existing literature on hotel SSTs and TACT. Technology Affordances and Constraints Theory is relatively new, and thus empirical studies about this theory are lacking. Majority of TACT studies are conducted from an individual perspective [16]. Therefore, this exploratory study from the standpoint of organisations (i.e., hotels) contributes to the generalisation and richness of TACT as well.

The rest of the paper is organized as follows. The theoretical background section provides the rationale for this study by critically reviewing research on TACT and the SSTs in the hospitality domain. The methodology section elaborates the study setting and data collection and analysis methods. Then, the findings are presented and discussed in the subsequent section. The final section concludes and identifies avenues for future research.

2 Theoretical Background

Technology Affordances and Constraints Theory is increasingly adopted to explain organisational technology use and consequences [16]. Technology affordance originated from the theory of affordance first coined by Gibson [17]. In Gibson's opinions, affordances are regarded as opportunities for action that the environment can afford to a creature, emphasising the relationships between the opportunities and the creature [17]. Similarly, the interaction between users and technologies can afford opportunities and hindrances for actions [18]. The concept of affordance is useful in examining what technology can do to users [19]. For example, academia has increasingly adopted theory of affordance to explore social media and information system [18–22]. *Technology affordances* refer to action potentials that technology can afford to a user with particular purposes [16, 19]. *Technology constraints* refer to ways in which technology hinders users with particular purposes [16].

The concept of affordance emphasises the dynamic interaction between technology and users, thus overcoming the limitations of theories that concentrate exclusively on psychological or social behaviour [16]. That is, affordances do not equal to technology features independent of people [23], but are related to users. In terms of approaching the analysis of affordances, usage context must be carefully considered [19], in case of exclusively focusing on either material features or social practice [23]. Specifically, how and under what circumstances are the action opportunities and potential stumbling blocks made available to users by technology should be investigated [19, 24].

Extant research highlights the reduced cost afforded by SSTs without direct employee engagement [25–27]. By contrast, the investment cost of SSTs is regarded as

a deterrent for providing self-service [9]. Affordances of service employees, including flexibility, customisation, and spontaneous delight may be lost in SST-based service encounters [28]. The pursuit of SSTs' merits seems out of alignment with significances of employee-customer service encounters to luxury hotels [13]. However, these costs are conflicting with findings of other studies and urge further exploration. For instance, flexibility, fun, and entertainment are regarded as the benefits of adopting SSTs rather than sacrifices [29, 30].

Additionally, service delivered via SSTs can be standardised [26, 27, 31], and thus, decreases deviations of service quality [11, 32]. In contrast, SSTs are criticised for sacrificing customised service [28]. Standardisation is featured by reduced time and cost, whereas the achievement of customisation sacrifices efficiency and money [33]. Customisation seems to be incompatible with reduced waiting time by SSTs [34].

Firms attach importance to using SSTs to enhance service quality and customer experience and thus to increase customers' satisfaction and loyalty, contributing to firms' return on investment [8, 25–27, 31]. Nonetheless, bad customer experience and decreased customer loyalty due to SSTs should not be neglected [11, 29].

The comprehensive review shows the conflicting views on adopting SSTs in business, in terms of the merits and costs of SSTs. Given the increasing popularity of SSTs and ambivalent opinions on their benefits and costs, it is necessary to clarify and fully understand how and when SSTs serve as contributors or inhibitors [35]. In this regard, the current study contributes to tackling conflicting opinions on the opportunities and consequences brought by SSTs through delving into how and under what circumstances are SSTs affordances/constraints made present to hotels under the guidance of TACT. The results of this study enrich the knowledge and understanding of what hotels with particular purposes can do with SSTs and thereby provide valuable and rational practical references for service firms that attempt to adopt SSTs.

3 Methodology

3.1 Study Setting: China

China is selected as the study setting due to its special situations and lacking academic research. Although the SST application in hotels in China started late, it has been developing rapidly in recent years. Technologies have been attached importance to tackling various labour issues in China such as high turnover rate and diminished labour supply [36]. For instance, a series of projects targeting self-service-based technologies and artificial intelligence has been announced including “Future Hotel”, “Future Hotel 2.0”, “WeChat Eco Hotel”, and “Easy Stay” in China since 2015. At the same time, domestic hotels such as Highxuan Spa Hotel Hangzhou, Brook Hotel and Fenglinwan Theme Hotel Sanya Phoenix Airport also indicated their attempts to adopt facial recognition check-in.

However, previous studies on hotel SSTs are conducted in USA and Australia instead of China which is distinct from western countries or other eastern countries [34, 37]. As a case in point, the Ministry of Public Security of the People's Republic of China requires hotels to upload customers' identification documents in real time with personnel checking the authentic documents with hotel guest. To some extent, this rule seems to inhibit the

application of self-check-in in China. Failure to consider the contextual factors and distinctive national culture may negatively influence customer service and hotel performance with respect to SST application [38]. For instance, in Macau, self-service kiosks had a low utilisation rate because prior testing was not conducted [30]. Furthermore, people from different regions show dissimilarities in utilising personal check-in, kiosk check-in and internet check-in [39]. Therefore, this study aims to enhance our understanding of SSTs application in hotels in China.

3.2 Focus Group

Given the lack of understanding of SSTs in hospitality and deficiency of qualitative enquires into this issue, mixed qualitative methods (focus group followed by in-depth interview) were adopted to delve SST affordances and constraints [25, 30, 40]. The trustfulness of study can be enhanced through this combined qualitative approach as a study using more than one data collection method is much more convincing than one adopting a single method [15].

Firstly, focus group discussions were conducted to deeply explore the affordances and constraints of SSTs in business practices from the perspective of hotel practitioners. Focus group discussions are good at offering opportunities for engaging participants to interact with one another and discuss a special topic (e.g., the application of SSTs in hotels) [27, 41–44]. Data were collected in Shenzhen, China in February 2017. Participants are practitioners from hotels in different cities in China.

Before the formal data collection, an initial focus group was conducted to examine the appropriateness of the discussion questions. This focus group discussion is not included in the final data analysis. Regarding the formal data collection, thirty hotel practitioners at different levels and from different departments were allocated to four groups. The average age of these participants is 36 years. The average work experience is 14 years. After a brief introduction of the research, questions focusing on the pros and cons of applying SSTs in hotels in China were discussed. With the agreement of participants, all the discussions were recorded and then transcribed [25]. The average time of discussions is 72.5 min.

3.3 In-Depth Interview

To further clarify how and when SSTs affordances and constraints occur, another fifteen hotel practitioners were invited for in-depth interviews. These fifteen in-depth interviews were conducted in December 2017, January 2018 and April 2018. These interviewees are from both international chain hotels and local hotels, with different age, gender, positions, and work experiences at the managerial level. The age of these hotel managers ranges from 28 to 56, while their work experience at the managerial level covers from 2 to more than 20 years. This variety functions as a signification that the triangulation was well done, securing the validity and reliability [25]. In-depth interviewees were encouraged to explain their opinions on the advantages and disadvantages of adopting SSTs in hotels in China in detail, providing substantial evidence for SST affordances and constraints [45]. With interviewees' agreement, all interviews were recorded and then transcribed [25]. The average time of interviews is 71.1 min.

3.4 Data Analysis

Both focus group discussions and interviews were thematically analysed. Thematic analysis was adopted due to its usefulness and its successful application in similar contexts [46]. With the help of NVivo 11, one of the authors identified four “Self-service Technology Affordances,” and three “Self-service Technology Constraints” via inductive coding. Information representing similar meanings was grouped together. During coding, codes and themes were constantly adjusted according to their similarities and differences [42]. To avoid conflicts and uncertainties, the two authors discussed the results of the data analysis of focus group discussions and in-depth interviews until reaching a consensus to ensure the reliability of the data analysis [47].

4 Findings

4.1 Self-service Technology Affordances

4.1.1 Save Cost

In light of hotel practitioners, SSTs afford opportunities for saving costs, including labour, operational and service costs by replacing human labours. The cost of employing people is much higher than using SSTs, as expressed in the statement of interviewee 3: “*Yes, it may cost a hotel 80,000 CNY per year to employ a people, while the cost of a robot is only 5000 CNY per year.*”

Although some participants expressed concerns about the investment cost and maintenance cost of SSTs, others argued that the evolution of technology would decrease these costs. Investment cost will not be a problem in the future because the cost will be dramatically discounted with the fast development of technologies, especially when SSTs gain scales. One practitioner from Group 4 explained: “*The cost of investment seems to be high presently. However, when it forms scales, the cost will be decreased.*”

Aside from the cost of SSTs, hotel age may keep hotels from using SSTs. According to practitioners, the application of SSTs should start from new hotels because old hotels need to spend considerable money to reconstruct their hardware to satisfy the requirements of SSTs application. This is evidenced in the following excerpt: “*If you ask it (hotel) to reconstruct, the cost is too high, and it is difficult to reconstruct. You can think, as long as one room is constructed, it costs money. Aside from money, it costs time. Therefore, new hotels can think about using SSTs, but it is hard for old hotels to reconstruct.*” (Interviewee 7)

4.1.2 Increase Efficiency

Practitioners emphasised the improved efficiency with SSTs. Application of high technology can simplify service delivery process and thus improve efficiency. Interviewee 4 cited ordering room service as an example to clarify the simplification brought by SSTs. In his opinion, with the room online order system, the order can be

directly sent to the kitchen, and thereby remove the involvement of service centre. An informant from Group 1 also mentioned that housekeeping departments benefit from self-check in because they can prioritise their room cleaning tasks. Therefore, they can clean these rooms in need more efficiently.

4.1.3 Improve Hotel Image

Another affordance of innovative SSTs lies in improving hotel image. In practitioners' opinions, customers would feel the sense of science and technology and regard a hotel with innovation SSTs as advanced. Interviewee 12 shared, "*some hotels have many high-tech facilities. I regard them as high-end and advanced. This is brand publicity*".

Customers are usually curious about innovative technologies in hotels. In the beginning, new SSTs can serve as selling points and appeal to customers, especially those who are keen on technology. For example, practitioners mentioned that automatic lighting allows lights to come up when customers step into the room without a room card. Such a technology is novel to customers. According to an informant from Group 1: "*I think, self-service firstly benefits marketing hotel image. I have a selling point. I have an intelligent technology*".

4.1.4 Enhance Customer Experience

Hotels also attempt to use SSTs to improve customer experience because, in their opinions, SSTs can offer customers more convenience, privacy and safety. An informant from Group 3 took Alipay, the most popular payment approach in China, as an example. The unnecessary of bringing cashes make customers feel safe. Regarding privacy, the omission of the involvement of employees helps customers to protect their privacy. A participant from Group3 stated that "*It is convenience that matters. No matter it is self-service or high technology, all are a convenience for customers. Why are there many people using Alipay? Because it brings convenience. Yes, there is no need to bring cashes. It is safe.*"

However, hotel practitioners paid attention to the lack of human touch resulting from the usage of SSTs. In their views, luxury hotels or resort hotels attaching importance to warm service should carefully think about SSTs. Interviewee 4 stated that "*I think, top-level or resort hotels still need warm service, demand human's smile, and render human care to serve customers....*".

Other informants believed that high technologies could be used to tackle repetitive, fixed and simple work. Consequently, saved labour could be allocated to concentrate on humanistic care and offer more personalised service. The liberated employees can provide more intimate services such as recommending dishes to customers, chatting with customers, and satisfying customers' immediate needs. "*In terms of the area where robots can replace human, personally, I think, for example, an intelligent cleaner can clean a whole floor by itself. Then, employees can take advantage of the saved times to serve customers. I would rather ask employees to interact with customers than having employees spending half an hour to clean room. Intelligent cleaner can save time and the saved time can be allocated to chat with customers or provide more personalised service.*" (An informant from Group 1)

4.2 Self-service Technology Constraints

4.2.1 Decrease Customer-to-Hotel Communication

The application of SSTs hinders hotels from communicating with customers via eliminating direct involvement of service employees. Respondents stated that face-to-face interaction is the most effective approach to communication in any case. The lack of direct engagement of service contact personnel leads to the absence of human touches. Although SSTs can make facial expressions, these expressions are not authentic and have not been applied in all hotels. A long time is required before SSTs can replace human's eye contact or emotional communication.

4.2.2 Requires the Ability of Customers

Hotels attempt to use SSTs to afford convenience to customers. However, SSTs demand customers' capability of mastery. Difficulties experienced when learning how to use SSTs may cost guests' time, decrease efficiency and eventually result in negative customer experience. Informants from Group 1, 3 and 4 shared their own experience to clarify the high learning cost with intelligent curtains and intelligent lighting. In their views, it is difficult for customers to find the switch and takes much time to study how to use this kind of curtains. If customers still cannot find the switch after self-learning, they are likely to turn to employees for help. In this regard, labour cost occurs rather than decreases. What's worse, such a bad experience may lead to negative user-generated contents. This finding is evidenced by the following statement: *"...like this weird design of intelligent lighting, customers commented that they are unable to find the switch, which results in negative feelings...Chinese guests, in terms of acceptance, are not so willing."* (An informant from Group 1)

Participants further clarified that the elderly possess less knowledge of SSTs than the youth. The former is likely to ask their young companions for help. If they are alone, they will not use SSTs. If they do not accept SSTs due to their ability, the purpose that hotels want to use SSTs to improve customer experience will be hindered. As interviewee 14 described: *"Maybe some people are not prepared to learn that (using mobile tablets to order dishes), like older people. If you (young people) have lunch with your grandparents, you can order for them. But when they go out by themselves, they will not go to the restaurant or using mobile tablets to order dishes."*

4.2.3 Fail to Satisfy Customers' Needs

Hotels that use SSTs may fail to satisfy customers' needs. SSTs are all standardised and thus are similar rather than personalised. When customers have instant requirements, SSTs cannot adjust themselves or satisfy customers. Customers are supposed to exert efforts to gain the service they want. For example, according to an informant from Group 3, when the room service is delivered by a robot, customers need to call service centre again if they have other questions. That is, the robot cannot receive additional orders, nor deal with customer needs instantly like a service staff. In addition, SSTs are not always accurate, and they may fail. *"This kind of intelligence, sometimes, might make mistakes. For example, it (facial recognition system for check-in) failed in recognising customer's face."* (An informant from Group 1)

5 Discussion

Advanced technology has transformed service [48]. Customers have begun to leverage technology to produce service for themselves [49]. However, the future of hotel SSTs still remains unclear [9]. Drawn from TACT, this study conducted four focuses groups followed by fifteen in-depth interviews to clarify how and under what circumstances are SSTs affordance/constraints made available to hotels. As shown in Fig. 1, hotels use SSTs to save cost, increase efficiency, improve hotel image and enhance customer experience. Self-service technology constraints include decreasing customer-to-hotel communication, requiring the ability of customer, and failing to satisfy customer needs.

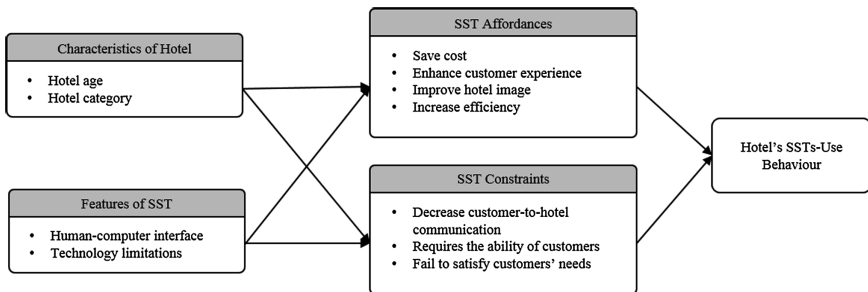


Fig. 1. Conceptual framework for SST affordances and constraints in hotels

Self-service technology affordances and constraints are related to SST features (human-computer interface and technology limitations). For example, the human-computer interface of SSTs may influence hotels in terms of satisfying customers. As mentioned by participants, the weird design of intelligent lighting disappointed hotel customers. The designers of SSTs must pay attention to simplifying the human-computer interface to allow the ordinary to utilise SSTs easily and quickly.

Self-service technology limitations, including the lack of human touch and flexibility, keep hotels from satisfying customers' needs. Service provided by SSTs are standardised and without emotional touches. Hardly can SSTs handle customers' instant demands or need for interaction, leading to bad customer experience.

Apart from SSTs features, the characteristics of hotels have influences on SST affordances and constraints. That is, new and business hotels, instead of old or resorts hotels, are more likely to achieve these affordances. Otherwise, these affordances would be transformed to constraints. For example, if a developed hotel introduces SSTs, then it will spend substantial money to reconstruct their hardware (e.g., line reconstruction). The reconstruction cost tends to surpass the money saved via reducing employees. Hence, the purpose of saving money via using SSTs fails. The dynamic relationship between hotel characteristics and SST affordances provides strong evidences for TACT that emphasises the interaction between technology and the user.

Specifically, the present research provides empirical supports for SSTs affordances and constraints available to hotels. This study clarifies how and when SSTs offer hotels

with affordances and constraints. Self-service Technology affordances and constraints are not independent of hotels. What SSTs can do for hotels are dynamic and related to hotels' characteristics. Therefore, this research handles contentions concerning SSTs application in hospitality. Previous studies disputed the cost saved via SSTs. Some researchers stated that SSTs application saves operational and labour cost [25–27], whereas others argue that cost inhibits the adoption of SSTs [9]. The findings of the present study revealed that SSTs contribute to saving labour cost and that its investment cost will decrease with its evolution.

Besides, existing studies hold distinct opinions about whether SSTs improve customer experience. The findings of this study indicate that SSTs may lead to bad customer experience due to the lack of human touches. However, if hotels use SSTs to help with accurate, fixed and repetitive work and thus to liberate some employees to focus on humanistic care and provide personalised and intimate services, then customer experience would be improved together with more convenience, privacy, and safety. This finding confirmed previous studies that suggested saved labour to concentrate on serving customers [9, 27]. Thus, whether SSTs improve, or damage customer experience lies in how hotels use SSTs and their purposes.

Although not all operations are beneficiaries of SSTs [28], merits of such technologies are valued by hotel managers [12]. Self-service technologies have endless possibilities [3]. Clarifying what hotels can do with SSTs offers valuable and practical references for hotel practitioners. The development of SSTs is too fast that hotels have difficulty in updating their knowledge timely. In this study, up-to-date and integrated information on SSTs affordances and constraints are gained through the participation of hoteliers from various hotels. The latest and integrated information enhances and updates practitioners' knowledge of SSTs timely. Armed with the comprehensive and timely knowledge of what can SSTs afford, hotels are more likely to implement SST successfully. Moreover, the availability of SSTs affordances and constraints are dynamic and related to the interaction between SSTs and hotels. Hotels should consider hotel characteristics and their purposes of using SSTs when evaluating SSTs affordances and constraints. In this sense, hotels can come up with better ideas on how to apply SSTs and are prohibited from trusting plausible media hype or investing SSTs blindly [16].

6 Conclusions

This research came up with a conceptual framework clarifying what can SSTs afford to hotels, on the basis of TACT (Fig. 1). Self-service technology affordances consist of saving cost, increasing efficiency, improving hotel image, and enhancing customer experience. Self-service technology constraints include decreasing customer-to-hotel communication, requiring the ability of customer, and failing to satisfy customers' needs. These affordances and constraints are dynamic and related to hotels. That is, affordances can be constraints depending on hotels' characteristics and purposes of using SSTs and SST features. These findings provide detailed and comprehensive knowledge of the SSTs and enhance our understanding of the role of SSTs in the service industry. Besides, these results confirm the usefulness of TACT. Exploring

SSTs application from the perspective of hotels instead of an individual viewpoint supports the generalisation and richness of TACT. This research also offers helpful references for practical application. The findings provide guidelines for hoteliers to make informed decisions on applying SST. Hotels should carefully take their dynamic interaction with SSTs into account when making decisions on applying SSTs.

Although combined qualitative methods were adopted, a quantitative study should be conducted in the future to examine the generalisation of the conceptual framework. In addition, the opinions of customers (the end users of SSTs) should be considered. It would be interesting and valuable to explore the relationship among hotels, customers and technology.

References

1. Tech breakthroughs megatrend: How to prepare for its impact. <https://www.pwc.com/gx/en/issues/technology/tech-breakthroughs-megatrend.pdf>. Accessed 26 Oct 2018
2. Trends in hotel technology. <http://www.hotelnewsnow.com/Articles/19589/10-trends-in-hotel-technology>. Accessed 26 Oct 2018
3. Meuter ML, Ostrom AL, Roundtree RI, Bitner MJ (2000) Self-service technologies: understanding customer satisfaction with technology-based service encounters. *J Mark* 64:50–64
4. Ivanov S, Webster C, Berezina K (2017) Adoption of robots and service automation by tourism and hospitality companies. In: INVTUR conference, Aveiro, Portugal
5. Scherer A, Wangenheim V, Florian (2016) Man versus machine-How the service channel affects customers' responses to service encounters. In: AMA winter educators' proceedings 2016, pp K-4–K-5
6. Kaushik AK, Agrawal AK, Rahman Z (2015) Tourist behaviour towards self-service hotel technology adoption: trust and subjective norm as key antecedents. *Tour Manag Perspect* 16:278–289
7. Ivanov S, Webster C (2017) Adoption of robots, artificial intelligence and service automation by travel, tourism and hospitality companies: a cost-benefit analysis. In: International scientific conference "contemporary tourism—traditions and innovations", Sofia University
8. Considine E, Cormican K (2016) Self-service technology adoption: an analysis of customer to technology interactions. *Procedia Comput Sci* 100:103–109
9. Kasavana ML (2008) The convergence of self-service technology. *Hospitality Upgrade Magazine*, pp 122–128
10. Oh H, Jeong M, Baloglu S (2013) Tourists' adoption of self-service technologies at resort hotels. *J Bus Res* 66:692–699
11. Selnes F, Hansen H (2001) The potential hazard of self-service in developing customer loyalty. *J Serv Res* 4:79–90
12. Karadag E, Dumanoglu S (2009) The productivity and competency of information technology in upscale hotels. *Int J Contemp Hosp Manag* 21:479–490
13. Kucukusta D, Heung V, Hui S (2014) Deploying self-service technology in luxury hotel brands: perceptions of business travelers. *J Travel Tour Mark* 31:55–70
14. Wei W, Torres E, Hua N (2016) Improving consumer commitment through the integration of self-service technologies: a transcendent consumer experience perspective. *Int J Hosp Manag* 59:105–115

15. Willis J (2007) Foundations of qualitative research: interpretive and critical approaches. SAGE, Thousand Oaks, London
16. Majchrzak A, Markus ML (2012) Technology affordances and constraints in management information systems (MIS). In: Kessler E (ed) Encyclopedia of management theory. Sage Publications, Thousand Oaks, pp 832–836
17. Gibson JJ (1979) The ecological approach to visual perception. Houghton Mifflin, Boston
18. Leidner DE, Gonzalez E, Koch H (2018) An affordance perspective of enterprise social media and organizational socialization. *J Strat Inf Syst* 27:117–138
19. Argyris YA, Monu K (2015) Corporate use of social media: technology affordance and external stakeholder relations. *J Organ Comput Electron Commer* 25:140–168
20. Leonardi PM, Vaast E (2017) Social media and their affordances for organizing: a review and agenda for research. *Acad Manag Ann* 11:150–188
21. Marabelli M, Newell S, Galliers RD (2018) Social media affordances and constraints: design, use and implications for enterprises. <https://ssrn.com/abstract=3143304>. Accessed 28 Oct 2018
22. Wang H, Wang J, Tang Q (2018) A review of application of affordance theory in information systems. *J Serv Sci Manag* 11:56–70
23. Treem JW, Leonardi PM (2016) Social media use in organizations: exploring the affordances of visibility, editability, persistence, and association. *Ann Int Commun Assoc* 36:143–189
24. Bloomfield BP, Latham Y, Vurdubakis T (2010) Bodies, technologies and action possibilities: when is an affordance? *Sociology* 44:415–433
25. Kelly P, Lawlor J, Mulvey M (2017) Customer roles in self-service technology encounters in a tourism context. *J Travel Tour Mark* 34:222–238
26. Kokkinou A, Cranage DA (2015) Why wait? Impact of waiting lines on self-service technology use. *Int J Contemp Hosp Manag* 27:1181–1197
27. Oh H, Jeong M, Lee S, Warnick R (2016) Attitudinal and situational determinants of self-service technology use. *J Hosp Tour Res* 40:236–265. <https://doi.org/10.1177/1096348013491598>
28. Ba S, Stallaert J, Zhang Z (2010) Balancing IT with the human touch: optimal investment in IT-based customer service. *Inf Syst Res* 21(3):423–442
29. Kim M, Qu H (2014) Travelers' behavioral intention toward hotel self-service kiosks usage. *Int J Contemp Hosp Manag* 26:225–245
30. Rosenbaum MS, Wong IA (2015) If you install it, will they use it? Understanding why hospitality customers take “technological pauses” from self-service technology. *J Bus Res* 68:1862–1868
31. El-Sherie TAE-F, Ghanem MS (2014) Self service technology failures and its effect on guests' behaviors: an exploratory research on self reservation technology in hotels. *Int J Herit Tour Hosp* 8:221–232
32. Mattila A (1999) Consumers value judgments: how business travelers evaluate luxury-hotel services. *Cornell Hotel Restaur Adm Q* 40:40–46
33. Wang G, Wang J, Ma X, Qiu RG (2010) The effect of standardization and customization on service satisfaction. *J Serv Sci* 2:1–23
34. Kokkinou A, Cranage DA (2013) Using self-service technology to reduce customer waiting times. *Int J Hosp Manag* 33:435–445
35. Giebelhausen M, Robinson SG, Sirianni NJ, Brady MK (2014) Touch versus tech: when technology functions as a barrier or a benefit to service encounters. *J Mark* 78:113–124
36. The lack of workforce pushes the development of industrial automation. <http://www.chinairm.com/news/20131022/090825810.html>. Accessed 28 Oct 2018. (in Chinese)
37. Beatson A, Coote LV, Rudd JM (2006) Determining consumer satisfaction and commitment through self-service technology and personal service usage. *J Mark Manag* 22:853–882

38. Fisher G, Beatson A (2002) The impact of culture on self-service on technology adoption in the hotel industry. *Int J Hosp Tour Adm* 3:59–77
39. Lu J-L, Choi JK, Tseng W-C (2011) Determinants of passengers' choice of airline check-in services: a case study of American, Australian, Korean, and Taiwanese passengers. *J Air Transp Manag* 17:249–252
40. So KKF, Oh H, Min S (2018) Motivations and constraints of Airbnb consumers: findings from a mixed-methods approach. *Tour. Manag.* 67:224–236
41. Edmunds H (1999) *The focus group research handbook*. NTC Business Books, U.S.A., Lincolnwood, Ill
42. Harding J (2013) *Qualitative data analysis from start to finish*. SAGE, London
43. Waller V, Farquharson K, Dempsey D (2016) *Qualitative social research: contemporary methods for the digital age*. SAGE, London
44. Wilkinson S (2016) Analysing focus group data. In: Silverman D (ed) *Qualitative research*, 4th edn. SAGE, London, pp 83–98
45. Veal AJ (2011) *Research methods for leisure and tourism: a practical guide*, 4th edn. Prentice Hall/Pearson, London
46. Wassler P, Li X, Hung K (2015) Hotel theming in China: a qualitative study of practitioners' views. *J Travel Tour Mark* 32:712–729
47. Jones RA (1995) *Research methods in the social and behavioral sciences*, 2nd edn. Sinauer Associates, Sunderland, Mass
48. Meuter ML, Bitner MJ, Ostrom AL, Brown SW (2005) Choosing among alternative service delivery modes: an investigation of customer trial of self-service technologies. *J Mark* 69:61–83
49. Dabholkar PA (1994) Technology-based service delivery: a classification scheme for developing marketing strategies. *Adv Serv Mark Manag* 3:241–271



Perceived Appropriateness and Intention to Use Service Robots in Tourism

Stanislav Ivanov¹(✉) and Craig Webster²

¹ Department of Tourism, Varna University of Management, Varna, Bulgaria
stanislav.ivanov@vumk.eu

² Department of Management, Ball State University, Muncie, IN, USA
cwebster3@bsu.edu

Abstract. This research investigates the ways in which customers of tourism and hospitality facilities view the appropriateness of robots in tourism-related industries. From a global sample with over 87 countries and territories represented and over 1,000 respondents, the findings illustrate that the most commonly approved of usage of robots is perceived to be information provision, housekeeping activities and processing bookings, payments and documents. Multiple regression analyses suggest that many different dimensions of robot application influence how willing potential customers are to use robots in a hospitality setting, while the best indicator of willingness to use a robot in a hospitality setting is a person's general attitude towards robots.

Keywords: Service robots · Tourism · Perceived appropriateness
Intention to use · Robonomics

1 Introduction

The International Organization for Standardization [1] defines a robot as an “actuated mechanism programmable in two or more axes with a degree of autonomy, moving within its environment, to perform intended tasks”. At present, industrial robots are widely used in manufacturing [2], agriculture [3], transportation [4], medicine [5], etc. Service and social robots are commonly used in many different fields, including education and eldercare [6–10].

While robots have been widely used in many different industries, both in terms of manufacturing/production as well as service, the implementation of robots into tourism-related industries has been rather recent, presumably because of the high level of customer service needed in the industry. With the evolution of technologies that can now react to the demands of industry, they are now increasingly being used by tourism-related industries. Here, the paper delves into perceptions of the public into the use of robots in tourism-related industries. Specifically, the paper aims to: (a) evaluate individuals' perceptions about the use of robots for implementing specific tasks and activities in travel, tourism and hospitality; and (b) how the perceived appropriateness of robots for implementing these activities influences the intentions of people to use them in a tourism setting.

The rest of the paper is organised as follows. First, the literature on the incorporation of robots into these industries is reviewed. Following the review of the literature, the paper explains the processes of data collection and analysis, discusses the findings, and draws some conclusions with regards to the ways in which the customers of travel-related industries view robots.

2 Literature Review

In just a few years, the academic literature has expanded with regards to exploring the attitudes towards robots [8, 9, 11–14]. Within travel, tourism and hospitality, research on robotics is very scarce and it tends to be driven by engineering and the design of robots [e.g. 15–17]. From a social sciences perspective, there are a few academic publications that deal directly with issues linked to the adoption of robots by travel, tourism and hospitality companies and their acceptance by consumers. For example, Murphy, Hofacker and Gretzel [18] reviewed prior studies on robotics and identified several research directions in the field of robots in tourism. In a later paper [19], the same authors investigate opportunities and challenges related to the anthropomorphism of robots in hospitality. Ivanov, Webster and Berezina [20] provide a review of the robotic and service automation technologies applied (or potentially applicable) by travel, tourism and hospitality companies, while [21] evaluates the factors that influence the successful adoption of service robots by hotels in Taiwan. Tung and Law [22] investigate the potential for tourism and hospitality experience research in human-robot interactions, further elaborated in [23]. Customers' evaluations of hotel service robots are provided in [24], while [25] assesses consumers' attitudes towards self-driving taxis. In a series of papers Ivanov and Webster [26–28] delved into issues related to robots as consumers, designing robot-friendly hospitality facilities and cost-benefit analysis in the adoption of robots by travel, tourism and hospitality companies. Perceptual differences toward humanlike service robots and humans are analysed by [29, 30].

This paper focuses on perceived appropriateness of robot use in travel, tourism and hospitality. There are only a few papers that actually evaluate which activities people consider as suitable to be delivered by robots instead of human employees in a travel, tourism or hospitality setting. Ivanov et al. [31] analyses the perceptions of young Russian adults and finds that they consider as most appropriate areas of application of robots in hotels the activities related to delivering items to guests' rooms, provision of information about the hotel and the destination and processing payments. The results are similar to the findings of [32] for the context of Iranian tourists, who consider cleaning, moving items, provision of information, taking customer orders, and processing payments as most appropriate activities for robotisation while activities like robotic guards or massages received less support. However, these two studies do not investigate the relationship between respondents' perceived appropriateness of robot use and the intention to use robots. Within the Technology Acceptance Model [33] and the UTAUT2 [34] the intention to use particular technology depends directly or indirectly on attitudes towards use, its perceived usefulness, ease of use, social influence, hedonic motivation, price value, habit. However, one could argue that if a person

considers that an activity is suitable for robotisation, he/she will use the robot that delivers the service.

The current paper builds on these two studies [31, 32] in three ways: (a) it expands the scope of analysed activities with potential for robotisation; (b) widens the geographic coverage of the sample, and (c) evaluates the relationship between respondents' perceived appropriateness of robot use and their intentions to use robots. The other factors that influence the use intentions go beyond the scope of the paper and will be subject to future research.

3 Methodology

This paper presents part of the initial findings of a global large-scale longitudinal research project on people's attitudes towards the use of service robots in travel, tourism and hospitality. Data were collected via an online questionnaire. The first version of the questionnaire was checked by six experts in information technology/robotics in tourism. After the necessary amendments a pilot testing of the questionnaire was implemented with 43 respondents to ensure the comprehensibility of the questions and determine the time necessary to complete the questionnaire. The final version was translated into 12 languages and distributed via email and social media. The sample used in this paper consists of the first 1003 responses collected by 7th September 2018 and its characteristics are presented in Table 1.

Table 1. Sample characteristics

Characteristic	N	%	Characteristic	N	%
<i>Gender</i>			<i>Education</i>		
Male	439	43.8	High school or less	125	12.5
Female	564	56.2	2 year/Associate degree	66	6.6
<i>Country of residence</i>			Bachelor	283	28.2
USA	281	28.1	Master	313	31.2
Bulgaria	280	28.0	Doctorate	216	21.5
UK	43	4.3	<i>Age</i>		
Turkey	29	2.9	18–30	466	46.5
Portugal	23	2.3	31–40	257	25.6
Russian Federation	19	1.9	41–50	152	15.2
India	15	1.5	51–60	79	7.9
Spain	15	1.5	61–70	42	4.2
France	14	1.4	71+	7	0.7
Brazil	13	1.3	<i>Tourism experience (times stayed in hotels during the last 12 months)</i>		
Other (77 countries and territories)	268	26.8			
<i>Occupation</i>					
Travel, tourism and hospitality industry	115	11.5	0	83	8.2
Tourism/hospitality education	159	15.8	1–3	471	47.0
Robotics (education/research/industry)	22	22.2	4–6	249	24.9
Other	701	70.0	7+	192	19.1
Not specified	6	0.5	Not specified	8	0.8
Total	1003	100		1003	100

The questionnaire included several blocks of questions regarding respondents' demographic characteristics, their level of agreement (measured with 7-point Likert scale from 1-completely disagree to 7-completely agree) with different statements about their attitudes towards robots and use intentions. One block was dedicated to the perceived appropriateness of the use of robots for implementing various tasks/activities within the travel, tourism and hospitality industries (hotels, restaurants and bars, travel agencies and tourist information centres, theme parks, events, museums and galleries, rent-a-car, airplanes/buses/trains, airports and other transport stations). A 7-point scale was used to measure perceived appropriateness. The current paper reports the findings from this block of questions. Considering the exploratory nature of this study, data were analysed through exploratory factor analysis. Regression analysis was used to model the relationships between the identified factors and the intentions to use robots in travel, tourism and hospitality.

4 Results and Discussion

Table 2 presents the main findings regarding the perceived appropriateness of use of robots for implementing various activities/tasks in different travel, tourism and hospitality industries. Results clearly indicate that respondents support the use of robots for the provision of information, housekeeping activities or for processing bookings, payments and documents (all means were greater than 5 on a 7-point scale). On the other hand, provision of personal services (like babysitting or hairdressing) were considered as least suitable areas of application for robots (all means in that groups were below the middle value of 4). It is interesting to note that most of the activities connected to entertainment have much lower perceived appropriateness compared to activities related to information provision or housekeeping (all Wilcoxon signed ranks test z-values are significant at $p < 0.001$). It seems that respondents accept robots to be used for information processing activities which computers and self-service kiosks already do and people are used to them (e.g. information provision, or processing bookings, documents and payments) or 3D (dirty, dull and dangerous) housekeeping tasks. These same activities do not require much human involvement in their delivery by a robot. At the same time, activities that require more complex human-robot interaction and greater human involvement (like entertainment) or the person is required to temporarily subordinate his/her body to a robot (e.g. massages, babysitting or hairdressing) were not considered as acceptable. These findings are similar to the results reported for young Russian adults [31] and Iranian tourists [32]. The exploratory factor analysis revealed that the activities could be collapsed into eight factors: *Information provision, Housekeeping, Food, beverages and guidance, Robot autonomy, Personal services, Entertainment, Booking, payments and documentation, and First and last impression*. These factors explain 67.666% of the variance in respondents' answers. Cronbach's alpha is above 0.8 for each factor.

Table 2. Exploratory factor analysis results – appropriateness of robot application in various activities in travel, tourism and hospitality industries

	Mean	Standard deviation	Factor loading	Cronbach's Alpha	Eigenvalue	Variance explained
<i>Factor 1: Information provision</i>				0.962	34.263	43.926%
TS > Provision of information about ticket prices/fees	5.88	1.449	0.806			
TS > Provision of information about departures/arrivals	5.95	1.403	0.796			
TS > Provision of information about seat/berth availability	5.88	1.406	0.793			
ABT > Providing information about the trip/flight/route	5.77	1.517	0.781			
ABT > Providing information about the vehicle	5.76	1.494	0.772			
E > Providing information about the event	5.55	1.585	0.756			
TS > Provision of information about special legal regulations, visa formalities, etc.	5.54	1.655	0.752			
MG > Providing information about the exhibits	5.59	1.640	0.735			
ABT > Providing information about the safety and security procedures and regulations on board	5.71	1.540	0.693			
TA > Provision of information about the offers (in the office of the agency/TIC)	5.22	1.732	0.674			
A > Providing information about facilities of the hotel/restaurant/theme park/airport/bus station/train station, etc.	5.63	1.558	0.662			
A > Providing information about the destination	5.61	1.560	0.623			
FB > Providing information about the menu	5.14	1.868	0.564			
FB > Taking orders for room service	5.42	1.673	0.528			
ABT > Check-in (e.g. at airports)	5.41	1.747	0.516			
<i>Factor 2: Housekeeping</i>				0.949	4.854	6.223%
A > Garbage collection	5.86	1.475	0.740			
A > Cleaning the common areas of the hotel/theme park/airport/restaurant etc.	5.79	1.481	0.719			
H > Laundry service	5.63	1.538	0.704			
H > Cleaning the room	5.23	1.758	0.697			
H > Ironing service	5.24	1.727	0.691			
ABT > Cleaning the vehicle/vessel/aircraft	5.61	1.582	0.681			
H > Delivering new towels, linen, etc.	5.59	1.637	0.680			
A > Luggage carrying in hotels/airports etc.	5.72	1.556	0.673			
RC > Cleaning the vehicles	5.69	1.514	0.654			
H > Delivering ready laundry	5.66	1.571	0.653			
A > Providing gardening services	5.11	1.718	0.643			
FB > Cleaning the table	5.24	1.808	0.602			
A > Luggage storage in hotels/airports etc.	5.63	1.573	0.581			
A > Providing repair and maintenance in a facility	5.02	1.766	0.547			
<i>Factor 3: Food, beverages and guidance</i>				0.962	3.867	4.958
E > Serving food during the event	4.66	1.953	0.730			
ABT > Serving food on board	4.77	1.936	0.717			
ABT > Serving drinks on board	4.76	1.941	0.709			
E > Serving drinks during the event	4.71	1.949	0.708			
FB > Serving food in the restaurant	4.46	1.999	0.677			
FB > Serving drinks in the restaurant/bar	4.43	2.010	0.661			
FB > Guiding guests to tables in the restaurant	4.80	1.967	0.657			
FB > Delivering food and drinks in room service	5.16	1.876	0.624			
E > Guiding the participants to their seats	5.01	1.869	0.622			
ABT > Guiding the passenger to the seat	5.08	1.819	0.621			
H > Guiding to the room	4.87	1.899	0.543			
<i>Factor 4: Robot autonomy</i>				0.915	3.267	4.188%
ABT > Self-driving buses	4.04	2.124	0.776			
RC > Self-driving cars	4.61	1.961	0.758			
ABT > Self-driving trains	4.42	2.090	0.744			
ABT > Self-driving vessels (e.g. ships, cruise ships)	3.96	2.099	0.727			
RC > The car goes to a gas station/charging station automatically when fuel tank/battery is below a specific limit	4.87	1.873	0.620			

(continued)

Table 2. (continued)

	Mean	Standard deviation	Factor loading	Cronbach's Alpha	Eigenvalue	Variance explained
RC > The car is opened and started by access code received with the booking (no physical key)	5.27	1.700	0.577			
TP > Automation of rides	4.77	1.832	0.563			
TP > Robotic control of the rides	4.54	1.904	0.559			
RC > Robotic car key delivery	5.36	1.712	0.526			
<i>Factor 5: Personal services</i>				0.834	2.270	2.910%
H > Hairdressing	2.98	1.846	0.701			
H > Babysitting	2.39	1.791	0.677			
FB > Cooking food	3.66	1.997	0.627			
A > Serve as guards/security	3.80	2.002	0.549			
A > Helping tourists/guests/passengers in case of emergency	3.92	2.035	0.535			
<i>Factor 6: Entertainment</i>				0.896	1.758	2.254%
E > Serve as robot-entertainers/show participants (events)	4.45	1.951	0.758			
TP > Serve as robot-entertainers/show participants (theme parks)	4.46	1.930	0.749			
H > Entertaining the guests (hotel)	4.32	1.973	0.686			
H > Playing games with the guests	4.35	1.985	0.666			
H > Dancing with guests	3.24	1.973	0.578			
<i>Factor 7: Bookings, payments and documentation</i>				0.890	1.350	1.731%
A > Processing credit card and debit card payments	5.50	1.675	0.772			
A > Issuing payment documents (e.g. invoice, receipt)	5.55	1.615	0.771			
A > Processing cash payments	5.33	1.708	0.708			
A > Issuing travel documents (e.g. voucher, tickets)	5.46	1.634	0.671			
A > Booking tourist services (e.g. flight tickets, hotel accommodation, transfers, rent-a-car, travel insurance, etc.)	5.27	1.745	0.558			
<i>Factor 8: First and last impression</i>				0.814	1.151	1.475%
A > Welcoming/greeting a tourist/guest/passenger	4.35	2.042	0.532			
A > Accompanying the guest when leaving the hotel/restaurant/theme park etc.	4.14	1.954	0.531			
Total variance extracted						67.666%

Notes: (a) Coding: 1-completely inappropriate, 7-completely appropriate; (b) Extraction method: Principal Component Analysis; (c) Rotation method: Varimax with Kaiser Normalization. (d) KMO Measure of Sampling Adequacy = 0.978; Bartlett's Test of Sphericity: $\chi^2 = 65173.027$, $df = 3003$, $p = 0.000$. (e) Industry abbreviations: A-all travel, tourism and hospitality industries, H-hotels (including Reception, Housekeeping and Additional services), FB-Hotel > Food and beverages/Restaurants and bars, E-events, RC-rent-a-car, TA-travel agencies and tourist information centres, TP-theme parks, TS-airports and other transport stations, ABT-airplanes/buses/trains, MG-museums and galleries.

Table 3 presents the results of the exploratory factor analysis for the statements that form the Use intention variable. The Cronbach's alpha value (0.932) showed that the scale is reliable and the single extracted factor explains over 83% of the variance in the four statements in the scale. Tables 4 and 5 present the regression model results. In Table 4 the intention to use service robots in tourism was modelled as a function of the eight factors of perceived appropriateness, while the model in Table 5 adds some demographic control variables and the respondents' attitudes towards the use of service robots in tourism. Both models have very high explanatory power and explain 56.9% (Model 1) and 65.6% (Model 2) of the dependent variable. The tolerance (all values are above 0.1) and VIF (all values are below 10) statistics indicate that no multicollinearity is observed. Results of both models clearly show that the perceived appropriateness of robot use is positively and significantly related to the intention to use robots. Therefore, higher perceived appropriateness of robot use for implementing various activities in a

tourism setting is associated to higher intentions to use the robots. None of the demographic variables and the tourism experience seem to be connected to robot use intentions. On the other hand, the personal attitude toward service robots in tourism is significantly and positively associated to robot use intentions, i.e. respondents with more positive attitudes were more inclined to use robots.

Table 3. Exploratory factor analysis – use intention

	Factor loading	Cronbach's alpha	Eigenvalue	Variance explained
<i>Factor: Use intention</i>		0.932	3.320	83.006%
I intend to use service robots	0.928			
I will be willing to recommend that others use service robots	0.915			
I will frequently use service robots	0.903			
I will be willing to use service robots	0.898			
Total variance extracted				83.006%

Notes: (a) Coding: 1-completely disagree, 7-completely agree; (b) Extraction method: Principal Component Analysis; (c) Rotation method: Varimax with Kaiser Normalization. (d) KMO Measure of Sampling Adequacy = 0.862; Bartlett's Test of Sphericity: $\chi^2 = 3979.963$, $df = 6$, $p = 0.000$.

Table 4. Regression analysis results (Model 1)

Dependent variable: <i>Use intention</i> Independent variables	Model 1					
	Unstandardized coefficients		Standardized coefficients	t	Collinearity statistics	
	B	Std. Error	Beta		Tolerance	VIF
(Constant)	0.003	0.023		0.135		
F1: Information provision	0.344	0.022	0.341	15.281***	1.000	1.000
F2: Housekeeping	0.206	0.023	0.204	9.139***	1.000	1.000
F3: Food, beverages and guidance	0.319	0.023	0.312	14.005***	1.000	1.000
F4: Robot autonomy	0.303	0.023	0.298	13.357***	1.000	1.000
F5: Personal services	0.230	0.023	0.227	10.192***	1.000	1.000
F6: Entertainment	0.255	0.023	0.253	11.332***	1.000	1.000
F7: Bookings, payments and documentation	0.271	0.023	0.268	12.015***	1.000	1.000
F8: First and last impression	0.192	0.023	0.189	8.494***	1.000	1.000
<i>Model summary characteristics</i>						
R	0.757			df	8	
R2	0.573			N	867	
Adjusted R2	0.569			F	144.336***	
Standard error of the estimate	0.66541					

Notes: Levels of significance: *** $p < 0.001$

Table 5. Regression analysis results (Model 2)

Dependent variable: <i>Use intention</i> Independent variables	Model 2					
	Unstandardized coefficients		Standardized coefficients	t	Collinearity statistics	
	B	Std. Error	Beta		Tolerance	VIF
(Constant)	-1.280	0.127		-10.086***		
F1: Information provision	0.234	0.021	0.232	10.906***	0.880	1.136
F2: Housekeeping	0.142	0.021	0.140	6.820***	0.936	1.069
F3: Food, beverages and guidance	0.220	0.022	0.215	10.063***	0.868	1.151
F4: Robot autonomy	0.190	0.022	0.187	8.540***	0.829	1.206
F5: Personal services	0.152	0.021	0.150	7.175***	0.909	1.100
F6: Entertainment	0.185	0.021	0.183	8.917***	0.939	1.065
F7: Bookings, payments and documentation	0.191	0.021	0.189	9.098***	0.925	1.081
F8: First and last impression	0.102	0.021	0.100	4.816***	0.912	1.096
Personal attitude towards robots in tourism	0.235	0.016	0.388	14.729***	0.571	1.750
Gender	0.008	0.043	0.004	0.177	0.897	1.114
Age	0.003	0.002	0.034	1.526	0.797	1.255
Education	0.005	0.018	0.007	0.305	0.811	1.233
Tourism experience	0.005	0.008	0.012	0.562	0.907	1.103
<i>Model summary characteristics</i>						
R	0.813			df	13	
R2	0.661			N	867	
Adjusted R2	0.656			F	128.001***	
Standard error of the estimate	0.59506					

Notes: Levels of significance: *** p < 0.001

5 Conclusion

5.1 Contribution

This paper contributed to the body of knowledge by identifying the activities which (potential) tourists consider as appropriate to be delivered by robots. The factor analysis showed that these activities can be grouped into eight groups regardless of the travel, tourism and hospitality industry these activities refer to. Information provision, housekeeping activities and processing bookings, payments and documents were considered as most appropriate areas of robot application. Finally, the paper revealed that the perceived appropriateness of robot application is positively associated to the robot use intentions as is a generally positive attitude towards the use of robots.

5.2 Managerial Implications

From a managerial perspective, the findings indicate the activities/tasks that customers perceive as most appropriate for robotisation. These are the activities that would face the least resistance from customers if/when travel, tourism and hospitality companies

decide to introduce robotic technologies in their service operations. Moreover, the activities within the groups *Information provision*, *Housekeeping activities*, *Processing bookings, payments and documents*, *Food, beverages and guidance* seem to be easiest to automate because they would step on currently existing technologies [20]. Tourist companies already use self-service kiosks for provision of information or check-in and baggage drop-off at airports [20] and moving to mobile interactive robots looks like the next natural step in automation. In fact, most of the commercial service robots currently on the market deal with information provision (e.g. in hotels, restaurants, museums) and delivering items (e.g. for room service in hotels, food/drinks in restaurants). Although entertainment activities had mostly neutral acceptance, they could serve as a good way to familiarise tourists with the potential of robots to improve their tourist experience.

Of course, not all activities that can be automated, should be automated. Companies need to consider that some customers may not be willing to use robots and may prefer the ‘high touch’ services of human employees instead of the ‘high tech’ robot-delivered services [35] as prior studies have shown [32]. This might be the explanation why the robotisation of personal services (like babysitting and hairdressing) received resistance by respondents in our survey. Nevertheless, in time, with the wider use of robots by travel, tourism and hospitality companies and their improved technological characteristics and interaction skill, tourists will become accustomed to robots which could have a positive influence on their acceptance of robot-delivered services.

5.3 Limitations and Future Research Directions

There are several limitations of this paper. First, although respondents are from 87 countries and territories, half of respondents come from the home countries of the two co-authors. As this paper is part of an ongoing research project, data collection continued after the time of writing of the paper (September 2018) through different channels in order to achieve a much larger and more diverse sample (especially in terms of country of residence and education of respondents). Second, it should be noted that the use intentions depend on many other factors besides the attitudes and perceived appropriateness [33, 34]. The goal of Tables 4 and 5 was not to provide explanation about the factors that influence robot use intentions, but to assess the relationship between perceived appropriateness and intentions to use robots. Therefore, findings need to be viewed in this context only.

Future research may use SEM and shed light to different aspects of people’s attitudes towards robots – acceptance of robots (based on TAM, UTAUT2 or other models), evaluation of people’s intentions to use service robots and the factors that influence it, analysis of actual human-robot interaction, assessment of the role of current work experience (e.g. tourism industry professionals and educators, robotics professionals and educators) on perceived appropriateness of robot use in a tourism setting. Research can also focus on the national/cultural differences in people’s attitudes towards robots in tourism. Finally, research could be expanded into tourism supply and elaborate on managers’ readiness to use robots as compliments or substitutes of human employees.

Acknowledgements. The authors would like to thank Ulrike Gretzel, Katerina Berezina, Iis Tussyadiah, Jamie Murphy, Dimitrios Buhalis and Cihan Cobanoglu for their valuable comments on the initial drafts of the questionnaire. The authors also thank Sofia Yanko, Katerina Berezina, Nadia Malenkina, Raul Fernandez Martin, Antoaneta Topalova, Florian Aubke, Nedra Bahri, Frederic Dimanche, Rosanna Leung, Kwang-ho Lee, Minako Okada, Isa Veira, Jean Max Tavares, Seden Dogan and Isabella Ye for devoting their time and effort into the translation of the questionnaire.

References

1. International organization for standardization (2012) ISO 8373:2012(en) Robots and robotic devices—vocabulary. <https://www.iso.org/obp/ui/#iso:std:iso:8373:ed-2:v1:en:term:2.2>. Accessed 11 Sept 2018
2. Pires JN (2007) Industrial robots programming: building applications for the factories of the future. Springer, New York. <https://doi.org/10.1007/b101252>
3. Driessen C, Heutinck LFM (2015) Cows desiring to be milked? Milking robots and the co-evolution of ethics and technology on Dutch dairy farms. *Agric Hum Values* 32(1):3–20. <https://doi.org/10.1007/s10460-014-9515-5>
4. Maurer M, Gerdes JC, Lenz B, Winner H (eds) (2016) Autonomous driving: technical, legal and social aspects. Springer Open, Heidelberg. <https://doi.org/10.1007/978-3-662-48847-8>
5. Schommer E, Patel VR, Mouraviev V, Thomas C, Thiel DD (2017) Diffusion of robotic technology into urologic practice has led to improved resident physician robotic skills. *J Surg Educ* 74(1):55–60. <https://doi.org/10.1016/j.jsurg.2016.06.006>
6. Agah A, Cabibihan JJ, Howard A, Salichs MA, He H (eds) (2016) Social robotics. In: Proceedings of the 8th International conference, ICSR 2016, vol 9979, Kansas City, MO, USA, 1–3 November 2016. Springer. <https://doi.org/10.1007/978-3-319-47437-3>
7. Ferreira MIA, Sequeira JS, Tokhi MO, Kadar E, Virk GS (Eds.) (2017) A world with robots. In: International conference on robot ethics: ICRE 2015, vol 84. Springer. <https://doi.org/10.1007/978-3-319-46667-5>
8. Hudson J, Orviska M, Hunady J (2017) People’s attitudes to robots in caring for the elderly. *Int J Social Robot* 9(2):199–210. <https://doi.org/10.1007/s12369-016-0384-5>
9. Reich-Stiebert N, Eyssel F (2015) Learning with educational companion robots? Toward attitudes on education robots, predictors of attitudes, and application potentials for education robots. *Int J Social Robot* 7(5):875–888. <https://doi.org/10.1007/s12369-015-0308-9>
10. Wirtz J et al. (2018) Brave new world: service robots in the frontline. *J Serv Manag* 29(5) (in press). <https://doi.org/10.1108/josm-04-2018-0119>
11. De Graaf MMA, Allouch SB, Klamer T (2015) Sharing a life with Harvey: exploring the acceptance of and relationship-building with a social robot. *Comput Hum Behav* 43:1–14. <https://doi.org/10.1016/j.chb.2014.10.030>
12. Dinet J, Vivian R (2014) Exploratory investigation of attitudes towards assistive robots for future users. *Le Trav Hum* 77(2):105–125. <https://doi.org/10.3917/th.772.0105>
13. Pino M, Boulay M, Jouen F, Rigaud A-S (2015) Are we ready for robots that care for us? Attitudes and opinions of older adults toward socially assistive robots. *Front Aging Neurosci* 7, Article 141. <https://doi.org/10.3389/fnagi.2015.00141>
14. Pochwatko G, Giger J-C, Różańska-Walczuk M, Świdrak J, Kukiełka K, Możaryn J, Piçarra N (2015) Polish version of the negative attitude toward robots scale (NARS-PL). *J Autom Mob Robot Intell Syst* 9(3):65–72. https://doi.org/10.14313/JAMRIS_3-2015/25

15. Acosta L, González E, Rodríguez JN, Hamilton AF (2006) Design and implementation of a service robot for a restaurant. *Int J Robot Autom* 21(4):273–280. <https://doi.org/10.2316/Journal.206.2006.4.206-2909>
16. López J, Pérez D, Zalama E, Gómez-García-Bermejo J (2013) Bellbot-a hotel assistant system using mobile robots. *Int J Adv Rob Syst* 10(1):40. <https://doi.org/10.5772/54954>
17. Pinillos R, Marcos S, Feliz R, Zalama E, Gómez-García-Bermejo J (2016) Long-term assessment of a service robot in a hotel environment. *Robot Auton Syst* 79:40–57. <https://doi.org/10.1016/j.robot.2016.01.014>
18. Murphy J, Hofacker C, Gretzel U (2017) Dawning of the age of robots in hospitality and tourism: challenges for teaching and research. *Eur J Tour Res* 15:104–111
19. Murphy J, Gretzel U, Hofacker C (2017) Service robots in hospitality and tourism: investigating anthropomorphism. Paper presented at the 15th APacCHRIE conference, 31 May–2 June 2017, Bali, Indonesia. http://heli.edu.au/wp-content/uploads/2017/06/APacCHRIE2017_Service-Robots_paper-200.pdf. Access 02 Dec 2017
20. Ivanov S, Webster C, Berezina K (2017) Adoption of robots and service automation by tourism and hospitality companies. *Rev Tur Desenvolv* 27(28):1501–1517
21. Kuo C-M, Chen L-C, Tseng C-Y (2017) Investigating an innovative service with hospitality robots. *Int J Contemp Hosp Manag* 29(5):1305–1321. <https://doi.org/10.1108/IJCHM-08-2015-0414>
22. Tung VWS, Law R (2017) The potential for tourism and hospitality experience research in human-robot interactions. *Int J Contemp Hosp Manag* 29(10):2498–2513. <https://doi.org/10.1108/IJCHM-09-2016-0520>
23. Tung VWS, Au N (2018) Exploring customer experiences with robotics in hospitality. *Int J Contemp Hosp Manag* (in press). <https://doi.org/10.1108/IJCHM-06-2017-0322>
24. Tussyadiah IP, Park S (2018) Consumer evaluation of hotel service robots. In: Stangl B, Pesonen J (eds) *Information and communication technologies in tourism 2018*. Springer, Cham, pp 308–320. https://doi.org/10.1007/978-3-319-72923-7_24
25. Tussyadiah IP, Zach FK Wang J (2017) Attitudes toward autonomous on demand mobility system: the case of self-driving taxi. In: Schegg R, Strangl B (eds) *Information and communication technologies in tourism 2017*, pp 755–766. https://doi.org/10.1007/978-3-319-51168-9_54
26. Ivanov S, Webster C (2017) The robot as a consumer: a research agenda. In: *Proceedings of the “marketing: experience and perspectives” conference*, 29–30 June 2017, University of Economics-Varna, Bulgaria, pp. 71–79
27. Ivanov S, Webster C (2017) Designing robot-friendly hospitality facilities. In: *Proceedings of the scientific conference “Tourism. Innovations. Strategies”*, 13–14 October 2017, Bourgas, Bulgaria, pp 74–81
28. Ivanov S, Webster C (2018) Adoption of robots, artificial intelligence and service automation by travel, tourism and hospitality companies—a cost-benefit analysis. In: Marinov V, Vodenska M, Assenova M, Dogramadjieva E (eds) *Traditions and innovations in contemporary tourism*. Scholars Publishing, Cambridge, pp 190–203
29. Yu, C-E (2018) Perceptual differences toward humanlike robots and humans in service: individualist versus collectivist cultures. In: Mauer C, Neuhofer B (eds) *ISCONTOUR 2018 tourism research perspectives: proceedings of the international student conference in tourism research*, pp 323–332)
30. Yu, C-E (2018) Humanlike robot and human staff in service: age and gender differences in perceiving smiling behaviors. In: *Proceedings of the 7th international conference on industrial technology and management (ICITM 2018)*. IEEE, pp 99–103. <https://doi.org/10.1109/icitm.2018.8333927>

31. Ivanov S, Webster C, Garenko A (2018) Young Russian adults' attitudes towards the potential use of robots in hotels. *Technology in Society* (forthcoming). <https://doi.org/10.1016/j.techsoc.2018.06.004>
32. Ivanov S, Webster C, Seyyedi P (2018) Consumers' attitudes towards the introduction of robots in accommodation establishments. *Tourism* 63(3):302–317
33. Davis FD (1989) Perceived usefulness, perceived ease of use, and user acceptance of information technology. *Manag Inf Syst Q* 13(3):319–340. <https://doi.org/10.2307/249008>
34. Venkatesh V, Thong JY, Xu X (2012) Consumer acceptance and use of information technology: extending the unified theory of acceptance and use of technology. *MIS Q* 36(1):157–178
35. Naisbitt J, Naisbitt D, Philips D (2001) *High tech high touch: technology and our accelerated search for meaning*. Nicolas Brealey Publishing, London



What Should Robots Do? A Comparative Analysis of Industry Professionals, Educators and Tourists

Stanislav Ivanov^{1(✉)} and Craig Webster²

¹ Department of Tourism, Varna University of Management, Varna, Bulgaria
stanislav.ivanov@vumk.eu

² Department of Management, Ball State University, Muncie, USA
cwebster3@bsu.edu

Abstract. While robots have been used extensively for many years in manufacturing, many robots are fairly new arrivals in tourism-related industries. This paper delves into how the general public and stakeholders in the travel, tourism and hospitality industries view the incorporation of robots into tourism-related industries. Based upon a sample of over 1,000 respondents to an international online survey, it analyses which tasks are deemed as most appropriate for being delegated to a robot. In addition, it segments the respondents to determine whether the professions of those responding view the delegation of tasks to robots differently. The results indicate that in general, the occupation of respondents did not seem to play a significant role in perceptions of which tasks are most appropriate for robots in tourism-related industries, although respondents employed in robotics seem to be more receptive towards robots, while tourism educators – more pessimistic.

Keywords: Service robots · Tourism · Perceived appropriateness
Service automation · Robonomics

1 Introduction

The robot, as a concept, was introduced back in 1920 by Karel Čapek [1], although it took several decades for industry to respond with the first company to produce a robot, Unimation, founded in 1956 [2]. While robots continue to enter into our lives in many different ways [3–5], the introduction of robots into tourism-related industries have lagged somewhat, relative to many other industries. For example, as early as the 1980s, automobile manufacturers were investing billions of dollars into robots to automate many basic tasks in their factories [6]. By comparison, robots have only very recently started to be used widely in tourism-related industries although they seem to be used not in many interesting and useful ways [7]. The nature of the workplace and the tasks to be performed in tourism-related industry have a very different nature than many of the tasks done in manufacturing, meaning that more sophisticated and varied types of robots are needed to respond to complicated customer questions and needs. However, as technology has advanced, tourism-related industries have begun to consider using robots, reaching a pinnacle with the Henn-na Hotel in Japan opening in 2015 and

operating using mostly robotic labour (<http://www.h-n-h.jp/en/>). This raises the necessity to identify the areas of application of robotic technologies in tourism that will receive greatest acceptance by tourists. Furthermore, it needs to be acknowledged that not all users of robotic technologies in tourism come from the same perspective – some have vested interest in implementing robotics technologies (e.g. the working in robotics companies) and some may consider robots as competitors in the workplace (employees in travel, tourism and hospitality companies). Therefore, this paper seeks to answer the following two important research questions:

RQ1: Which travel, tourism and hospitality activities are considered by tourists as most appropriate for robotization?

RQ2: Does a respondents' occupation influence their perceptions about the use of robots in a tourism setting?

2 Literature Review

Engineering research in the field of service robots for travel, tourism and hospitality has been quite extensive. Studies deal with service robots in restaurants [8–10] and bars [11], hotel room service [12], hotel bellboys [13, 14], concierge robot [15], robots for information provision and guidance at train stations [16, 17] and airports [18], tour guides in museums [19], mobile robots for surveillance at airports and other public areas [20], cleaning robots at airports [21], and dancing robots for events [22], among others. The review of engineering research on tourism/hospitality robot design reveals that, besides general robotics topics such as robot autonomy, mobility, navigation, and face/object recognition, researchers focus on robotization of activities related mostly to providing information to users, delivering items and cleaning. These activities in travel, tourism and hospitality companies seem easiest to automate – they are routine and repetitive, do not require much involvement by the human employees who do them and, in the context of cleaning, human employees prefer not to do them.

In addition to the engineering literature on robot design, there are numerous studies on people's attitudes towards robots [see, for example, 23–29], including robots in travel, tourism and hospitality context [30–33]. However, despite the growing research in robotics in travel, tourism and hospitality [34–43] only a few papers actually analyse in details which activities tourists perceive as suitable for robotization. For example, one recent study [30] evaluates the perceptions of young Russian adults toward the robotization of various activities in a hotel and finds that the most acceptable for the customers are the activities related to delivering items to guests' rooms, provision of information about the hotel and the destination and processing payments. These results are further confirmed by [31] using a sample of Iranian tourists, who consider provision of information, cleaning, taking customer orders, delivering items, and processing payments as the most appropriate activities for robotization while massages and robotic guards do not receive much support by respondents.

Prior studies [23, 25, 26, 28] suggest some elements that influence how a person perceives the adoption of robots in service industries. The major consensus of the research is that gender seems to play a role in influencing a person's perception of the willingness to use robots, although there is a small minority of researchers that do not find evidence that gender impacts upon a person's perception of the use of robots [see, for example, 24]. There is also evidence that urbanites seem to look more favourably upon using robots [25, 30]. More importantly, it seems that general attitudes towards robots in industry conditions a person's willingness to use robots for particular purposes [27, 30, 31].

What is especially interesting is that there seems to be little or no concern for the impression of how different stakeholders view robots. While there is a threat that many less-skilled people will lose their jobs to increased automation of services, the academic literature does not typically investigate how different groups apart from demographic segments view the robot in service-based industries. The reason that robots could be viewed differently could be based upon a class-bias, as robots are most likely to replace the labour of less-skilled labour. Apart from a Marxist/class-based view upon robots, it may well also be that different stakeholders (those working in the travel, tourism and hospitality industries, those working in the robotic industry, and those working in the hospitality/tourism education sector) view the penetration of increasingly sophisticated automation into the travel, tourism and hospitality industries differently from others. Since the phrase "where you stand depends upon where you sit," was brought to popularity in the social sciences by [44], the importance of a person's career upon conditioning the way she/he views the world has been a major influence upon how Political Science views political choice. In this analysis, the paper incorporates an approach that takes this very political view of the incorporation of robots into tourism-related industries, instead of merely looking at the more obvious and easily measured demographic characteristics. Thus, the paper delves into how careers may seem to influence how a person looks upon the tasks that robots will be used for in tourism-related industries.

3 Methodology

This paper reports some of the initial findings of a global large-scale longitudinal research project on people's attitudes towards the use of service robots in travel, tourism and hospitality. An online questionnaire was used for data collection. The first version of the questionnaire was checked by six experts in information technology/robotics in tourism and after their comments were incorporated, a pilot testing was implemented with 43 respondents to ensure the readability of the questionnaire and determine the time necessary to complete it. The final version was translated into 12 languages and distributed via email and social media. The sample used in this paper consists of the first 1003 responses collected by 7th September 2018. The sample characteristics from these preliminary data are reported in Table 1.

Table 1. Sample characteristics

Characteristic		Number of respondents	Percent
Gender	Male	439	43.8
	Female	564	56.2
Country of living	USA	281	28.1
	Bulgaria	280	28.0
	UK	43	4.3
	Turkey	29	2.9
	Portugal	23	2.3
	Russian Federation	19	1.9
	India	15	1.5
	Spain	15	1.5
	France	14	1.4
	Brazil	13	1.3
	Other (77 countries and territories)	268	26.8
Education	High school or less	125	12.5
	2 year/Associate degree	66	6.6
	Bachelor	283	28.2
	Master	313	31.2
	Doctorate	216	21.5
Occupation	Travel, tourism and hospitality industry	115	11.5
	Tourism/hospitality education	159	15.8
	Robotics (education, research, industry)	22	22.2
	Other	701	70.0
	Not specified	6	0.5
Age	18–30	466	46.5
	31–40	257	25.6
	41–50	152	15.2
	51–60	79	7.9
	61–70	42	4.2
	71+	7	0.7
Total		1003	100.0

The questionnaire included several blocks of questions regarding respondents' demographic characteristics and their level of agreement with different statements about their attitudes towards robots and use intentions. One block was dedicated to the perceived appropriateness (measured with a 7-point scale from 1-completely inappropriate to 7-completely appropriate) of the use of robots for implementing various tasks/activities within the travel, tourism and hospitality industries (hotels, restaurants and bars, travel agencies and tourist information centres, theme parks, events, museums

and galleries, rent-a-car, airplanes/buses/trains, airports and other transport stations). This paper reports the insights gained from the answers to this block of questions.

The analysis of skewness and kurtosis values and their standard errors showed that respondents' answers did not have normal distribution. This was further confirmed by the Kolmogorov-Smirnov and Shapiro-Wilk tests (all $p < 0.001$). Therefore, the non-parametric tests Kruskal-Wallis χ^2 test and Mann-Whitney U-test were used for data analysis. In particular, Kruskal-Wallis χ^2 test was used to identify differences between the four groups of respondents on the basis of their occupation – (1) employment in travel, tourism and hospitality industry, (2) in tourism/hospitality education, (3) in robotics (education, research, industry) and (4) other (occupation in another area or currently unemployed). The Mann-Whitney U-test was adopted to determine the statistical significance of the difference between the maximum and minimum mean values for each activity/task of robot application in travel, tourism and hospitality. The Wilcoxon signed ranks test was used to identify differences in respondents' answers to some questions.

4 Results and Discussion

4.1 The General Picture

Table 2 presents the main findings regarding the perceived appropriateness of using robots for implementing various activities in travel, tourism and hospitality. Due to space limitations the full results are included in an appendix that is available on this link: <https://bit.ly/2CAc2f5>. In regard to the first research question, the activities with highest acceptance by respondents include *Provision of information about departures/arrivals* ($m = 5.95$), *about seat/berth availability* ($m = 5.88$), and *about ticket prices/fees* ($m = 5.88$) at airports and other transport stations, *Garbage collection* ($m = 5.86$), *Cleaning the common areas of the hotel/theme park/airport/restaurant etc.* ($m = 5.79$), *Provision of information about the trip/flight/route* ($m = 5.77$) and *about the vehicle* ($m = 5.76$), and *Luggage carrying in hotels/airports etc.* ($m = 5.72$). Activities related to delivering items (e.g. laundry, linen, towels) received high acceptance as well. The most inappropriate areas for robot application are considered *Babysitting* ($m = 2.39$) *Hairdressing* ($m = 2.98$), *Dancing with guests* ($m = 3.24$) and *Massages* ($m = 3.62$). It is clear that the services which respondents accept to be provided by robots relate to provision of information or housekeeping, i.e. those which respondents were already used to through self-service kiosks (information provision) or consider as dull, dirty or dangerous (housekeeping). In fact, all activities related to information provision and housekeeping (e.g. cleaning, laundry, ironing, gardening, maintenance) across all analysed tourism industries have high mean values (above 5 on a 7-point scale). At the same time, activities which require the person to subordinate his/her body to a robot (e.g. massages, babysitting or hairdressing) were not considered as acceptable. These findings are similar to the results reported in [30] for young Russian adults and in [31] for Iranian tourists. It is interesting to note that *Cooking food* ($m = 3.66$) was not perceived as an appropriate activity by robots, despite the recent developments in cooking robots [45, 46].

Table 2. Perceived appropriateness of robot application in various activities in travel, tourism and hospitality industries – selected results

Activity	Mean values				
	TI	TE	R	O	T
<i>Travel, tourism and hospitality industries in general</i>					
Welcoming/greeting a tourist/guest/passenger	4.10	4.12	5.50	4.41	4.35
Accompanying the guest when leaving the hotel/restaurant/theme park	4.07	3.97	4.77	4.17	4.14
Providing information about facilities of the hotel/restaurant/theme park/airport/bus station/train station, etc.	5.76	5.62	5.82	5.60	5.63
Providing information about the destination	5.66	5.46	5.68	5.64	5.61
Booking tourist services (e.g. flight tickets, hotel accommodation, transfers, rent-a-car, travel insurance, etc.)	5.00	5.13	5.59	5.34	5.27
Concierge services (e.g. ordering tickets for shows, taxis)	5.05	5.04	5.55	5.21	5.17
Issuing travel documents (e.g. voucher, tickets)	5.39	5.57	5.41	5.45	5.46
Issuing payment documents (e.g. invoice, receipt)	5.30	5.73	5.27	5.55	5.55
Processing cash payments	5.11	5.43	5.09	5.35	5.33
Processing credit card and debit card payments	5.25	5.62	5.36	5.52	5.50
Luggage carrying in hotels/airports etc.	5.63	5.79	5.59	5.73	5.72
Luggage storage in hotels/airports etc.	5.55	5.91	5.55	5.59	5.63
Garbage collection	5.77	5.89	5.73	5.87	5.86
Cleaning the common areas of the hotel/theme park/airport/restaurant	5.71	5.95	5.64	5.78	5.79
Providing gardening services	4.94	5.26	5.50	5.09	5.11
Providing repair and maintenance in a facility	4.92	5.18	4.77	5.01	5.02
Serve as guards/security	3.90	4.11	4.82	3.68	3.80
Helping tourists/guests/passengers in case of emergency	4.00	3.89	4.45	3.90	3.92
<i>Hotel > Reception</i>					
Check-in	4.80	4.52	5.48	4.98	4.89
Guiding to the room	4.56	4.39	5.68	5.00	4.87
Check-out	4.88	4.88	5.36	5.21	5.12
<i>Hotel > Housekeeping</i>					
Cleaning the room	5.23	5.29	5.55	5.20	5.23
Taking customer orders for laundry	5.42	5.58	5.45	5.52	5.52
Laundry service	5.61	5.85	5.64	5.58	5.63
Ironing service	5.25	5.46	5.23	5.19	5.24
Delivering ready laundry	5.74	5.67	5.55	5.65	5.66
Taking customer orders for new towels, linen, etc.	5.57	5.62	5.55	5.67	5.65
Delivering new towels, linen, etc.	5.63	5.58	5.68	5.58	5.59

(continued)

Table 2. (continued)

Activity	Mean values				
	TI	TE	R	O	T
<i>Hotel > Food and beverages/Restaurants</i>					
Taking orders for room service	5.33	5.41	5.73	5.43	5.42
Delivering food and drinks in room service	4.87	5.03	5.45	5.22	5.16
Guiding guests to tables in the restaurant	4.42	4.55	5.27	4.90	4.80
Providing information about the menu	5.12	5.04	5.59	5.15	5.14
Taking orders in the restaurant	4.85	4.79	5.59	4.99	4.96
Cooking food	3.76	3.59	4.59	3.62	3.66
Serving food in the restaurant	4.25	4.21	4.82	4.54	4.46
Making drinks (coffee, tea, cocktails) in the restaurant/bar	4.48	4.46	5.18	4.51	4.51
Serving drinks in the restaurant/bar	4.14	4.28	4.95	4.49	4.43
Cleaning the table	5.31	5.21	5.52	5.22	5.24
<i>Hotel > Additional services</i>					
Massages	3.83	3.37	4.64	3.62	3.62
Playing games with the guests	4.60	4.10	4.95	4.35	4.35
Entertaining the guests	4.31	4.27	5.05	4.31	4.32
Dancing with guests	3.37	2.95	4.41	3.24	3.24
Babysitting	2.81	2.24	3.73	2.31	2.39
Provision of very short 1–2 h workshops to guests (e.g. on gardening, cooking, painting, astronomy, etc.)	3.92	3.90	4.91	4.00	3.99
Hairdressing	3.03	2.93	4.09	2.95	2.98
<i>Travel agency/Tourist information centre</i>					
Provision of information about the offers (in the office of the agency/TIC)	5.25	4.96	5.55	5.27	5.22
Robot tour guide in the destination (outside the office of the agency/TIC)	4.42	4.24	5.00	4.62	4.54
<i>Theme park</i>					
Automation of rides	4.96	5.15	5.14	4.64	4.77
Robotic control of the rides	4.74	4.98	4.62	4.41	4.54
Serve as robot-entertainers/show participants	4.32	4.29	5.29	4.49	4.46
<i>Events</i>					
Providing information about the event	5.56	5.37	5.59	5.59	5.55
Guiding the participants to their seats	4.81	4.72	5.41	5.10	5.01
Serving food during the event	4.44	4.29	5.05	4.76	4.66
Serving drinks during the event	4.51	4.42	4.95	4.80	4.71
Serve as robot-entertainers/show participants	4.33	4.27	4.95	4.49	4.45
<i>Museums and galleries</i>					
Providing information about the exhibits	5.50	5.54	5.67	5.61	5.59
Robot tour guide in the museum/gallery	4.89	4.92	5.43	5.12	5.07

(continued)

Table 2. (continued)

Activity	Mean values				
	TI	TE	R	O	T
<i>Rent-a-car</i>					
Self-driving cars	5.03	4.67	5.00	4.51	4.61
Cleaning the vehicles	5.74	5.59	5.55	5.71	5.69
Robotic car key delivery	5.40	5.37	5.32	5.35	5.36
The car is opened and started by access code received with the booking (no physical key)	5.38	5.39	5.64	5.21	5.27
The car is electric	5.76	5.71	5.45	5.72	5.72
The car goes to a gas station/charging station automatically when fuel tank/battery is below a specific limit	5.04	5.06	5.14	4.79	4.87
<i>Airplanes/Buses/Trains</i>					
Self-driving planes	3.98	3.78	4.95	3.50	3.64
Self-driving buses	4.39	4.07	5.18	3.93	4.04
Self-driving trains	4.68	4.53	5.41	4.32	4.42
Self-driving vessels (e.g. ships, cruise ships)	4.30	4.05	5.14	3.84	3.96
Check-in (e.g. at airports)	5.37	5.19	5.86	5.44	5.41
Guiding the passenger to the seat	4.95	4.75	5.64	5.15	5.08
Providing information about the vehicle	5.73	5.65	5.76	5.79	5.76
Providing information about the trip/flight/route	5.80	5.72	5.82	5.77	5.77
Providing information about the safety and security procedures and regulations on board	5.63	5.65	5.64	5.74	5.71
Serving food on board	4.58	4.52	5.27	4.83	4.77
Serving drinks on board	4.72	4.45	5.23	4.81	4.76
Cleaning the vehicle/vessel/aircraft	5.44	5.68	5.57	5.62	5.61
<i>Airports and other transportation stations</i>					
Provision of information about departures/arrivals	5.93	5.86	5.82	5.97	5.95
Provision of information about seat/berth availability	5.85	5.87	5.82	5.89	5.88
Provision of information about ticket prices/fees	5.89	5.86	5.77	5.89	5.88
Provision of information about special legal regulations, visa formalities, etc.	5.50	5.60	5.36	5.54	5.54
Number of maximum mean values across the 4 groups	6	16	53	7	
Number of minimum mean values across the 4 groups	16	35	16	15	
Number of minimum and maximum mean values across the 4 groups	22	51	69	22	

Notes 1. Maximum means marked in bold, minimum means marked in italic. 2. Abbreviations: TI - Travel, tourism and hospitality industry; TE - Tourism and hospitality education; R - Robotics (research, education, industry); O - Other; T - Total

One of the most hyped technologies is the autonomous vehicles [47]. Respondents were more ready to accept self-driving cars ($m = 4.61$) and trains ($m = 4.42$), rather than buses ($m = 4.04$) or planes ($m = 3.64$) (all Wilcoxon signed ranks test z-values are significant at $p < 0.001$). This means that respondents accept robotic technologies for transports that have received much media attention like autonomous cars, or they regularly use such as trains (daily commute with metro, intercity travels) and cars. On the other hand, the types of transport that usually carry a lot of passengers simultaneously, cause a lot of casualties in the rare cases of fatal incidents and require special skills to drive (like cruise ships and airplanes) received much resistance. With the technological advances in autonomous cars, trains, vessels and airplanes, and their improved performance and safety, one could expect that autonomous vehicles would receive higher acceptance by travellers, probably initially for transportation of goods and later for passengers.

4.2 Findings by Occupation of Respondents

Results in Table 2 further show that the mean values for the four groups are quite close to each other and for some activities such as *Delivering new towels, linen, etc.*, the difference between the maximum mean (5.68 for the robotics-related respondent group) and the minimum mean (5.58 for the tourism educators group) is as low as 0.10 on a 7-point scale. In fact, the Kruskal-Wallis χ^2 test is significant for only 17 out of 80 (or 21.3%) of investigated activities/tasks. This means that in general the occupation of respondents seems not to influence their perceptions about the directions of robot use in travel, tourism and hospitality. A closer look, however, reveals a slightly different picture. The last three rows of Table 2 include the number of maximum, minimum and extreme mean values across the four analysed groups. For 53 of the activities (66.3%) respondents involved in robotics (either in research, education or production of robots) have highest perceived appropriateness of robot use among the four groups. Therefore, they seem to be the most pro-robotic of the respondents. This is an expected finding since they have vested interest in robotics (as researchers, educators or managers/employees in companies producing robots). At the same time tourism and hospitality educators had minimum mean value for 35 of the activities (44.8%), making them somewhat more sceptical than the rest of the respondent groups. It is interesting to note that altogether the travel, tourism and hospitality professionals had more balanced responses and for only 22 of the activities (27.5%) they had an extreme mean value (min or max). On the contrary, tourism and hospitality educators had extreme values in 51 (63.8%) of the case, while robotics involved respondents – for 69 (85.3%) activities. In any case, the difference between the minimum and the maximum mean values for most activities were very small and the Mann-Whitney U-test was significant for only 18 (22.5%) of them. Therefore, in regard to the second research question one can say that the occupation of respondents only partially related to their perceptions about the appropriateness of robot application in travel, tourism and hospitality.

5 Conclusion

5.1 Contribution

This paper contributed to the body of knowledge by identifying the activities which (potential) tourists consider as appropriate to be delivered by robots instead of human employees. In total 80 activities across all travel, tourism and hospitality industries were evaluated. The results showed that information provision and housekeeping activities were considered as most appropriate while babysitting, dancing with robots, and hairdressing were as least preferred by respondents (RQ1). The Kruskal-Wallis χ^2 -test and the Mann-Whitney U-test showed that the occupation of respondents generally did not have a significant impact on the perceived appropriateness of robot applications in various activities in travel, tourism and hospitality industries. However, it was found that respondents involved in robotics (as researchers, educators or managers/employees in robot manufacturers) seemed to be slightly more optimistic, while tourism educators – slightly more pessimistic towards the application of robots in travel, tourism and hospitality compared to the rest of respondents (RQ2).

5.2 Managerial Implications

From a managerial perspective, our results show which robot-delivered activities in travel, tourism and hospitality companies customers would welcome. Clearly these relate to information provision, housekeeping, delivering items, i.e. activities which tourists are already used to be provided by computers or self-service kiosks (e.g. information provision), or activities which people usually are not keen to do (e.g. cleaning, laundry, ironing, maintenance), or do not require much involvement by the customer (e.g. delivering various items by a robot). Therefore, companies need to focus on producing robots for these activities (RQ1). Of course, one robot can serve various needs within a hotel; hence, the same robot can be used for implementing two or more activities, especially in regard to information provision and delivering items. In fact, these are the same activities which were in the focus of the commercial service robot manufacturers (e.g., by Suzhou Pangolin Robot Corp. (<http://en.csjbot.com/>), Savioko (<http://www.savioko.com/>), Softbank Robotics (<https://www.softbankrobotics.com>), Maidbot (<https://maidbot.com/>), or iRobot (<https://www.irobot.com>)). Therefore, although robotics related respondents to our survey were more optimistic towards the robotization of travel, tourism and hospitality services (RQ2), their opinions largely resonated in the frequencies of the other respondent groups and reflected what service robot manufacturers actually did. At the same time, the low acceptance of robotization for cooking food would mean that robotised restaurants like Spyce in Boston (<https://www.spyce.com/>) may need to have a very targeted marketing campaign to familiarise their potential customers with the robotic kitchen technology and address customers' concerns.

5.3 Limitations and Future Research Directions

The main limitation of this research is the geographic coverage and educational profile of respondents. Although they come from 87 countries and territories, half of them are from the home countries of the two co-authors. However, data collection continued after the time of writing of the paper (September 2018) in order to achieve a much larger and more diverse sample especially in terms of geographic coverage and educational profile of respondents.

Future research may focus on the role of gender, national culture, education of technical expertise of respondents on their acceptance of robots in travel, tourism and hospitality. Research can adopt the Technology Acceptance Model and its variations and upgrades to evaluate the factors that influence the adoption of service robots. Research can be expanded into evaluation of perceived quality of robot-delivered services. Ultimately, future research can delve into tourism supply and elaborate on managers' readiness to use robots as compliments or substitutes of human employees, the impact of robots on companies' bottom line, their competitiveness, operations, services cape, human resource management and other aspects of their activities.

Acknowledgements. The authors would like to thank Ulrike Gretzel, Katerina Berezina, Iis Tussyadiah, Jamie Murphy, Dimitrios Buhalis and Cihan Cobanoglu for their valuable comments on the initial drafts of the questionnaire. The authors also thank Sofia Yanko, Katerina Berezina, Nadia Malenkina, Raul Fernandez Martin, Antoaneta Topalova, Florian Aubke, Nedra Bahri, Frederic Dimanche, Rosanna Leung, Kwang-ho Lee, Minako Okada, Isa Veira, Jean Max Tavares, Seden Dogan and Isabella Ye for devoting their time and effort into the translation of the questionnaire.

References

1. NPR (2011) Science Diction: The Origin of the Word 'Robot'. <https://www.npr.org/2011/04/22/135634400/science-diction-the-origin-of-the-word-robot>. Accessed 12 Jan 2018
2. International Federation of Robotics (2012) History of Industrial Robots. Retrieved from: https://web.archive.org/web/20121224213437/http://www.ifr.org/uploads/media/History_of_Industrial_Robots_online_brochure_by_IFR_2012.pdf. Accessed 11 Feb 2018
3. Agah A, Cabibihan JJ, Howard A, Salichs MA, He H (eds) (2016) Social robotics. In: Proceedings of the 8th International conference, ICSR 2016, Kansas City, MO, USA, November 1–3, 2016. vol 9979. Springer. <https://doi.org/10.1007/978-3-319-47437-3>
4. Ferreira MIA, Sequeira JS, Tokhi MO, Kadar E, Virk GS (eds) (2017) A world with robots. In: International conference on robot ethics: ICRE 2015 vol 84. Springer. <https://doi.org/10.1007/978-3-319-46667-5>
5. Wirtz J, Patterson P, Kunz W, Gruber T, Lu VN, Paluch S, Martins A (2018) Brave new world: service robots in the frontline. *J Serv Manag* 29(5) (in press). <https://doi.org/10.1108/josm-04-2018-0119>
6. Robotics Industries Association (2017) The History of Robotics in the Automotive Industry. <https://www.robotics.org/blog-article.cfm/The-History-of-Robotics-in-the-Automotive-Industry/24>. Accessed 12 Sep 2018
7. Ivanov S, Webster C, Berezina K (2017) Adoption of robots and service automation by tourism and hospitality companies. *Revista Turismo Desenvolv* 27(28):1501–1517

8. Acosta L, González E, Rodríguez JN, Hamilton AF (2006) Design and implementation of a service robot for a restaurant. *Int J Robot Autom* 21(4):273–280. <https://doi.org/10.2316/Journal.206.2006.4.206-2909>
9. Huang GS, Lu YJ (2017) To build a smart unmanned restaurant with multi-mobile robots. In: 2017 International automatic control conference (CACs), IEEE, pp 1–6. <https://doi.org/10.1109/cacs.2017.8284256>
10. Yu Q, Yuan C, Fu Z, Zhao Y (2012) An autonomous restaurant service robot with high positioning accuracy. *Ind Robot Int J* 39(3):271–281. <https://doi.org/10.1108/01439911211217107>
11. Jutharee W, Maneewarn T, Polvichai J (2013) Trajectory generation based on human attention for a bartender robot. In: 13th International conference on control, automation and systems (ICCAS) IEEE, pp 1468–1473. <https://doi.org/10.1109/iccas.2013.6704118>
12. Graf R, Weckesser P (1998) Autonomous roomservice in a hotel. *IFAC Proc Volumes* 31(3):501–507. [https://doi.org/10.1016/S1474-6670\(17\)44135-8](https://doi.org/10.1016/S1474-6670(17)44135-8)
13. López J, Pérez D, Zalama E, Gómez-García-Bermejo J (2013) Bellbot-a hotel assistant system using mobile robots. *Int J Adv Rob Syst* 10(1):40. <https://doi.org/10.5772/54954>
14. Pinillos R, Marcos S, Feliz R, Zalama E, Gómez-García-Bermejo J (2016) Long-term assessment of a service robot in a hotel environment. *Rob Auton Syst* 79:40–57. <https://doi.org/10.1016/j.robot.2016.01.014>
15. Sun S, Takeda T, Koyama H, Kubota N (2016) Smart device interlocked robot partners for information support systems in sightseeing guide. In: Joint 8th international conference on soft computing and intelligent systems (SCIS) and 17th international symposium on advanced intelligent systems, pp 586–590. IEEE. <https://doi.org/10.1109/scis-isis.2016.0129>
16. Sakamoto D, Hayashi K, Kanda T, Shiomi M, Koizumi S, Ishiguro H, Ogasawara T, Hagita N (2009) Humanoid robots as a broadcasting communication medium in open public spaces. *Int J Soc Robot* 1(2):157–169. <https://doi.org/10.1007/s12369-009-0015-5>
17. Shiomi M, Sakamoto D, Kanda T, Ishi CT, Ishiguro H, Hagita N (2008) A semi-autonomous communication robot: a field trial at a train station. In: Proceedings of the 3rd ACM/IEEE international conference on Human robot interaction, pp 303–310. ACM. <https://doi.org/10.1145/1349822.1349862>
18. Triebel R, Arras K, Alami R, Beyer L, Breuers S, Chatila R, Chetouani M, Cremers D, Evers V, Fiore M, Hung H (2016) Spencer: a socially aware service robot for passenger guidance and help in busy airports. In: Wettergreen D, Barfoot T (eds) *Field and service robotics*. Springer Tracts in Advanced Robotics, vol 113, pp 607–622. Springer, Cham. https://doi.org/10.1007/978-3-319-27702-8_40
19. Burgard W, Cremers AB, Fox D, Hähnel D, Lakemeyer G, Schulz D, Steiner W, Thrun S (1999) Experiences with an interactive museum tour-guide robot. *Artif Intell* 114(1–2):3–55. [https://doi.org/10.1016/S0004-3702\(99\)00070-3](https://doi.org/10.1016/S0004-3702(99)00070-3)
20. Acaccia, GM, Bruzzone LE, Razzoli RP (2006, January) Mobile robots for airports surveillance: a modular solution. In: ASME 8th Biennial conference on engineering systems design and analysis, pp 705–711. American Society of Mechanical Engineers. <https://doi.org/10.1115/esda2006-95392>
21. Sadjadi H, Jarrar MA (2011) Autonomous cleaning system for Dubai international airport. *J Frankl Inst* 348(1):112–124. <https://doi.org/10.1016/j.jfranklin.2009.02.015>
22. Abad P, Franco M, Castillón R, Alonso I, Cambra A, Sierra J, Riazuelo L, Montano L, Murillo AC (2017) Integrating an autonomous robot on a dance and new technologies festival. In: *Iberian robotics conference*, pp 75–87. Springer, Cham. https://doi.org/10.1007/978-3-319-70833-1_7

23. De Graaf MMA, Allouch SB, Klamer T (2015) Sharing a life with Harvey: Exploring the acceptance of and relationship-building with a social robot. *Comput Hum Behav* 43:1–14. <https://doi.org/10.1016/j.chb.2014.10.030>
24. Dinet J, Vivian R (2014) Exploratory investigation of attitudes towards assistive robots for future users. *Le travail humain* 77(2):105–125. <https://doi.org/10.3917/th.772.0105>
25. Hudson J, Orviska M, Hunady J (2017) People’s attitudes to robots in caring for the elderly. *Int J Soc Robot* 9(2):199–210. <https://doi.org/10.1007/s12369-016-0384-5>
26. Katz JE, Halpern D (2014) Attitudes towards robots suitability for various jobs as affected robot appearance. *Behav Inf Technol* 33(9):941–953. <https://doi.org/10.1080/0144929X.2013.783115>
27. Malchus K, Jaecks P, Wrede B, Stenneken P (2013) Application of social robots in speech and language therapy?! An investigation into speech and language pathologists’ attitudes towards embodied agents [Einsatz sozialer Roboter in der Sprachtherapie?! Erhebung eines Stimmungsbildes von SprachtherapeutInnen] *L.O.G.O.S. Interdisziplinär* 21(2): 106–116. <https://doi.org/10.7345/prolog-1302106>
28. Pochwatko G, Giger J-C, Róžańska-Walczuk M, Świdrak J, Kukielka K, Możaryn J, Piçarra N (2015) Polish version of the negative attitude toward robots scale (NARS-PL) *Journal of Automation. Mobile Robot Intell Syst* 9(3):65–72. https://doi.org/10.14313/JAMRIS_3-2015/25
29. Reich-Stiebert N, Eyssel F (2015) Learning with educational companion robots? Toward attitudes on education robots, predictors of attitudes, and application potentials for education robots. *Int J Soc Robot* 7(5):875–888. <https://doi.org/10.1007/s12369-015-0308-9>
30. Ivanov S, Webster C, Garenko A (2018) Young Russian adults’ attitudes towards the potential use of robots in hotels. *Technol Soc* (in press), <https://doi.org/10.1016/j.techsoc.2018.06.004>
31. Ivanov S, Webster C, Seyyedi P (2018) Consumers’ attitudes towards the introduction of robots in accommodation establishments. *Tourism* 63(3):302–317
32. Tussyadiah IP, Park S (2018) Consumer evaluation of hotel service robots. In: Stangl B, Pesonen J (eds) *Information and communication technologies in tourism 2018*. Springer, Cham, pp 308–320. https://doi.org/10.1007/978-3-319-72923-7_24
33. Tussyadiah IP, Zach FK Wang J (2017) Attitudes toward autonomous on demand mobility system: the case of self-driving taxi. In: Schegg R, Strangl B (eds) *Information and communication technologies in tourism 2017*, pp 755–766. https://doi.org/10.1007/978-3-319-51168-9_54
34. Ivanov S, Webster C (2017) Designing robot-friendly hospitality facilities. In: *Proceedings of the scientific conference “Tourism. Innovations. Strategies”*, 13–14 October 2017, Bourgas, Bulgaria, pp 74–81
35. Ivanov S, Webster C (2017) The robot as a consumer: a research agenda. In: *Proceedings of the “Marketing: experience and perspectives” conference*, 29–30 June 2017, University of Economics-Varna, Bulgaria, pp 71–79
36. Ivanov S, Webster C (2018) Adoption of robots, artificial intelligence and service automation by travel, tourism and hospitality companies – a cost-benefit analysis. In: Marinov V, Vodenska M, Assenova M, Dogramadjieva E (eds) *Traditions and innovations in contemporary tourism*. Scholars Publishing, Cambridge, pp 190–203
37. Kuo C-M, Chen L-C, Tseng C-Y (2017) Investigating an innovative service with hospitality robots. *Int J Contemp Hosp Manag* 29(5):1305–1321. <https://doi.org/10.1108/IJCHM-08-2015-0414>

38. Murphy J, Gretzel U, Hofacker C (2017) Service robots in hospitality and tourism: investigating anthropomorphism. Paper presented at the 15th APacCHRIE Conference, 31 May–2 June 2017, Bali, Indonesia. http://heli.edu.au/wp-content/uploads/2017/06/APacCHRIE2017_Service-Robots_paper-200.pdf. Access 2 Dec 2017
39. Murphy J, Hofacker C, Gretzel U (2017) Dawning of the age of robots in hospitality and tourism: challenges for teaching and research. *Eur J Tour Res* 15:104–111
40. Tung VWS, Au N (2018) Exploring customer experiences with robotics in hospitality. *Int J Contemp Hosp Manag* (in press), <https://doi.org/10.1108/ijchm-06-2017-0322>
41. Tung VWS, Law R (2017) The potential for tourism and hospitality experience research in human-robot interactions. *Int J Contemp Hosp Manag* 29(10):2498–2513. <https://doi.org/10.1108/IJCHM-09-2016-0520>
42. Yu C-E (2018) Humanlike robot and human staff in service: age and gender differences in perceiving smiling behaviors. In: Proceedings of the 7th international conference on industrial technology and management (ICITM), 2018, pp 99–103. IEEE. <https://doi.org/10.1109/icitm.2018.8333927>
43. Yu C-E (2018) Perceptual differences toward humanlike robots and humans in service: Individualist versus collectivist cultures. In: Mauer C, Neuhofer B (eds) ISCONTOUR 2018 tourism research perspectives: proceedings of the international student conference in tourism research, pp 323–332
44. Allison G (1971) *Essence of decision: explaining the cuban missile crisis*, 1ed. Little Brown. ISBN 0-673-39412-3
45. Bollini M, Tellex S, Thompson T, Roy N, Rus D (2013) Interpreting and executing recipes with a cooking robot. In: Desai J, Dudek G, Khatib O, Kumar V (eds) Experimental robotics. Springer tracts in advanced robotics, vol 88. Springer, Heidelberg. https://doi.org/10.1007/978-3-319-00065-7_33
46. Zhai J, Pan G, Yan W, Fu Z, Zhao Y (2015) Dynamic analysis of a dual-arm humanoid cooking robot. In: IEEE 10th Conference on industrial electronics and applications (ICIEA), pp 835–838. IEEE. <https://doi.org/10.1109/iciea.2015.7334226>
47. Maurer M, Gerdes JC, Lenz B, Winner H (eds) (2016) Autonomous driving: technical, legal and social aspects. Springer Open, Berlin, Heidelberg. <https://doi.org/10.1007/978-3-662-48847-8>

Technology in Tourism Industry



Insights into Advanced Dynamic Pricing Systems at Hotel Booking Platforms

Michael Möhring^(✉), Barbara Keller, and Rainer Schmidt

Department of Computer Science and Mathematics,
Munich University of Applied Sciences, Lothstr. 64, 80335 Munich, Germany
{michael.moehring, barbara.keller,
rainer.schmidt}@hm.edu

Abstract. Hotel booking platforms using different approaches to implement dynamic pricing. Past research was focusing on basic factors of dynamic pricing like time of the booking, quotas, or length of stay management. Approaches using new variables for price determination were not considered in research so far. This research paper is focussing on the advanced dynamic pricing systems of hotel booking platforms in Europe, which are currently implemented as well as under development. Applying a case study research approach, the paper reveals a scientific overview about the current status-quo and the upcoming trends of different dynamic pricing concepts for hotel booking platforms in Europe. First, the understanding of dynamic pricing and its concepts in Tourism and Hospitality are clarified – theoretically, practically as well as in terms of customer behaviour. Following this, new advanced method still under development are investigated. Therefore, opportunities and challenges are shown up and discussed.

Keywords: Hospitality · Booking platforms · Dynamic pricing
Revenue

1 Introduction

A few years ago, booking hotels was quite different compared to nowadays. Travel agencies and direct distribution by hoteliers and holiday providers managed the largest part of the revenue stream. However, digitization impacted the hospitality industry deeply [1]. In two steps the tourism industry was transformed [1]. First, many hotels created their own homepages to disintermediate travel agencies. Then, booking platforms [2] became an important part of the hospitality industry. For instance, the amount of bookings and users of online booking platforms in Tourism in Europe increased over the last years [3]. In Europe, 39% of the hotel bookings in 2017 will be made through online platforms according to a current study [4]. Platforms are two-sided markets [5, 6] bringing together providers and customers of products and services. Platforms augment intermediaries by facilitating an end-to-end interaction between the participants [5, 6]. Contrary to other sectors, the tourism sector is permeated and even dominated by booking platforms. The often small-sized market participants on the supply side and their multitude made such a trusted intermediary inevitable to select and book hotels, especially if the customer is remote from the hospitality service

provider. Platforms have three important tasks [5, 6]: they shall pull hospitality service providers and customers to the platform, match them and facilitate interaction between them. Pricing is the most important part of matching. Due to the perishable nature of hotel services, dynamic pricing is the preferred approach to match offer with demand [7]. Dynamic pricing determines the prices of a good or service depending on several variables [7]. In the beginning, hotel platforms used booking data for dynamic pricing [8]. However, in practice (e.g., [9]), there is an increasing number of advanced dynamic pricing approaches that use new variables for price determination not considered in research so far. Examples for such new variables for dynamic pricing are the channel and location of the customer. Therefore, this research is looking at this gap and focusing on the question: “*Which advanced dynamic pricing systems are currently implemented and under development in hotel booking platforms in Europe?*”. The goal of this paper is first, to identify new types of dynamic pricing systems and components that are implemented or under development by European hotel booking platforms and secondly, to describe the application of these advanced dynamic pricing approaches. The paper is organized as follows: in the next section, the related literature of the research is drawn and a lack of research in this area is emphasized. Consequently, the research method and data collection to explore this research field is defined. Therefore, a case study method with major European hotel booking platforms is applied to get real insights in dynamic pricing systems in this area. Finally, the results are shown, discussed and mark out links for future research are given.

2 Background

Booking platforms provide value to the customer in manifold ways [2]. First, they aggregate offers. This creates transparency for the customer about available hospitality services. Thus, the customer is able to quickly find the hospitality services complying to the individual needs. Furthermore, booking platforms also aggregate customer reviews. In this way, they enable and even facilitate the customer to evaluate the services offered. Even from the suppliers’ point of view platforms are highly advantageous. They are providing services without owning resources [5]. Therefore, platforms turn enterprise architecture inside out [5] and offer new highly flexible options to place and reorganize the range of services. A peculiarity of the hospitality industry is that intermediaries were involved rather soon in pricing [1]. Concepts of pricing are very important in different research areas (e.g., Dodds et al. [10], Hinz et al. [11], Zeithaml [12]). According to Zeithaml [12] the abstract concept of pricing defines the customer’s perception of the trade-off between cost and benefit. If the precepted value is greater or equal to the expenses, customer satisfaction may arise [13]. In literature, the proposition that customer satisfaction could impact customer loyalty and consecutively profitability is often discussed [13, 14]. This link is easily comprehensible due to the fact that customer loyalty reduces cost for customer acquisition and retention as well as the price sensitivity of the customers [13]. Customer’s value perception can be controlled by price perception [15]. Dynamic pricing can provide higher profitability [16] and can be therefore seen as a part of revenue management [17]. Revenue management tries to maximize profits by selling services to the most profitable mix of

customers [16, 18]. Dynamic pricing refers to this aim by means of price discrimination [11]. This implies that the revenue is enlarged by offering the same service to different prices [11] and consecutively through the absorption of customers' surplus in various patterns. In the hospitality industry the application of a revenue management is particularly favourable [19] because of specific determinants such as fixed capacity, fluctuating demand and a perishable/non-stockable services. The hotel and hospitality sector are quite aware about this for quite some time now and revenue management is already implemented differently in all day business. This is mentioned in the literature, too. For instance, based on historical data and demand forecasts optimal decision support systems try to help hotels to implement a revenue management system in practice [20]. Furthermore, hotels can increase their revenues by reducing customers' surplus [21]. Ivanova et al. [22] define hotel revenue management as a constellation of tools and actions that optimizes net revenues and profit by offers made directly to customers by the right distribution channel that embrace the right product. Furthermore, these offers are made at the right time with the right communication. Dynamic pricing selects a price that is reflecting the current level of demand and occupancy [16]. Abrate et al. [17] found, that a large majority of hotels is using some form of dynamic pricing. According to Melis and Piga [23] dynamic pricing is more often implemented by four or five-star hotels compared to three or less star hotels and depending of the culture of the hotel. This stands in line with research of Möhring et al. [24], that small and medium-sized hotels or hotel chains are currently less able to implement an analytical based revenue management information system. First considerations for an optimized, dynamic policy for hotel yield management are made by Badinelli [8]. Guo et al. [25] found that dynamic pricing based on an appropriate segmentation is advantageous both for hotels and guests. Furthermore, O'Connor [26] found that pricing strategies create significant differences depending on the market segment. Cost aspects are also very important. The implementation of different pricing mechanisms can increase profits without a huge effort in terms of cost according to a research project of Bapna et al. [27, 28]. Mechanisms for adapting pricing to market demand while maximizing revenue are indispensable for the hospitality industry [17] due to the perishable nature of hospitality services. Rooms have high fixed cost and unsold rooms have zero salvage value [25]. The impact of hotel price sequences on consumers' reference prices was investigated by Viglia et al. [29] through a lab and a field experiment. Unfortunately, there is no deep research about the current use and development of advanced dynamic pricing in hotel booking platforms in Europe according to a systematic literature review in leading scientific databases like AiSel, SpringerLink, ScienceDirect, EBSCOHost, IEEEExplore according to general recommendations of Webster and Watson [30] with keywords like "dynamic pricing", "booking platform", "hotel" etc. over the last decades. Hospitality literature lacks research on advanced dynamic pricing strategies as confirmed by the literature reviews from Ivanov et al. [31], Abrate et al. [17], and Guillet et al. [15] and already found by Tso et al. [32]. For instance, Abrate et al. [17] investigate the effects of dynamic pricing strategies of European hotels, however, they do not identify or analyse the underlying advanced components. The analysis of popular pricing and price framing techniques from Mattila and Gao [2] did not identify any research on advanced dynamic pricing strategies. The research of Schütze [33] investigates the variance of hotel pricing

strategies within the hotel platform hrs.com. It was found that hotels use dynamic pricing, pre-fixed constant pricing and pre-fixed mixed pricing. On the other hand, there is research on traditional dynamic pricing approaches. For example, Azis et al. [34] developed a mathematical model for dynamic pricing as same as Baker and Collier [35] and Bayoumie et al. [36]. Besides the scientific literature, also practice reports on new approaches of dynamic pricing. For instance, the Wall Street Journal [9] describes that people who use an Apple Computer must spend much more for a hotel room per night as other costumers with different computer manufacturers. Therefore, in the US hotel sites use information about the information technology used by the customer for dynamic pricing. Because of a lack of research about advanced dynamic pricing systems in hotel booking platforms, an explorative case study research was conducted to investigate this research gap in the research project aiming to contribute and enlarging the knowledge in this field. The research method and data collection are described in detail in the following section.

3 Research Method and Data Collection

Due to the complex research field and the lack of current scientifically research, a case study research method seems to be the best method to answering the research question. Case studies are suitable to understand complex phenomena and to get deep and understandable insights, which are generalizable [37]. Furthermore, case study research is often applied in research (e.g., [39–39]). An explorative case study research approach according to general recommendations was implemented [40–41]. To get insights into the hotel booking platforms via explorative case study research, the management of different major platforms (regarding the general ranking of hotel booking platforms of the year 2016) in Europe in 2016, was contacted formal and informal. It was hard to get real insights in this highly competitive field. Finally, the chance was given to conduct a case study research in which the management of two major booking platforms in Europe participated. The data was collected and analysed in the second term of 2016 and 2017. Here, semi-structured interviews and discussions with the management of the enterprises were performed. The interviews were structured as follows. First, they started with a short preamble and the introduction of participants. After, question about the current pricing approaches used in their booking platform, new or currently under development approaches as well as up-coming trends were asked. For every question, the participants had enough time to reveal all their thoughts and even queries were allowed to ensure correctness of questions and answers. The interviews were conducted via telephone. On average, every interview lasted approximately one hour. The data was transcribed from the conversations with the management. The interviewed participants from the management have a strong background and long working experiences in the observed field. For instance, the responsible manager from case (1) has more than fourteen years of business experience in this area and is one of the regional directors of the observed booking platform. The responsible manager of platform (2) in this case is a regional sales leader of the observed booking platform with more than a decade industrial background. Furthermore, observations of the booking platform (e.g., evaluations through real booking transactions) and secondary data from documentations and presentations were

collected to avoid biases and misinterpretations of real phenomena. Therefore, different methods and data sources were used to produce a more comprehensive set of findings. The qualitative data was analysed with different coding techniques like open and selective coding following the guidelines recommended by Glaser and Strauss [42]. The analytical process of the qualitative data was supported by standard software tools for qualitative analysis recommended in literature. Aiming to avoid personal biases and misinterpretations, different coders were used. In fact, two different researchers run the first steps of the analytical coding processes independently from each other and discuss later on the results as well as work further on the analytical process. Furthermore, to avoid any acknowledging biases [43] each step was reflected regarding for example past experiences, blind spots, and discussed with a third researcher. A compromised case description can be found in the following: The two researched platforms are major platforms in Europe. According to market researchers, the two platforms can be found at the top of the used booking platforms in Europe over the last years. The platforms are operating all their services in the European Union (EU) as well as in Switzerland. Furthermore, there are also services that are operated outside the EU, but these were not observed in this case study. The headquarter of the platform 1) is in Switzerland, for 2) it is in Germany. Both platforms have a few thousand employees. The platforms wish to remain anonym, because of the highly competitive environment. The annual turnover of the platforms is in the three to four-digit million Euro range. Customers can use the platform via internet browser (mobile/desktop version) and app (iOS, Android, WindowsPhone). The apps are used by more than 20 million devices worldwide. However, most bookings are made through the desktop computer via a website.

4 Results

After analysing the collected data with regards to the defined methods and recommendations of the literature, the results summarized in Fig. 1 and described detailed in the following were got. The components of the dynamic pricing system that are under development are marked as dashed areas in Fig. 1.

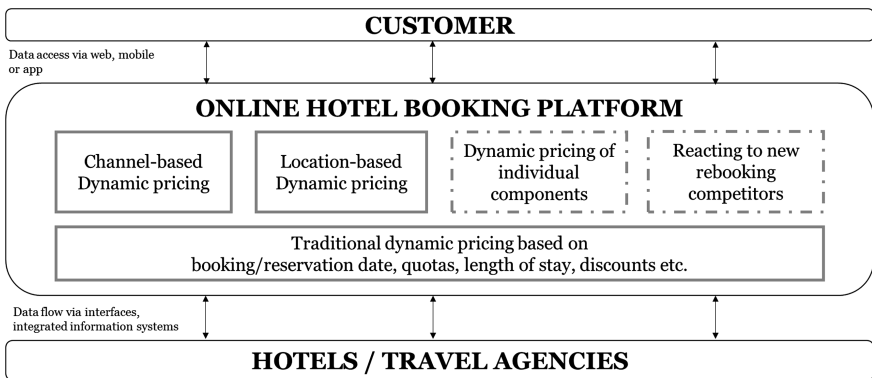


Fig. 1. Dynamic pricing systems at european hotel booking platforms

The dynamic pricing system of online booking platforms consists of interfaces to the customer as well as to the hotels and travel agencies. The main components of the dynamic pricing system are the traditional pricing systems adapted by four newer upcoming advanced components that are implemented or under development. The major booking platforms in the case study clearly state that until now the prices in the European market are not made with regards to personal information such as the used operating system, customer's search behaviour, etc. This stands in contrast to formerly conducted observations for different US platforms and hotel chains (e.g., [9]). One of the interviewed experts of case 2 argues, that the platform is querying different hotels and booking partners without transferring customer's personal data off to them:

This is not possible for us. Prices are defined by our hotel partners. They fix the price for the room, the category and even for the day dynamically.

The booking platform uses personal information only for showing cross-selling potentials or to propose similar hotels at other destinations. For instance, if the customer always selects 4-star hotels with free breakfast, W-LAN access and SPA, the platform will propose the customer primarily similar hotels for future bookings. The pricing data is exchanged from the hotel or (online) travel agency via different standardized data formats like XML and booking information systems such as Amadeus. Furthermore, smaller hotels and hotel chains are enabled to change easily the available rooms and rates manually via an interface at the website of the hotel booking platform. The realization of a real dynamic pricing strategy is only possible if they connect their booking system automatically with the online booking platform. One of the experts of the booking platform of case 1 argues about the complexity of the interfaces in the following quote:

At the moment, a user entering our platform hundreds of interfaces will be scanned. [...] However, we scan these interfaces, not the users themselves.

This argument also underlines, that no personal data of the customer is transferred to the booking portal before the booking is finally confirmed. The dynamic price adjustment at the observed European hotel booking platforms is implemented with regards to different variable aspects. These include besides the different provided prices for the platform at different times based on the individual service request (e.g., time, room type, number of persons, length of stay) and also yield agreements with the hotel or travel agency. Furthermore, there are influences referring to different promotional campaigns. These promotional campaigns can induce misleading prices. One of the managers of case 2 comment on this subject as follows:

I am really not sure about whether the promotion was implemented properly. It might be also conceivable that it was just forgotten.

The phenomena of different prices between booking platforms and hotel websites are described by the expert of case 2 mostly as a data exchange problem:

They are not able to maintain tidily the databases of 5–6 portals. Therefore, you need a quite good technical know-how and your interfaces should be implemented remarkably good.

This factor also highlights the complexity especially if different information systems are used simultaneously and underlined the need for a professional integration.

Furthermore, the platforms are concerned about the customer satisfaction. A critical situation could occur if the customer noticed different prices for the same service at the same time. The managers in the cases further mentioned the barriers of data protection and the related challenge of using all personal data for calculating and displaying individual prices. Especially in the European Union [44], this aspect is quite important and challenging, because strict and customer-friendly data protection inhibit the use of personal information for dynamic pricing. Besides, the traditional dynamic pricing realizations [19] based on e.g. time, room type, quotas, overbooking, amount of persons or length of stay, the platforms implemented and worked on different advanced dynamic pricing components in Europe. The collected empirical data show four further different advanced components for dynamic pricing systems: channel-based Dynamic Pricing, location-based Dynamic Pricing, Dynamic Pricing of components and the reacting to new rebooking competitors. Whereas Channel-based Dynamic Pricing and location-based Dynamic Pricing are already approved and successfully implemented; Dynamic Pricing of components and the reacting to new rebooking competitors are still in the early stages of development.

4.1 Channel-Based Dynamic Pricing

In the interviews and related data, conducted in the research, revealed that in every single channel the configuration of the dynamic pricing strategy is different. For instance, the expert of the booking platform of case 1 argues that mobile sites show different prices compared to the website shown on normal desktop computers:

The search via mobile devices and the online search differ in price.

This statement was also confirmed by the expert of the second case. He described the same design for the implementation of the pricing system as follows:

It might be the case that you will get a better price using an app on a mobile device instead of a desktop computer.

This fact could be explained by changes in customer behaviour and the adjustment of the yield strategies. Now, the use of mobile applications (e.g. apps) is stimulated with lower prices to change customer behaviour. Current research [45] suggests that mobile shopping can increase the amount of purchases and can also increase the revenues. These results stand in line with the viewpoint of the experts. They also commented that customers would take booking decisions on mobile devices faster, without many price and platform comparisons. Furthermore, customers' willingness to this kind of application in tourism is given [46]. In terms of a changed customer behaviour, this refers to the adaption level theory [47] in combination with the prospect theory [48]. Both are well-known and proved theories which were already applied for dynamic pricing (e.g., [49]). In accordance with adaption level theory [47] customers have individual internal reference prices for services (e.g. price for a hotel room) built by former price experiences. When booking a room, they use this reference price to estimate the price for the current booking situation. Furthermore, customers want to avoid that they pay too much for a service. This fact refers to the prospect theory [48]

and is also known as loss aversion. That implies that if the price is below the internal price level, the customer perceives a gain, because from the customer's viewpoint a loss is excluded (here: paying too much for the service) and vice versa. In example, if the price for a room on the mobile site of the platform is lower than expected, customers will respond favourable because of the perceived gain and will fix the booking. Even the collected data showed evidence for this solution.

4.2 Location-Based Dynamic Pricing

The same hotel room at the same time could have different prices conditioned by a country-specific website of the booking platform. For instance, the price for the hotel for a customer from Austria could be much more expensive than for a customer from Czech Republic. The dynamic pricing systems of both observed cases implement this kind of geographical pricing [50] depending on diverse entry websites for different countries with several top-level domains. In general, geographical pricing offers different prices for an identical service to a customer regarding the determined country. This puts the supplier in a position to maximize profits in accordance with the country-specific wage level as well as the connected willingness-to-pay [51]. The following quote from a manager of the booking platform of case 1 point out the phenomenon of different prices at different countries very well:

It depends on the used country-specific platform. Probably the customer would get different prices.

Additionally, empirical observations during the research in 2016 and 2017 were conducted to prove this interesting aspect affirmed this insight significantly. Depending on the different country-specific websites the same booking platform offered different prices for the same service. The average reference price a customer perceives for a service differs from country to country (e.g., [52]). Therefore, if the platform defines the right price for different regions regarding this expected price, the customer will respond favourable to the given offer on the platform and will book the sought service there (e.g. hotel room). This behaviour is again in agreement with the adaption level theory [47] and the prospect theory [48]. In a nutshell: If the price for a service is much more expensive than expected or even not affordable for the citizens of a certain country, the platform will be rejected to maintain the internal levels. In the investigated cases this phenomenon was also mentioned as a reason for the implementation of these aspects in terms of dynamic pricing.

4.3 Dynamic Pricing of Components

The investigated cases in the research showed, that the enterprises in the Tourism sector work currently on the realization of effective dynamic pricing for different service components. In general, the components can be sold as bundle of services like hotel room including breakfast and spa entry or the components can be offered as all in all individual service [53, 54]. Now, the different (further) components of a hotel service are offered at a predetermined (static) price or only a weak price differentiation regarding the point of booking is made (e.g., early bird fares). One expert of case 1

show that the pricing of the components will be more dynamic in the future and explain this development by taking the example of the airline industry:

In the aviation industry, this aspect is well established. At the airport, it is much more expensive to check in one's luggage than before. [...] Absolutely, this will be more dynamic in the future.

This statement is in line with the found results in case 2. This booking platform is working on the same idea to design a dynamic pricing for single service components. A manager from case 2 agreed with the opinion given above as follows:

Soon, pricing components will be more dynamic.

That implies that due to the current booking commons and customer behaviour the dynamic pricing in this field will grow. For instance, contrarily to the present mainly static price, different services such as wellness, dinner or breakfast packages will be priced more dynamical. In this context, it is very interesting to observe customers' response to this modification. According to adaption level theory [47] and prospect theory [55], the customer will book the additional components, if the price is below their internal price level built on former experiences. If the price is higher, the customer will not book the additional components anymore. This would be a quite unfavourable situation for the suppliers because the loss customer experience, in that case, is more unpleasant and larger than the possible benefit could be at all. Therefore, the booking platforms must weigh and balance this measurement critically to avoid damaging customers' satisfaction. However, the dynamic pricing of this component is still under development and in the early stages. Therefore, no empirical insights are gained, but there is already work on prospective studies together with the platforms which already participated in the researches.

4.4 Reacting to New Rebooking Competitors

The analysis of the data revealed a further new aspect which will have an impact on the dynamic pricing for hotel rooms via online booking platforms in Europe. New competitors with different business models will change the market situation again and especially the established enterprises must meet this challenge. To be more precisely, enterprises like Dreamcheaper.com take advantage of the free-of-charge cancellation agreement many hotels offer. Therefore, these new market players allow the customer to rebook hotel rooms for a cheaper fee. Such new services can trigger new ways of dynamic pricing because new and different rebooking strategies arise. One manager in the study of case 2 argues about the dynamic of this rebooking feature like following:

Rebooking features enhance the dynamic in this market.

Current research shows that customers using such customer-friendly solutions to save cost for booking a hotel room [56]. Therefore, the booking platforms should be aware of the new competitors, because they decrease the revenues of the hotels and the booking platforms as well. These new competitors utilize the adaption level theory [47] and prospect theory [48] to evoke favourable consumer behaviour. Therefore, they enlarge the perceived gain of the customer by rebooking the room for a lower price. The observed platforms are aware of this challenge and plan to scan these competitors

and will implement different new ways for customer retention, discounts, and new kinds of cancellation agreements. Currently, further studies in this interesting area for future research are developed.

5 Conclusion, Discussion and Future Research

Dynamic pricing is a challenge for hotel booking platforms. The lack of research in this field requires a first qualitative explorative research approach to prepare future studies. The research shows different insights into the current status-quo and the up-coming trends in advanced dynamic pricing systems. In contrast to the findings in practical reports from the US [9] the observed two major platforms in Europe do not implement a dynamic pricing approach based on customers personal information (e.g. used operating system) [9]. Besides the traditional dynamic pricing factors such as dates, length of stay or quotas [19] the platforms use currently Channel-based and Location-based Dynamic Pricing and work on new approaches to realize a Dynamic Pricing of components. Furthermore, they have a look on new rebooking competitors (e.g., Dreamcheaper.com), which increase the dynamic in this market. This research contributes to the current literature by enlarging the knowledge in terms of new approaches in the design of dynamic pricing systems for hotel booking platforms in Europe. The understanding about how data is currently collected and how personal information is used by platforms is clarified. In accordance with the empirical data, general ideas of location-based price differentiation are implemented by means of user's access by country specific domains. In addition, platforms trying to transfer customers to use a mobile device for booking with the aim to gather the advantage will book rooms there faster without intensive comparison. The study also looked ahead and pointed out which approaches are currently under development. Additionally, it was tried to predict customer booking behaviour by transfer the psychological approaches of the adaption level theory [47] and the prospect theory [48] to the findings to ensure whether the components of the dynamic pricing system could really work as expected. The research also contributes to the belongings of practice and management in several ways. They can benefit in terms of a better understanding of the status-quo, the arising developments of dynamic pricing and the knowledge why some prices phenomena may occur. The empirical findings implicate, that the integration of hotels, travel agencies and platforms are not always implemented as well as it could be. Therefore, (unwanted) different prices arise. Different prices can decrease revenues, by destroying customer satisfaction, customer loyalty as well the brand image [14, 53]. New rebooking competitors [56] should be observed and changes in the pricing and booking systems are needed in the future to stay competitive. Limitations can be found in the two major European booking platform cases and the use of a qualitative research approach (e.g., interpretation biases). Nevertheless, this research approach as well as sample size is often applied in research (e.g., [38]). Future research projects can benefit from these findings by using them as a foundation for a deeper and more concrete investigation of components of a dynamic pricing system. Additionally, future research could go deeper into the different phenomena's and parts of dynamic pricing in European hotel booking platforms of the identified dynamic pricing components (e.g., with experiments,

observations). Further quantitative studies (e.g., experiments) will be conducted to prove the findings influence and importance statistically and make them more generalizable. Furthermore, future research should enlarge the cases and compare it with the current research results. Also, the comparison of different dynamic pricing strategies of different platforms in different countries or the observation of the effects arising with the new rebooking competitors as well as investigating personalized pricing approaches at hotel websites are interesting points for future research. Even, further case studies of the new competitors and the investigation of their strategies might be interesting to find maybe possible starting points to integrate them into the revenue management.

References

1. Carroll B, Siguaw J (2003) The evolution of electronic distribution. *Cornell Hotel Restaur Adm Q* 44(4):38–50
2. Mattila AS, Gao Y (2016) An examination of popular pricing and price framing techniques in the hospitality industry and directions for future research. *Int J Revenue Manag* 9(2–3):175–185
3. EU (2017) Statistics on ICT use in tourism. http://ec.europa.eu/eurostat/statistics-explained/index.php/Statistics_on_ICT_use_in_tourism#Further_Eurostat_information
4. ETOA (2017) What Will the Global Hotel Industry Look Like? <http://www.etoa.org/media/all-news/news-item/fast-forward-to-2017>. Accessed 29 Sep 2018
5. Eisenmann T, Parker G, Van Alstyne MW (2006) Strategies for two-sided markets. *Harv Bus Rev* 84(10):92–101
6. Eisenmann TR (2007) managing proprietary and shared platforms: a life-cycle view, division of research. Harvard Business School
7. Gallego G, Van Ryzin G (1994) Optimal dynamic pricing of inventories with stochastic demand over finite horizons. *Manag Sci* 40(8):999–1020
8. Badinelli RD (2000) An optimal, dynamic policy for hotel yield management. *Eur J Oper Res* 121(3):476–503
9. Mattioli D (2012) On orbitz, mac users steered to pricier hotels. *Wall Street J* <https://www.wsj.com/articles/SB10001424052702304458604577488822667325882>. Accessed 29 Sep 2018
10. Dodds WB, Monroe KB, Grewal D (1991) Effects of price, brand, and store information on buyers' product evaluations. *J Mark Res* 28(3):307–319
11. Hinz O, Hann IH, Spann M (2011) Price discrimination in e-commerce? An examination of dynamic pricing in name-your-own price markets. *MIS Q* 35(1):81–98
12. Zeithaml VA (1988) Consumer perceptions of price, quality, and value: a means-end model and synthesis of evidence. *J Market* 52(3):2–22
13. Hallowell R (1996) The relationships of customer satisfaction, customer loyalty, and profitability: an empirical study. *Serv Ind Manag* 7(4):27–42
14. Zeithaml VA, Parasuraman A, Berry LL, Berry LL (1990) Delivering quality service: balancing customer perceptions and expectations. Free Press, New York
15. Denizci Guillet B, Mohammed I (2015) Revenue management research in hospitality and tourism. *J Contemp Hosp Manag* 27(4):526–560
16. Ivanova M, Ivanov S, Magnini VP (2016) Handbook of hotel chain management
17. Abrate G, Fraquelli G, Viglia G (2012) Dynamic pricing strategies: evidence from European hotels. *Int J Hosp Manag* 31(1):160–168

18. Heo CY, Lee S (2011) Influences of consumer characteristics on fairness perceptions of revenue management pricing in the hotel industry. *Int J Hosp Manag* 30(2):243–251
19. Legohérel P, Poutier E, Fyall A (2013) Revenue management for hospitality and tourism. Goodfellow Publishers Woodeaton
20. Guadix J, Cortés P, Onieva L, Muñuzuri J (2010) Technology revenue management system for customer groups in hotels. *J Bus Res* 63(5):519–527
21. Kimes SE, Wirtz J (2003) Has revenue management become acceptable? *J Serv Res* 6(2):125–135
22. Ivanova M, Ivanov S, Magnini VP (2016) Handbook of hotel chain management
23. Melis G, Piga CA (2017) Are all online hotel prices created dynamic? an empirical assessment. *Int J Hosp Manag* 67:163–173
24. Möhring M, Keller B, Schmidt R, Zimmermann A (2018) Revenue management information systems for small and medium-sized hotels. In: International conference on intelligent decision technologies, pp 120–127
25. Guo X, Ling L, Yang C, Li Z, Liang L (2013) Optimal pricing strategy based on market segmentation for service products using online reservation systems: an application to hotel rooms. *Int J Hosp Manag* 35:274–281
26. O'Connor P (2002) An empirical analysis of hotel chain online pricing strategies. *Inf Technol Tour* 5(2):65–72
27. Bapna R, Goes P, Gupta A (2003) Analysis and design of business-to-consumer online auctions. *Manag Sci* 49(1):85–101
28. Bapna R, Goes P, Gupta A, Jin Y (2004) User heterogeneity and its impact on electronic auction market design: an empirical exploration. *MIS Q* 28(1):21–43
29. Viglia G, Mauri A, Carricano M (2016) The exploration of hotel reference prices under dynamic pricing scenarios and different forms of competition. *Int J Hosp Manag* 52:46–55
30. Webster J, Watson RT (2002) Analyzing the past to prepare for the future: writing. *MIS Q* 26(2):494–508
31. Ivanov S, Zhechev V (2012) Hotel revenue management—a critical literature review. *Turizam* 60(2):175–197
32. Tso A, Law R (2005) Analysing the online pricing practices of hotels in Hong Kong. *Int J Hosp Manag* 24(2):301–307
33. Schütze J (2008) Pricing strategies for perishable products: the case of Vienna and the hotel reservation system hrs.com. *Central Eur J Oper Res* 16(1):43–66
34. Aziz HA, Saleh M, Rasmy MH, ElShishiny H (2011) Dynamic room pricing model for hotel revenue management systems. *Inform J* 12(3):177–183
35. Baker TK, Collier DA (1999) A comparative revenue analysis of hotel yield management heuristics. *Decis Sci* 30(1):239–263
36. Bayoumi AEM, Saleh M, Atiya AF, Aziz HA (2013) Dynamic pricing for hotel revenue management using price multipliers. *J Revenue Pricing Manag* 12(3):271–285
37. Darke P, Shanks G, Broadbent M (1998) Successfully completing case study research. *Inf Syst J* 8(4):273–289
38. Seidel S, Recker JC, Vom Brocke J (2013) Sensemaking and sustainable practicing. *MIS Q* 37(4):1275–1299
39. Yin R (2011) Applications of case study research. Sage
40. Yin R (1994) Case study research: design and methods. Sage Publications, Beverly Hills
41. Eisenhardt KM, Graebner ME (2007) Theory building from cases: opportunities and challenges. *Acad Manag J* 50(1):25–32
42. Glaser BG, Strauss AL (2009) The discovery of grounded theory, transaction Publishers
43. Baran ML (2016) Mixed methods research for improved scientific study. IGI

44. Bignami F (2007) Privacy and law enforcement in the European union: the data retention directive. *Chi J Int'l L* 8:233
45. Wang RJH, Malthouse EC, Krishnamurthi L (2015) On the go: How mobile shopping affects customer purchase behaviour. *J Retail* 91(2):217–234
46. Mo Kwon J, Bae J, Blum SC (2013) Mobile applications in the hospitality industry. *J Hosp Tour Technol* 4(1):81–92
47. Helson H (1964) *Adaptation-level theory*. Harper & Row, Oxford, England
48. Kahneman D, Tversky A (1979) Prospect theory: an analysis of decision under risk. *Econometrica: J Econom Soc*, 263–291
49. Popescu I, Wu Y (2007) Dynamic pricing strategies with reference effects. *Oper Res* 55(3):413–429
50. Kotler P, Armstrong G (2010). *Principles of marketing*, Pearson Education
51. Avlonitis GJ, Indounas KA (2006) Pricing practices of service organizations. *J Serv Market* 20(5):346–356
52. Seidler G (1937) Geographical price relations and competition. *J Market* 1(3):198–204
53. Shoemaker S (2003) The future of pricing in services. *J Revenue Pricing Manag* 2(3):271–279
54. Venkatesh R, Mahajan V (1993) A probabilistic approach to pricing a bundle of products or services. *J Market Res* 30(4):494–508
55. Kahneman D (2011) *Thinking*. Penguin, Fast and Slow, London
56. Piccoli G, Pigni F (2016) TRIPBAM: leveraging digital data streams to unleash savings. *Commun AIS* 39(1):556–574



Privacy Protection in Tourism: Where We Are and Where We Should Be Heading For

Iis Tussyadiah¹(✉), Shujun Li², and Graham Miller¹

¹ School of Hospitality and Tourism Management, University of Surrey,
Guildford, UK

{i.tussyadiah, g.miller}@surrey.ac.uk

² Kent Interdisciplinary Research Centre in Cyber Security (KirCCS) and School
of Computing, University of Kent, Canterbury, UK

s.j.li@kent.ac.uk

Abstract. The link between information privacy concerns and privacy behaviours has been a focus of extensive investigation in various disciplines. However, little attention has been devoted to this issue in the tourism literature. Spurred by technological development and shaped by tourism-related environments, emerging privacy issues call for comprehensive yet context-specific studies to ensure tourists are making beneficial privacy choices. This paper first presents a comprehensive review of state-of-the-art research on privacy concerns and behaviours. Then, it suggests a list of overarching research priorities, merging social and technical aspects of privacy protection approaches as they apply to tourism. The priorities include research to measure tourists' privacy concerns, explore specific biases in tourists' privacy decisions, experiment with privacy nudges, and explore how to integrate privacy nudges in system design. Thus, this paper contributes to guiding the direction of future research on privacy protection in tourism.

Keywords: Privacy concern · Personal data · Information disclosure
Privacy paradox · Nudges

1 Emerging Issues

Tourism is information intensive [1, 2]. Tourists need to process a significant amount of information to make various decisions along their journey from pre-trip planning to in-destination experiences to post-trip evaluation and experience sharing. Correspondingly, tourists are often required to give up personal information in exchange for services to enable (e.g., booking process, visa application) and enhance (e.g., access to discounts) their travel experiences. As an illustration, overwhelmed with the large number and variety of points-of-interest (POIs) in a destination, some tourists will resort to using recommender systems (RSs) to make informed decisions [3]. Various RSs have been developed to suggest POIs, tourist services, user-generated content and social networking services, routes and tours, and personalised multiple-day tour planning [4]. In order to deliver relevant recommendations, these RSs collect and process sensitive data about users, such as their locations, interests, mobility

requirements, previous visits, etc., sometimes without tourists being fully aware of it. While getting personalised recommendations is found in prior research to lead to positive responses, including higher willingness to disclose personal information, it can also lead to negative responses due to higher level of privacy concerns; generating the so-called personalisation–privacy paradox [5].

Indeed, the link between privacy concerns and disclosure of personal information has been a focus of investigation in various disciplines [6–8]. Its application in the tourism context requires a critical perspective due to several existing and emerging issues that may contribute to less awareness of privacy threats and greater vulnerability to violations [9, 10]. *First*, information technologies develop fast and travel and tourism tend to be among the first industries to embrace them [2]. While tourists have an option to skip the use of emerging technologies such as mobile payment while travelling, some other technologies are much harder or impossible to avoid. An example is the use of automated check-in kiosks collecting biometric information at an airport gate. Additionally, destinations increasingly use real-time surveillance system for safety and security purposes, to protect tourists and residents from crimes. Tourists may not be aware of the range of privacy and security threats that come with these technologies. Furthermore, recent breakthroughs in Artificial Intelligence (AI) have allowed tourists to rely on automated systems such as an intelligent personal assistant, a system that is capable of learning the interests and behaviour of the user and respond accordingly [11]. This potentially raises new layers of privacy concerns.

Second, being in an unfamiliar environment, tourists may be easily persuaded to disclose personal information due to an inflated sense of urgency to obtain information and/or services [9]. This applies when information is considered time-critical, as tourists try to maximise activities within the limited length of stay. For the same reason, tourists may feel more at ease when sharing information with organisations or individuals they do not expect to interact extensively (or at all) anymore after the trip. *Third*, tourists' relationships with service providers and thus services rendered/used are typically short-lived and variety-seeking tourists are seldom loyal customers [10]. This will limit trust building, which may affect privacy decisions. *Fourth*, due to the prevalence of online social networks (OSNs) among Internet users, many travellers would like to share their travel experience including pictures and videos with friends and the public, both during and after the trip. Many of them consider this an important part of their overall travel experience, so have a tendency to overshare. Note that such information sharing activities often involve sharing information of other people (e.g., family members and friends travelling together or being visited). *Last*, with the prevalent use of peer-to-peer (P2P) platforms such as Airbnb and Uber where trust mechanism is built upon reciprocal reviews, sensitive personal information revealed privately during offline guest–host interactions may reach the public sphere or a scope wider than expected by way of online reviews. This implies the risks from compounded physical and informational privacy [12].

These emerging issues call for comprehensive studies to better understand the ever more complex information privacy decision making for tourists. Importantly, as privacy failures can impact not only the travel industry and tourism destinations, but also a wider society, efforts to bring about desired privacy behaviours from tourists are critical. To that end, this paper aims to review the state-of-the-art research on the topic

of information privacy from various disciplinary perspectives and, based on emerging issues in tourism, recommend areas of research priorities to ensure tourists are making more informed choices when it comes to disclosing personal information related to their travels.

2 State-of-the-Art

Westin [13] defined privacy as “...the claim of individuals, groups, or institutions to determine for themselves when, how, and to what extent information about them is communicated to others” (p.7). Subsequent research conceptualised privacy as a right or an ability to control how information about self is collected, retained and/or maintained, used and communicated, disclosed or shared [14]. More specifically, the definitional approach is classified to privacy into value-based (privacy as a human right integral to society’s moral value system) or cognate-based (privacy is related to individual’s mind, perceptions, and cognition rather than to an absolute moral value) [15]. The first approach defined privacy as a right and as a commodity (economic subject), while the latter defined privacy as a state (of limited access to information) and as (ability to) control information [15]. These definitions influence how privacy is measured in empirical research.

While research on information privacy in the context of tourism is extremely limited, the topic, especially pertaining to behaviour in online environments, has been extensively investigated in behaviour economics, decision science, and information systems disciplines. As suggested in a number of systematic review and meta-analytic studies [6–8, 15–18], research on privacy has focused on individuals’ privacy behaviours, specifically investigating perceived privacy concerns and its antecedents and consequences, cognitive and behavioural biases influencing privacy decisions, including the concept of privacy paradox, and nudge strategies for positive behaviour intervention.

2.1 Perceived Privacy Concerns

Privacy concerns, which refer to individuals’ beliefs about the risks and potential negative consequences associated with disclosing personal information [6, 19], are considered a measurable proxy for privacy [15]. In essence, consumers who are worried about information privacy would take protective actions to reduce these perceived risks, which will generate significant impacts on service providers. Therefore, studies have been dedicated to theorising privacy concerns and finding empirical support for behavioural models linking privacy concerns and privacy management [8, 18], also termed the macro model of APCO (Antecedents → Privacy Concerns → Outcomes) to assess privacy at an individual level [15].

Theories of Privacy Concerns. Li [18] presents a comprehensive analysis of the theoretical landscape underlying information privacy concerns. To explain what leads to privacy concerns, research refers to Agency Theory [20] and Social Contract Theory [21], which elucidate how privacy concerns exist due to incomplete information and

providers' opportunistic behaviour regarding customer information. The consequences of privacy concerns are generally explained with Theory of Reasoned Action (TRA) [22] and Theory of Planned Behaviour (TPB) [23], which describe how privacy concerns can manifest in attitude toward privacy, intention, and information disclosure behaviour. Other systematic reviews have also been devoted to the relationship between different consequences of privacy concerns [7, 17], specifically on the (in-)information) Privacy Paradox [24–26], which refers to the dichotomy of privacy attitude and actual behaviour.

The Privacy Calculus Theory [27, 28] plays a central role in explicating the trade-offs (benefits vs. risks) consumers consider when deciding to disclose personal information. Three various forms of privacy calculus were also considered in previous research: Utility Maximisation Theory [29], Expectancy Theory of Motivation [30], and Expectancy-Value Theory [22]. The discussions regarding risks and benefits of information disclosure also dominated the literature on Privacy Paradox [7, 17], with a multitude of theories used to elucidate risk–benefit calculation in privacy decisions as guided by rationality (e.g., Rational Choice Theory of Human Behaviour [31], Resource Exchange Theory [32, 33]), biases in risk–benefit assessment (e.g., Theory of Bounded Rationality [34], Uses and Gratification Theory [35, 36], Prospect Theory [37]), and failure to perceive risks associated with privacy decisions (e.g., Theory of Incomplete Information [38]). Biases associated with privacy decisions, including heuristics, will be discussed in the next section.

Finally, to explain factors influencing privacy concerns, such as institutional and individual factors, different theories were used in previous research, including Procedural Fairness Theory (27), Protection Motivation Theory [39], and Social Cognitive Theory [40, 41]. Li [18] suggests the mediating role of protection-motivation in the impacts of institutional and individual factors on perceived privacy concerns and proposes a new Risk Calculus Theory, referring to the trade-off between perceived risks and the efficacy to cope with these risks, which together with the privacy calculus form the *Dual-Calculus* model determining individuals' intention to disclose personal information.

Measures of Privacy Concerns. Notable frameworks to assess individuals' concerns for privacy include Global Information Privacy Concerns (GPIC), Concerns for Information Privacy (CFIP) [42], and Internet Users' Information Privacy Concerns (IUIPC) scales [43]. GPIC is a unidimensional scale measuring privacy concerns in general, while CFIP delves into specific dimensions of individual's privacy concerns, mainly focusing on organisations' responsibilities for the proper handling of customer information. CFIP consists of four dimensions: the collection of personal information, unauthorised secondary use of personal information, improper access to personal information, and errors in storing of personal information. The purpose of IUIPC is to reflect internet users' concerns, focusing on perceptions of fairness and justice in the context of information privacy in online environments [43]. It has three factors: collection (whether the exchange of personal information is equitable), control (whether users have control over the data), and awareness (whether users are adequately informed about the use of the data). Various privacy research has adopted the aforementioned scales, adapted them to specific research contexts, or refined the scales with additional dimensions, such as technological, socio-cultural, and legal aspects of

privacy concerns [12, 44, 45]. Research calls for refining the privacy concerns construct by incorporating various facets of information privacy and test the construct validity in different contexts [8], including tourism.

Antecedents of Privacy Concerns. In general, individuals' concerns of information privacy depend on a number of factors. Antecedents evaluated in empirical research on privacy are summarised in [8, 15]. Reviewing privacy research in the marketing domain, [45] categorised these factors into consumer determinants (psychology of privacy), which are affected by privacy in society factors. They include:

- *Individual factors*: demographic differences, personality differences, privacy experiences, privacy awareness and knowledge, psychological and socio-psychological factors (including dispositions to heuristics, which will be discussed in subsequent section), self-efficacy, etc.
- *Social-relational factors*: the influence of important others (social norms/subjective norms).
- *Organisational factors*: awareness of improper handling of personal data by organisations and organisational communication of privacy.
- *Macro-environmental factors*: ethical framework, global variation (cross-cultural preferences, cross-national regulatory variation and effects), and legal and policy implications (privacy failure intervention).
- *Information contingencies*: types and sensitivity of information (personally identifiable information, medical records, financial information, biometric templates, etc.).

Previous research calls for exploration for additional antecedent factors to privacy concerns [8], especially as they relate to risks associated with various contexts.

Outcomes of Privacy Concerns. As an independent variable, privacy concerns are linked to behavioural responses [15]. In marketing research, a range of outcomes at the individual level include purchase intent, willingness to disclose information, click-through (in online environments), falsifying information, negative word-of-mouth, and switching behaviour [45]. In general, consequences of privacy concerns are analysed from TRA and TPB perspectives, which can be categorised into [8]:

- *Personal beliefs*: trusting beliefs, risk and uncertainty beliefs, etc.
- *Attitude*: conceptualised as a direct result of beliefs, it refers to attitude toward information disclosure.
- *Behavioural intention*: intention to share, to adopt, to take protective actions, etc.
- *Actual behaviour*: transactional behaviours (e.g., information disclosure) and protective behaviours (e.g., refusal to provide information, removal of information, negative word-of-mouth, information fabrication) [46, 47].

While the conceptualised link between attitude, intention, and behaviour has been validated, behaviour research also found discrepancies between attitude, intention and actual behaviour [47], as captured in the concept of privacy paradox [7, 17, 26]. This remains an important research area. The following subsection will touch upon the limitations faced by consumers when making decisions to disclose personal information, which provide some explanation to some of the inconsistencies in consumers' privacy behaviour.

2.2 Cognitive and Behavioural Biases in Privacy Decisions

Early research on privacy behaviour based its assumption on rational model of decision-making, assuming that people make rational deliberation comparing risks and benefits of information disclosure [28, 42]. However, privacy behaviours are complex and nuanced; they are also made based on heuristics, affects, and emotions [16, 17]. Based on a comprehensive review of research in behavioural decision research, behavioural economics, and experimental psychology, three hurdles that consumers face when making privacy decisions, preventing them from making rational choices, were suggested [16]. *First*, technologies and threats constantly evolve, so users are left with incomplete and asymmetric information. Data holders (e.g., service providers) usually have more information regarding the purposes and conditions of future use of personal data, compared to consumers. *Second*, consumers have limited mental resources to evaluate all possible consequences of their behaviour (i.e., bounded rationality), leading them to lean on heuristics. *Third*, privacy decisions are prone to be affected by cognitive and behavioural biases.

Some of the psychological biases found in previous research to influence privacy and security decisions are [7, 16, 17]:

- *Anchoring*: consumers may be affected by what others do when deciding to disclose personal information, regardless of the consequences that it may entail.
- *Loss aversion*: people report high privacy concerns about companies gathering their personal information (loss), but refuse to pay for privacy protection.
- *Framing effect*: consumers may find a privacy policy more desirable when framed as more protective compared to a reference point (e.g., a competitor's privacy notice), thus affecting their willingness to share personal information.
- *Hyperbolic discounting or immediate gratification bias*: consumers may choose an option with immediate gain in choices involving inter-temporal trade-offs, such as access to desired services (immediate benefit) vs. privacy costs that may be incurred months later (risk diffusion).
- *Optimism bias and overconfidence*: consumers may be overconfident in their assessment of privacy or security risks.
- *Post-completion errors*: consumers omitting secondary tasks (e.g., logging out of a shared computer) after completing a primary task (e.g., booking a tour), leading to privacy and security risks.
- *Status quo bias*: people have an affinity for default choices, such as the default configurations of privacy tools without actually reviewing the settings.
- *Habit*: habitual use of technologies spills over to other consumption situations.
- *Indeterminacy* (from quantum theory): consumers may alter their preferences indeterminately, at the time an actual decision is made.

Users are often unaware of these biases and tend to be influenced by the same biases as they make similar decisions. This signifies the need for behavioural interventions to avoid negative consequences of poor privacy-related decisions.

2.3 Nudges for Privacy

In light of the limitations facing consumers when making privacy decisions, researchers have attempted to identify approaches to balancing information disclosure and protection of personal data in ways that optimise consumers' overall welfare and minimise losses such as regrettable disclosure. Previous research uses soft paternalistic intervention approaches (or nudges) [48, 49], applying lessons from behavioural research to design policies, systems, and choice architectures to nudge users toward more beneficial choices [16, 50]. Six interrelated nudging dimensions were proposed [16] to mitigate (or exploit) the aforementioned limitations in privacy decisions, which include:

- *Nudging with information*: reducing information asymmetries and providing a realistic perspective of risks via education (prior to decision) and feedback (after decision). For example, presenting privacy settings in a concise and readable manner (e.g., “everyone can see this photo.”) will improve user's understanding of privacy risks and result in responsible data sharing behaviour.
- *Nudging with presentation*: providing necessary contextual cues in the user interface to reduce cognitive load and convey the appropriate level of risk through framing and structure (e.g., increasing saliency or exaggerating privacy risk).
- *Nudging with defaults*: reduce user effort by configuring the system according to users' expectations, such as defaults for opting-in or opting-out consent.
- *Nudging with incentives*: motivating users to behave according to their stated preferences through rewards and punishments. These also include non-financial rewards and punishments such as social support and peer pressure. Another example is nudging away from risky behaviour by making it more difficult to share information (e.g., by multiple confirmation).
- *Facilitating reversibility and error resiliency*: limiting the impact of mistakes by designing systems that ease error correction, through forced actions or automated completion and reversibility (e.g., deleting regrettable posts, comments, or tweets that reveal too much information).
- *Timing of nudges*: defining the right moment to nudge.

Further, a question has been raised [16] how far nudging should go in influencing user behaviour, especially in situations where right or wrong decisions are not entirely clear. This calls for further studies pertaining to implementation of nudges, including the ethical and legal aspects of it (i.e., liability issues arising from consumers following nudges that are later proven illegal). Additionally, there may be no one-size-fits-all approach to nudging for privacy. Thus, identifying most effective nudges for different population and privacy contexts is a critical research area.

3 Research Priorities

Extensive research on information privacy has been done in various disciplines. Yet, these call for further studies to continue the research tradition in this area, to refine the measurements of privacy, and to explore the dynamics of individuals' privacy

management and behaviours in various contexts. Taking the context of tourism, it is critical that future research will not be a mere attempt to test whether existing theories and models are applicable to tourists and tourism, but instead enrich the literature by refining the conceptualisation of privacy and exploring new factors that contribute to the better understanding of general and situational privacy behaviour. Therefore, a set of research priorities is presented in the following, taking into consideration emerging issues and the state-of-the-art, to guide future research on this topic (see Fig. 1).

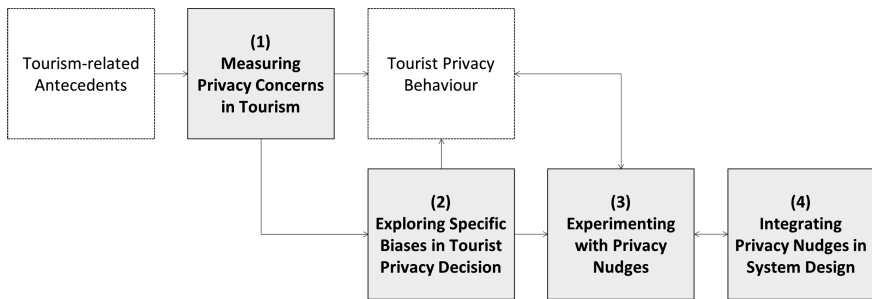


Fig. 1. Privacy protection in eTourism: research priorities

3.1 Measuring Privacy Concerns in Tourism

In order to assess privacy concerns in the context of tourism, it is necessary to refine existing privacy concerns construct by incorporating different facets of information privacy, integrating potential compounding privacy concerns from online and offline (i.e., cyber-physical) environments, and validate the constructs with diverse population of tourists. Furthermore, future research needs to focus on identifying specific antecedents and consequences of tourists’ privacy concerns. Specifically, contextual factors will influence information contingencies involved in tourists’ disclosure behaviour, such as types and sensitivity of information, as well as organisational and macro-environmental factors. For instance, the influence of cross-national regulatory contexts in international travel will be an important area to explore: as tourists crossed boundaries, they would need to adapt to new regulatory frameworks for privacy protection and (mandatory) information disclosure, which might add to privacy concerns. Additionally, it is necessary to further explore the limited interactions and thus opportunities for trust building between tourists and service providers and their consequences on information disclosure behaviour. Lastly, in terms of behavioural outcomes, future research should be devoted to examine whether tourists employ different disclosure or protective actions while travelling compared to actions in daily life and to what extent the privacy paradox phenomenon (i.e. discrepancy between attitude and behaviour) exists in travel contexts.

3.2 Exploring Specific Biases in Tourists' Privacy Decisions

Tourism is a hedonic experience; leisure tourists typically search for enjoyment from traveling to a destination. This may have an influence on tourists leaning more toward employing affect heuristics when making decisions while travelling. In addition, the fact that tourists will be in unfamiliar environments and have limited access to resources they normally have at home, the problem of incomplete information may be stronger for tourists, which may result in added anxiety. This may also lead to underestimation of risks due to the transient nature of travel activities. Furthermore, tourists may need to use entirely different sets of service providers, adding to information asymmetry issues. Therefore, future research needs to focus on specific biases that influence tourists' privacy decisions. These may also include a greater potential for hyperbolic discounting due to time-critical services and information in the limited time of traveling and post-completion errors as tourists are driven to complete their primary to-do list in the destination (e.g., forgetting to log out or delete browsing history after using a computer in a hotel's business centre to search for nearby attractions or to check-in for a flight online).

3.3 Experimenting with Nudges

Based on specific hurdles tourists face for their privacy decisions, future research needs to be devoted to evaluation of different nudges and their outcomes. It is important that a range of nudging strategies and specific designs of those strategies are tested to tackle the most prevalent biases that pose greater risk for privacy failures (suboptimal privacy-related decisions) in the travel contexts. From a methodological point of view, behavioural experiments with nudges will yield relevant results to test the effectiveness of nudging strategies and designs. These can be done in a controlled lab setting to quickly assess how people react to various nudging strategies for travellers and in the field, such as places of transit and tourist destinations, to assess the impacts of nudges on actual tourist behaviour in the real world. Importantly, while people might respond positively to education and feedback (i.e., nudging with information) as they complete travel-related tasks in a lab experiment, such as booking accommodation or sharing travel photos with their social network, they might not have the same responses to these strategies while actually traveling. Therefore, a combination of lab-based and field studies will be desirable for more robust results.

3.4 Integrating Privacy Nudges in System Design

As a general principle, Privacy by Design (PbD) including privacy by default has been widely accepted by both designers and end users, and also been included in the latest European data protection law, General Data Protection Regulation (GDPR). However, despite a lot of efforts on privacy enhancing technologies, there have been much less work on applying behavioural nudges in technical solutions of privacy protection. To better incorporate privacy nudges into a tourist-facing privacy protection system, more future research is called to address at least the following aspects: computational ontology for incorporating proven theories in behavioural science into the automated system,

environmental and behavioural monitoring for personalising and contextualising nudges, (semi-)automated privacy risk assessment including mathematical models of different parts of the whole process, the use of interactive information visualisation for qualitative presentation of risks and nudges, information fusion of data from multiple sources to cover a more complete picture of users' privacy behaviour and privacy risks, and human-in-the-loop approach to facilitating incremental refinement of automated components.

4 Concluding Remarks

In light of existing and emerging privacy issues in tourism, comprehensive yet context-specific studies are needed to better understand tourists' privacy decision making process in order to ensure they are making informed decisions when it comes to sharing personal information while traveling. This paper presents a comprehensive review of state-of-the-art research on privacy concerns, cognitive biases in privacy decisions, and nudges for privacy. This review is inclusive of theoretical foundation underpinning the conceptual framework of previous information privacy research in various contexts as well as methodological framework to empirically measure privacy-related concepts, such as privacy concerns and their antecedents and outcomes. Based on this review, this paper provides a set of overarching research priorities, merging the social and technical aspects of privacy protection framework to nudge tourists into making more responsible disclosure decisions. In so doing, this paper contributes to guiding the direction of future research on information privacy in tourism context.

The research priorities are intended to affect various groups of researchers and practitioners in tourism. First, for researchers focusing on tourist behaviour, the theoretical models and methodological frameworks reviewed herein could be applied to explain and measure tourists' privacy concerns, including their antecedents and outcomes, and cognitive biases in tourists' privacy decisions. Second, for researchers focusing on tourism-related policy, travel organisations, and policymakers, the array of nudging strategies explained herein could be implemented to influence tourists' privacy behaviours. Finally, for researchers and practitioners in tourism information systems and technologies, the priorities should entice the design of an effective tourist-facing privacy protection system.

Acknowledgements. This work was part of the “PRIvacy-aware personal data management and Value Enhancement for Leisure Travellers (PriVELT)” Project supported by the UK's Engineering and Physical Sciences Research Council (EPSRC) (EP/R033196/1, EP/R033749/1, and EP/R033609/1).

References

1. Gretzel U (2011) Intelligent systems in tourism: a social science perspective. *Ann Tour Res* 38(3):757–779
2. Werthner H, Klein S (1999) *Information technology and tourism—a challenging relationship*. Springer, Vienna

3. Drosatos G, Efraimidis PS, Arampatzis A, Stamatelatos G, Athanasiadis IN (2015) Pythia: a privacy-enhanced personalized contextual suggestion system for Tourism. 2015. In: IEEE 39th annual international computers, software & applications conference. <https://doi.org/10.1109/compsac.2015.88>
4. Gavalas D, Kasapakis V, Konstantopoulos C, Mastakas K, Pantziou G (2013) A survey on mobile tourism recommender systems. <https://doi.org/10.1109/iccitechnology.2013.6579536>
5. Lee CH, Cranage DA (2011) Personalisation–privacy paradox: the effects of personalisation and privacy assurance on customer responses to travel websites. *Tour Manag* 32(5):987–994
6. Baruh L, Secinti E, Cemalcilar Z (2017) Online privacy concerns and privacy management: a meta-analytical review. *J Commun* 67(1):26–53
7. Barth S, de Jong MDT (2017) The privacy paradox: Investigating discrepancies between expressed privacy concerns and actual online behavior - a systematic literature review. *Telemat Inf* 34(7):1038–1058
8. Li Y (2011) Empirical studies on online information privacy concerns: literature review and an integrative framework. *Commun Assoc Inf Syst* 28:453–496
9. Anuar F, Gretzel U (2011) Privacy concerns in the context of location based services for tourism. Paper presented at the ENTER 2011 conference, Innsbruck, Austria, January 26–28, 2011
10. Gretzel U, Sigala M, Xiang Z, Koo C (2015) Smart tourism: foundations and developments. *Electron Market* 25(3):179–188
11. Manikonda L, Deotale A, Kambhampati S (2017) What’s up with privacy?: User preferences and privacy concerns in intelligent personal assistants. <https://arxiv.org/abs/1711.07543>
12. Lutz C, Hoffmann CP, Bucher E, Fieseler C (2018) The role of privacy concerns in the sharing economy. *Inf Commun Soc* 21(10):1472–1492
13. Westin AF (1967) *Privacy and freedom*. Atheneum, New York
14. Xu H, Teo H-H (2004) Alleviating consumers’ privacy concerns in location-based services: A psychological control perspective. In: ICIS 2004 Proceedings, 64. <https://aisel.aisnet.org/icis2004/64>
15. Smith HJ, Dinev T, Xu H (2011) Information privacy research: an interdisciplinary review. *MIS Q* 35(4):89–1015
16. Acquisti A, Adjerid I, Balebako R, Brandimarte L, Cranor LF, Komanduri S, Leon PG, Sadeh N, Schaub F, Sleeper M, Wang Y, Wilson S (2017) Nudges for privacy and security: Understanding and assisting users’ choices online. *ACM Comput Surv* 50(3):44
17. Kokolakis S (2017) Privacy attitudes and privacy behaviour. *Comput Secur* 64(C): 122–134
18. Li Y (2012) Theories in online information privacy research: a critical review and an integrated framework. *Decis Support Syst* 54(1):471–481
19. Zhou T, Li H (2014) Understanding mobile SNS continuance usage in China from the perspectives of social influence and privacy concern. *Comput Hum Behav* 37:283–289
20. Eisenhardt KM (1989) Agency theory: an assessment and review. *Acad Manag Rev* 14(1):57–74
21. Milne GR, Gordon ME (1993) Direct mail privacy-efficiency trade-offs within an implied social contract framework. *J Public Policy Market* 12(2):206–215
22. Ajzen I (1991) The theory of planned behavior. *Organ Behav Hum Decis Process* 50:179–211
23. Ajzen I, Fishbein M (1980) *Understanding attitudes and predicting social behavior*. Prentice-Hall, Englewood-Cliffs, NJ
24. Acquisti A (2004) Privacy in electronic commerce and the economics of immediate gratification. In: Proceedings of the 5th ACM conference on electronic commerce, 21–29
25. Barnes SB (2006) A privacy paradox: social networking in the United States. *First Monday*, 11. <http://dx.doi.org/10.5210/fm.v11i9.1394>

26. Norberg PA, Horne DR, Horne DA (2007) The privacy paradox: personal information disclosure intentions versus behaviors. *J Consum Aff* 41(1):100–126
27. Culnan MJ, Armstrong PK (1999) Information privacy concerns, procedural fairness, and impersonal trust: an empirical investigation. *Organ Sci* 10(1):104–115
28. Laufer RS, Wolfe M (1977) Privacy as a concept and a social issue: a multidimensional development theory. *J Soc Issues* 33(3):23–42
29. Awad NF, Krishnan MS (2006) The personalization privacy paradox: an empirical evaluation of information transparency and the willingness to be profiled online for personalization. *MIS Q* 30(1):13–28
30. Stone EF, Stone DL (1990) Privacy in organizations: theoretical issues, research findings, and protection mechanisms. *Res Pers Hum Resour Manag* 8:349–411
31. Simon HA (1955) A behavioral model of rational choice. *Q J Econ* 69(1):99–118
32. Donnerwerth GV, Foa UG (1974) Effect of resource class on retaliation to injustice in interpersonal exchange. *J Personal Soc Psychol* 29:785–793
33. Foa UG (1971) Interpersonal and economic resources. *Science* 71:345–351
34. Simon HA (1982) Models of Bounded Rationality. Volume 1: economic analysis and public policy. Vol 2. Behavioural economics and business organization. MIT Press, Cambridge, MA
35. Blumler JG, Katz E (1974) The uses of mass communication. Sage, Beverly Hills, CA
36. Katz E, Blumler JG, Gurevitch M (1973) Uses and gratifications research. *Public Opin Q* 37(4):509–523
37. Kahneman D, Tversky A (1979) Prospect theory: an analysis of decision under risk. *Econometrica* 47(2):263–291
38. Harsanyi JC (1967) Games with incomplete information played by “Bayesian” players, I-III. Part I. The basic model. *Manag Sci* 14(3):159–182
39. Floyd DL, Prentice-Dunn S, Rogers RW (2000) A meta-analysis of research on protection motivation theory. *J Appl Soc Psychol* 30(2):407–429
40. Bandura A (1986) Social foundations of thought and action: a social cognitive theory. Prentice-Hall, Englewood Cliffs, NJ
41. Bandura A (2001) Social cognitive theory: an agentic perspective. *Ann Rev Psychol* 52:1–26
42. Smith HJ, Milberg S, Burke S (1996) Information privacy: measuring individuals’ concerns about organizational practices. *MIS Q* 20(2):167–196
43. Malhotra NK, Kim SS, Agarwal J (2004) Internet users’ information privacy concerns (IUIPC): the construct, the scale, and a causal model. *Inf Syst Res* 15(4):336–355
44. Buchanan T, Paine C, Joinson AN, Reips UD (2007) Development of measures of online privacy concern and protection for use on the internet. *J Am Soc Inf Sci Technol* 58(2):157–165
45. Martin KD, Murphy PE (2017) The role of data privacy in marketing. *J Acad Market Sci* 45(2):135–155
46. Son J-Y, Kim SS (2008) Internet users’ information privacy-protective responses: a taxonomy and a nomological model. *MIS Q* 32(3):503–529
47. Ajzen I, Brown TC, Carvajal F (2004) Explaining the discrepancy between intentions and actions: the case of hypothetical bias in contingent valuation. *Personal Soc Psychol Bull* 30:1108–1121
48. Thaler RH, Sunstein CR (2008) Nudge: improving decisions about health, wealth, and happiness. Yale University Press, New Haven & London

49. Hansen PG (2016) The definition of nudge and libertarian paternalism: does the hand fit the glove? *Eur J Risk Regul* 7(1):155–174
50. Acquisti A (2009) Nudging privacy: the behavioral economics of personal information. *IEEE Secur Priv* 7(6):82–85



An e-Tourism Adoption Model & Its Implications for Tourism Industry in Nepal

Sanjay Lama¹(✉), Sojen Pradhan¹, and Anup Shrestha²

¹ School of Information, Systems and Modelling, University of Technology
Sydney, Ultimo, Australia

Sanjay.Lama@student.uts.edu.au,
Sojendra.Pradhan@uts.edu.au

² School of Management and Enterprise, University of Southern Queensland,
Toowoomba, Australia
Anup.Shrestha@usq.edu.au

Abstract. Although Nepal has tremendous tourism opportunities, the small and medium tourism enterprises (SMTEs) that constitute the largest percentage of tourism service providers, are lagging behind in e-Tourism adoption. This research conducts a comprehensive analysis of existing literature to propose an e-Tourism adoption model based on the Technology-Organisation-Environment and e-Readiness models. This model is supported by empirical data using qualitative in-depth interviews with seven key stakeholders and quantitative survey with 198 SMTEs. An operational model is outlined to identify the barriers and motivators for e-Tourism adoption in Nepal. Implications of this model for key stakeholders such as the government, tourism organisations and tourism associations are discussed. As Nepal moves to a federal political structure, the findings and recommendation from this research are expected to help policy makers, tourism associations and SMTEs to develop specific e-Tourism based programs in order to provide superior services to tourists.

Keywords: e-Tourism adoption · Nepal tourism · Stakeholders
SMTEs · Tourism organisations

1 Introduction

Information Technology (IT) has made substantial impacts in everyone's daily lives by changing the way they communicate, connect with people, compare, buy and sell products or services. According to Statista.com [1], more than 4.1 billion people in the world has access to the Internet which they use for various activities every day, including planning for travelling. Searching for travel information is one of the most popular Internet activities, for example, 73% of Internet users reported this activity among the top 10 searches [2]. Travellers are not only searching for travel information online but they are also planning, comparing, booking and paying for the tour packages through online platforms [3]. Furthermore, online reviews by consumers in the travel

industry enhance the decision-making process for travellers [4, 5]. Subsequently, online reviews platform such as TripAdvisor covers hotels, restaurants and attractions from more than 190 countries in the world [6].

Tourism is one of the major economic sectors in Nepal, which provides a significant employment (about 427,000 people) and contributed almost 7.5% of the total Gross Development Product (GDP) in the year 2016 [7]. Although Nepal has a great tourism potential with its natural beauty and diverse cultural heritage, small and medium tourism enterprises (SMTEs) which constitute the largest percentage of tourism service providers, are lagging behind in the use of online services to run their businesses, serve existing customers and attract more potential customers.

Tourism has been one of the biggest exports for many developing countries [8] and is considered as one of the principal pillars of the economy of such countries. Developing countries may have common challenges such as low information and communication technologies (ICTs) adoption, turbulent political and macroeconomic circumstances [9], but every nation provides its own unique characteristics regarding tourism attractions. The application of ICTs for digitised services in the tourism sector is often coined as e-Tourism, similar to the well-accepted notion of e-commerce for Internet-enabled commercial transactions. Using the lens of e-commerce concepts, we discuss e-Tourism adoption and its implications to Nepal. It is widely recognised that the factors impacting e-commerce adoption differ greatly for every industry [10]. Therefore, the 'one-size-fits-all' model may not be feasible for e-commerce adoption [11].

This study investigates the status of ICTs in Nepal for tourism and evaluates the possible frameworks of e-commerce adoption suitable for the tourism industry (i.e. the e-Tourism adoption). After a comprehensive analysis of existing literature and frameworks, an e-Tourism adoption model is proposed. With the help of empirical data from both qualitative in-depth interviews with seven key stakeholders and quantitative survey with 198 SMTEs, this study proposed a comprehensive e-Tourism adoption model for e-Tourism Nepal. The model identifies the barriers and motivators of e-Tourism adoption specific to Nepal based on its unique context and specific environment. Implications of the model for major stakeholders such as the government, tourism organisations and tourism associations are discussed.

In this paper, tourism governance structure in Nepal is discussed next. The proposed model is based on two widely accepted technology adoption models: Technology, Organisation and Environment (TOE) model and e-Readiness model. A brief overview of these two theoretical models is presented. Then, the research methodology of this study is outlined. The following sections cover a preliminary e-Tourism adoption model for Nepal and how it was empirically tested. An operational model of e-Tourism was subsequently described with its practical implications in the following section. A conclusion is drawn with future directions of this research in the end.

2 Background

2.1 Tourism Governance Structure in Nepal

There are over 4,500 tourism organisations registered with the Tourism Department of Nepal. The major stakeholders in the tourism industry are tourism service providers, tourists and the government. Most of the service providers in Nepal provide either tours and travel, trekking or accommodation services to the tourists. Those tourism organisations are usually represented by either one or more associations, such as Nepal Association of Tour and Travel Agents (NATTA), Hotel Association of Nepal (HAN) and Trekking Agents Association of Nepal (TAAN). These associations are independent, not-for-profit and representatives of specific tourism industries, for example, HAN representing all hoteliers. Figure 1 shows major stakeholders of the tourism industry in Nepal and an overall structure of how tourism organisations fall under these associations and are running their operations with a guidance from those associations. Ministry of Culture, Tourism and Civil Aviation (MoCTCA) is the pioneer government department for Nepal tourism and they also have an autonomous entity called Nepal Tourism Board (NTB) which is an independent government body dedicated for advertising Nepal tourism to the world.

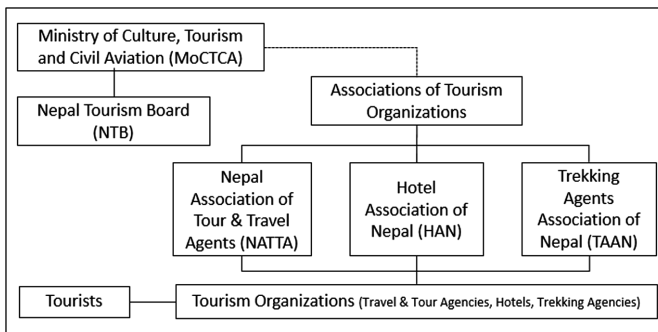


Fig. 1. Nepal tourism governance structure

2.2 e-Tourism in Nepal

The IT penetration is low and a late comer in Nepal compared to other developed countries. For example, the government created the IT Policy only in 2000 [12] with the objective of making ICTs more accessible to the public and create a knowledge-based society and industries. It was a government initiative to use IT as a tool for development and growth [13]. It has only been a decade since Electronic Transaction Act 2008 was enacted with the motive of paving ways for the legal aspects of electronic business for online transactions. This act also formulated the provision for different authorities such as IT tribunal, Controller of Certification Authority & Certification, Authorities for digital certificates along with dispute settlement mechanism. However, the objectives have not been fully materialised due to political and other incumbent

challenges in Nepal [14]. Similarly, an e-government Master Plan (e-GMP) was prepared and proposed by the government in 2010 with the objectives of good governance and socio-economic development of the country using e-governance. Transparency, accountability, poverty alleviation, reduction in corruption, informed citizen and better government service delivery were some of the objectives of the Master Plan [15]. The increasing usage of ICTs has yet to reach a priority agenda for the government since Nepal's primary plans and programs are currently focused on political federalisation, basic infrastructure building problems and other socio-economic issues related to fundamental necessities such as education, rather than tourism.

Likewise, the lack of international payment system and international electronic payment cards (debit and credit cards) are cited as a primary reason for the late adoption and low e-commerce usage in Nepal. The cards issued by the local banks can be used locally in a limited number of websites only. The local transactions are facilitated by local payment gateways which are funded through selective banks and usually works on selected websites on a commission basis [16]. Due to these shortcomings, e-Tourism adoption is generally limited to the use of websites to provide general information for tourists only.

2.3 Relevant e-Tourism Adoption Models

Adoption of e-commerce is plagued by a lack of sound framework in the developing countries [17] and Nepal is no exception. Most of existing frameworks on adoption are related to ICTs or innovation rather than e-commerce or e-Tourism adoption. In this study, widely accepted technology adoption frameworks were reviewed: Theory of Reasoned Action (TRA) [18], Technology Acceptance Model (TAM) [19], Technology, Organisation and Environment (TOE) model [20], TAM 2 [21], Unified Theory of Acceptance and use of Technology (UTAUT) [22] and e-Readiness model [11]. Each framework and its constructs were examined to assess their relevant for e-Tourism adoption study in Nepal. A detailed evaluation of these frameworks relevant to this study has been reported earlier [23].

TOE [20] and e-readiness model [11] were chosen since they focus at organisational units which is relevant to this study. Using these two frameworks, relevant factors affecting technology for SMTEs in Nepal, were studied. The TOE framework created by Tornatzky & Fleischer [20] argue that three factors influence adoption of an innovation in a business: technological context, organisational context, and environmental context. Similarly, the e-readiness model emphasises perceived external e-readiness (PEER) and perceived organisational e-readiness (POER) towards technology adoption [11]. These two frameworks provide a foundation to propose the preliminary e-Tourism adoption model for Nepal that was subsequently reviewed and validated as part of the research study. The research methodology is outlined next.

3 Research Methodology

This study explores the barriers and motivators to e-Tourism adoption using mixed methods, i.e. qualitative and quantitative. The mixed method approach has been known to broaden the range of research and make research more comprehensive [24]. Data has been collected through interviews and surveys with representatives of tourism associations and the SMTEs in Nepal.

Initial factors were investigated from the extant literature. Based on the initial factors, in-depth semi-structured interviews (qualitative stage) were conducted with key representatives of the major stakeholders as shown in Fig. 1. A preliminary e-Tourism adoption model was developed based on seven interview findings as well as similar studies conducted in the context of other developing countries and frameworks using the e-Readiness model [11] and Technology Organisational Environment (TOE) model [20]. The validation of the e-Tourism adoption model was done based on statistical analysis from a survey (quantitative stage) of 198 SMTEs in Nepal. The triangulation of multiple methods for data collection and analysis enhance interpretability, reliability and internal validity to make research findings acceptable [25].

4 Development of the Preliminary e-Tourism Adoption Model

The major constructs of the selected frameworks (TOE and e-Readiness model) were used as the foundations to create the initial constructs of the e-Tourism adoption model for Nepal. These components are used since they have been already extensively tested in previous studies as highlighted in Sect. 2.

Based on the selected frameworks, the factors are classified into environmental or external and organisational or internal categories as illustrated in Fig. 2.

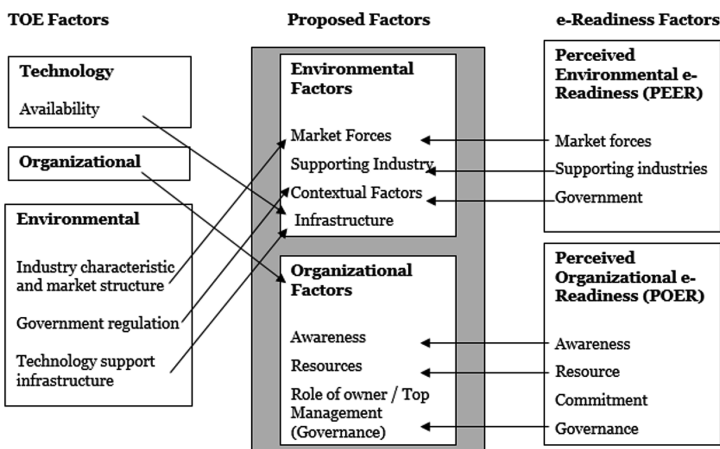


Fig. 2. Derivation of preliminary e-Tourism adoption model from the literature

The proposed categories identified in Fig. 2 were used to classify relevant factors for e-Tourism adoption identified from literature review. Table 1 presents all the relevant factors and associated categories for e-Tourism.

Table 1. Categories and factors for e-Tourism adoption in Nepal

Category	Factor	Description
Market forces	Market readiness and size	Degree to which market is ready for e-Tourism adoption
	Pressure from competitors	Pressure to adopt e-Tourism because of competitors adopting similar technologies
Supporting industry	Supporting IT industry	Readiness, capability and status of IT organisations to implement
Contextual factors	Condition of country	Political situation of country and its effect on e-Tourism adoption
	Plan and policies	Plans and policies of government relating to technology
	Incentives from government	Incentives and motivation provided by government for the adoption
Infrastructure	Electricity	Availability of electricity in the country
	Financial	Condition and readiness of financial institutions for the adoption
	Technological framework	Situation of country regarding technical resources such as status of internet, digital divide, e-readiness
	Legal framework	National status of country regarding laws relating to e-Tourism
Awareness	Awareness about e-Tourism	Owner’s knowledge and information about e-Tourism and its benefits and usage
Resources	Skill & Human resource	Human skills and other skills to implement
	Cost of resource	Initial and operational required for e-Tourism
	Technological	Resources such as hardware and software
Role of owner/Top management	Owner support	The degree of owner’s commitment and encouragement to use
	Owner’s characteristics	Owner’s confidence about e-Tourism
Other factors (not included in Fig. 2)	Culture	Culture such as tradition, ways of doing things
	Language	The language used for technology and lack of knowledge about it
	Perceived benefits	Expected benefits of using e-Tourism
	Relative advantage	Degree of perception as better than existing
	Lack of trust	Confidence that e-Tourism is safe and trustworthy
	Privacy concerns	Concern about of the privacy and data misuse

The last row in Table 1 lists some of the probable factors that did not fit any of the existing categories. These factors were checked for similarity with each other and subsequently new categories were created according to their unique features and based on the information about the factors from the literature review.

The six factors which did not fit into any of the categories were divided into three new groups. Kshetri [26] included the factors related to language and culture into one category called cognitive factors. Similarly, Kapurubandara and Lawson [27] used “social-cultural” construct to include factors related to culture. So, as the two associated factors - cultural and language barriers were put into the same category, and a new category called “socio-cultural” factors was created. Similarly, both perceived benefits and relative advantage are related to the value that the adoption of e-commerce can add to the organisations [28]. The factor “perceived benefits” has been used from the organisational perspective. Similarly, various studies [29–31] investigated e-commerce adoption and examined relative advantage or value proposition factors with the TOE model. Since both factors are related to value addition, they are categorised into a new category named “value proposition”. Finally, the remaining factors “security concern and trust” and “privacy concerns” are related to information security based on the literature review on e-commerce adoption. Therefore, a broader category called “security concern” is created to include the final two factors.

A survey of 198 SMTEs was used to validate the 10 categories in the preliminary e-Tourism adoption model. Reliability and hypothesis tests of these categories have been previously reported [23]. The significance value (p-value <0.05) indicates that the factors are significant in the model. Three categories were not supported: supporting industries, socio-cultural and security concern. The remaining seven categories were supported from the quantitative study, as shown in Table 2.

Table 2. Binary regression results

Factor	β	S.E.	Wald	df	Sig. (p value)	Exp(B)	Result
Lack of infrastructure	-.486	.236	4.243	1	.039	.615	Supported
Market forces	.651	.255	6.525	1	.011	1.918	Supported
Supporting IT industry	.411	.251	2.674	1	.102	1.509	Not Supported
Socio-cultural	.029	.221	.017	1	.896	1.029	Not Supported
Contextual factors	-.436	.201	4.711	1	.030	.646	Supported
Awareness	.525	.259	4.118	1	.042	1.691	Supported
Lack of resources	-.997	.269	13.765	1	.000	.369	Supported
Security concerns	-.102	.257	.158	1	.691	.903	Not Supported
Value proposition	.889	.283	9.890	1	.002	2.433	Supported
Owner's role	1.117	.318	12.351	1	.000	3.055	Supported

Subsequently the final e-Tourism adoption model was updated as illustrated in Fig. 3.

In order to implement the e-Tourism adoption model for the Nepalese context, we developed an operational model to understand the implications of the adoption factors and how these can be implemented in practice by initial and advanced adopters. Next, the barriers and motivators of tourism industry in Nepal due to the use of e-Tourism and its implication to the major stakeholders, is discussed.

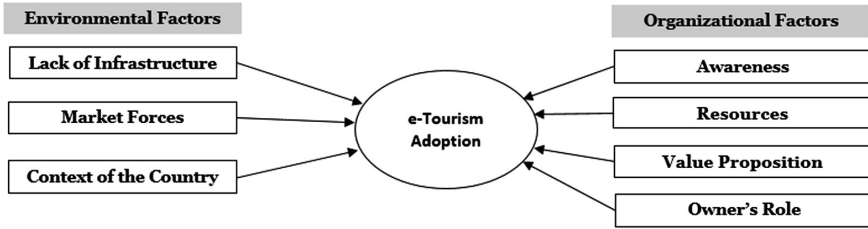


Fig. 3. Final e-Tourism adoption model for Nepal

5 An Operational Model to Understand Implications of e-Tourism Adoption in Nepal

The validated factors determined by the proposed e-Tourism adoption model for Nepal (Fig. 3) can be operationalised by demonstrating the barriers and motivators for e-Tourism adoption. The relationship of each factor with the adoption of e-Tourism can be represented as a barrier or a motivator. Such relationships are represented in the operational model for e-Tourism adoption in Nepal in Fig. 4.

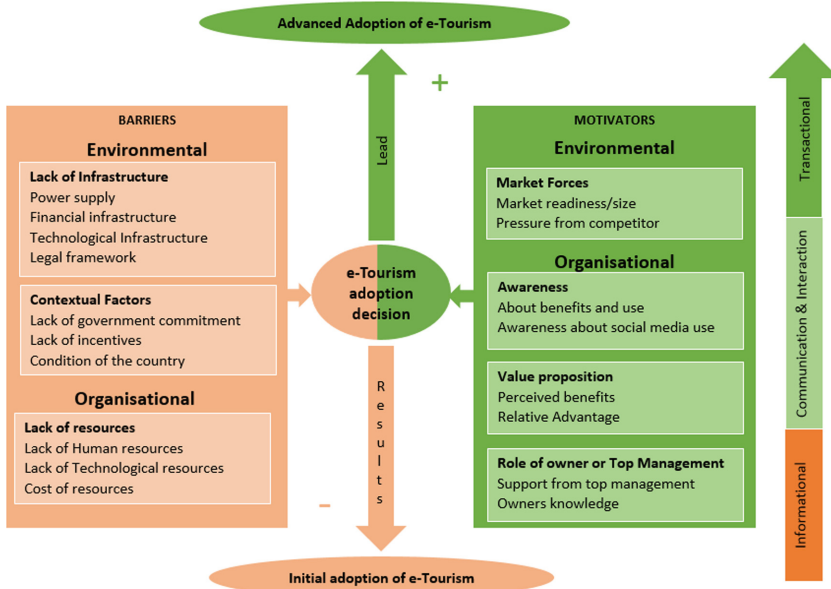


Fig. 4. Operational model for e-Tourism adoption in Nepal

The factors on the right-hand side represented in Fig. 4 represents positive impact on e-Tourism adoption and acts as motivators whereas the factors on the left-hand side represents barriers that have negative impact on e-Tourism adoption. Figure 4 clearly

demonstrates that external factors of lack of infrastructure and contextual factors, and internal factor of lack of resources inhibit the adoption of e-Tourism in Nepal. Likewise, the external factor of market forces and the internal factors associated with awareness, value proposition and the role of owner or top management presents as motivators demonstrating opportunities for e-Tourism adoption in Nepal.

Leveraging the motivators and minimising the effects of barriers facilitates streamlined e-Tourism adoption in Nepal. This is also represented in the operational model (Fig. 4) at two levels: initial and advanced adoption levels whereby the SMTEs in Nepal can move between the two levels. The barriers inhibit SMTEs to move from initial to advanced level of e-Tourism adoption, whereas the motivators can act as a catalyst for advanced level of e-Tourism adoption.

The transition from initial to advanced level of e-Tourism adoption is characterised by three stages of e-Tourism adoption maturity: informational; communication and interaction; and transactional. At the maturity level of informational, e-Tourism is adopted at a primitive level with the use of website for static information only, i.e. unidirectional information dissemination. At this level, e-Tourism barriers are highly prominent and e-Tourism motivators are negligible. Similarly, when the maturity level elevates to communication & interaction, there is an evidence of two-way communication between SMTEs and tourists, thereby resulting in superior customer service. Examples of this maturity level are the use of dynamic website/ mobile apps with search and contact features and the use of social media. Likewise, the highest level of maturity is recognised as transactional e-Tourism, whereby SMTEs make use of e-Tourism features to streamline their operations and engage with tourists during the entire customer journey – from initial search to bookings to post service delivery activities such as feedbacks and complaints handling. At this level of maturity, e-Tourism motivators are highly effective and there are little to no barriers for adoption.

The operational model demonstrated in Fig. 4 showcases a pathway for Nepal tourism stakeholders to follow in order to improve their tourism services by e-Tourism adoption. Currently most tourism service providers, particularly the SMTEs, operate at the initial adoption level with the basic informational e-Tourism maturity level. The journey from this level to reach the advanced e-Tourism adoption level can be mapped with the use of the operational model. The model is helpful for policy makers and tourism practitioners to understand the roles and interplay of factors that act as motivators and barriers for e-Tourism adoption so that the higher maturity level of adoption can be achieved. Implications are further detailed in the next section.

6 Practical Implications of the Research

The operational model presented in Fig. 4 provides a roadmap on how e-Tourism is adopted by SMTEs in Nepal and how it could be improved. The model represents the levels of adoption, e-Tourism maturity levels and adoption factors in the form of barriers and motivators that can have significant implications to practice. With the use of this model, the concerned stakeholders can have more insights into how e-Tourism adoption barriers and motivators work in the context of Nepal. The stakeholders should

work to mitigate the identified barriers, and they should make strategic plans and policies by taking advantage of the motivators.

Since this model depicts the prescribed transition of SMTEs from an initial level to the advanced level of e-Tourism adoption. The model has broad implication for each stakeholder which are described below.

6.1 SMTEs

In order to implement this model, identifying the existing level of adoption by SMTEs (either initial or advanced) is the first step. Understanding the current level of adoption will help an SMTE to understand the nature of e-Tourism use and develop plans according to such initial assessments. For example, the SMTEs which are at the initial level can concentrate on the plans to upgrade to the advanced level based on the e-Tourism maturity levels.

The identifications of specific barriers and motivators can help SMTEs to plan accordingly during their adoption journey. The SMTEs can also use this model to investigate these factors and act accordingly by determining whether they are internal or external to their organisation. Such analysis will help them to develop strategies, such as conducting a SWOT analysis, that yield maximum benefits out of the e-Tourism usage and mitigate the risks related to e-Tourism adoption.

6.2 Policymakers and the Government

This model provides relevant information on positive or negative effects from factors on e-Tourism adoption that can help the government and relevant policy making bodies, such as law enforcement office or judicial bodies, to construct relevant plans and policies. The categorisation of the level of e-Tourism adoption can help the government to tailor and prepare policies according to the maturity levels of e-Tourism adoption.

For example, the research shows there is lack of awareness about technical, security and legal issues among initial adopters whereas advanced adopters have raised the concerns about the quality of Internet among others. The government of Nepal can formulate their programs directing their limited resources according to the issues or the needs based on the levels of adoption.

6.3 Tourism Associations

The tourism associations aim to work for the betterment of SMTEs and the tourism industry of Nepal based on the collective efforts of their members. Using this model, the association can facilitate its member organisations in a transparent manner based on their maturity level of e-Tourism adoption. The identification of barriers at each level can help tourism associations to identify where the efforts of the association should be prioritised. For example, the model shows that there is lack of information about laws and information security for the initial adopters. Therefore, the association can organise awareness program to minimise these barriers for the initial adopters. Similarly, this

model can also help to identify the areas where the association can collaborate with the government and other stakeholders.

6.4 Other Stakeholders

Since the model paints a transparent picture of the current e-Tourism ecosystem in Nepal, it is expected to help supporting IT organisations to understand the barriers and motivators to e-commerce adoption by SMTEs of Nepal. The model provides IT companies reliable information to determine where they should concentrate their efforts to technically support e-Tourism initiatives. Such understanding will not only enable them to provide better support to facilitate e-Tourism adoption but also helps to expand their IT business and to the enhance the quality of their services.

The model can also be used by global tourism service providers such as airlines or hotel chains to understand the e-Tourism landscape for adoption in the tourism industry of Nepal. Similarly, the model can be useful for the individual tourists to assess e-Tourism services that they can expect from their tourism service providers since the model provides useful information about factors that are associated with tourism services that are available and how the tourism industry operates in developing countries like Nepal. Such information can help them to be better informed and plan their trip in Nepal. However favourable local adoption by a significant number of SMTEs as well as strong endorsement by key stakeholders, particularly the tourism associations is necessary for the model to be relevant to individual tourists.

In short, the proposed operational model has broad and substantial practical implications and benefits for a wide range of stakeholders.

7 Conclusion

Research studies on e-Tourism adoption in Nepal is in the infancy stage, despite the potential growth of the Nepalese tourism market due to its natural beauty, high mountains and diverse heritage cultural backgrounds. This study proposed and validated a comprehensive e-Tourism adoption model through extant literature, content analysis of interviews with key informants and statistical validation using a survey with 198 SMTEs. The model is further reviewed to propose an operational model to outline pathways for e-Tourism adoption for Nepal based on barriers and motivators. This research is expected to help stakeholders to identify key areas they should focus on so that they can channel their efforts to deal with the barriers. As a result, the environmental and organisational factors derived from the proposed model can be used by the policymakers, information consultants, and tourism organisations in their plans and policies.

The plans and policies regarding IT, and the use of e-Tourism applications are in developing stages, as federal states are being created after the prolonged political instability in Nepal. In addition to national plans and policies, the findings and recommendation from this research would be useful for each federal state to create their specific programs related to ICTs and tourism.

Acknowledgements. This paper is a part of research on e-Tourism adoption for Nepal, which is sponsored by Endeavour Australia.

References

1. Statista.com <https://www.statista.com/statistics/617136/digital-population-worldwide/>. Accessed 7 Sep 2018
2. Infoplease.com <https://www.infoplease.com/science-health/internet-statistics-and-resources/most-popular-internet-activities>. Accessed 5 Sep 2018
3. Buhalis D, Jun SH (2011) 'e-Tourism', *Contemporary tourism reviews*, pp 1–38
4. Gretzel U, Yoo KH (2008) Use and impact of online travel reviews. *Inf Commun Technol Tourism* 2008, 35–46
5. Gonzalo F (2014) 8 Etourism Stats to Consider for 2015. <http://fredericgonzalo.com/en/2014/10/16/8-etourism-stats-to-consider-for-2015/>
6. Zhang HY, Ji P, Wang JQ, Chen XH (2017) A novel decision support model for satisfactory restaurants utilizing social information: a case study of TripAdvisor. *com. Tour Manag* 59:281–297
7. UNWTO (2017) *Tourism and the world economy, in the Facts and Figures*, World Tourism Organization, 2016. <http://www.unwto.org/index.php>
8. Samimi AJ, Sadeghi S, Sadeghi S (2011) Tourism and economic growth in developing countries: P-VAR approach. *Middle-East J Sci Res* 10(1):28–32
9. Karanasios S, Burgess S (2008) Tourism and internet adoption: a developing world perspective. *Int J Tour Res* 10(2):169–182
10. Brdese HS (2013) Exploring factors impacting e-commerce adoption in tourism industry in Saudi Arabia. RMIT University Melbourne, Australia
11. Molla A, Licker PS (2005) Perceived e-readiness factors in e-commerce adoption: an empirical investigation in a developing country. *Int J Electron Commer* 10(1):83–110
12. Ministry of Science and Technology G.o.N. (2000) 'Information Technology Policy 2000', Kathmandu. [http://moste.gov.np/it_policy_2057_\(2000_ad\)](http://moste.gov.np/it_policy_2057_(2000_ad)). Accessed 5 Sep 2018
13. Ministry of Information and Communication, 'National Information and Communication Technology Policy, 2015'. <http://www.nta.gov.np/en/component/joomdoc/ICTPolicy.pdf/download>. Accessed 5 Sep 2018
14. Dhami AMC (2015) 'Trends of Cybersecurity Threats in Nepal: Law Enforcement Experience', paper presented to the Cybersecurity: Challenges and solutions for developing economies. Kathmandu, <http://www.itconference.org.np/presentations/TrendsofCybersecurityThreatsinNepal-LawEnforcementExperience.pdf>. Accessed 5 Sep 2018
15. Bhattarai MK (2006) National plan for e-governance in Nepal. High Level Commission for IT, Kathmandu, Nepal
16. Aryal M (2016) List of Online Payment services Companies in Nepal, ictframe.com, Kathmandu, viewed 15 Feb 2017 2016. <http://ictframe.com/list-of-online-payment-service-companies-in-nepal/>. Accessed 5 Sep 2018
17. Lawrence JE, Tar UA (2010) Barriers to e-commerce in developing countries. *Inf Soc Justice J* 3(1):23–35
18. Ajzen I, Fishbein M (1980) 'Understanding attitudes and predicting social behaviour'
19. Davis FD (1989) Perceived usefulness, perceived ease of use, and user acceptance of information technology. *MIS Q* 13(3):319–340. <https://doi.org/10.2307/249008>

20. Tornatzky LG, Fleischer M (1990) Processes of technological innovation. Lexington Books, Lexington
21. Venkatesh V, Davis FD (2000) A theoretical extension of the technology acceptance model: four longitudinal field studies. *Manage Sci* 46(2):186–204
22. Venkatesh V, Morris MG, Davis GB, Davis FD (2003) User acceptance of information technology: Toward a unified view. *MIS Q* 27(3):425–478. <https://doi.org/10.2307/30036540>
23. Lama S, Pradhan S, Shrestha A, Beirman D (2018) Barriers of e-Tourism adoption in developing countries: a case study of nepal. In: The 29th Australasian conference on information systems (ACIS 2018), Sydney, Australia, 3–5 Dec 2018
24. Creswell JW (2013) Research design: Qualitative, quantitative, and mixed methods approaches. Sage Publications, Los Angeles, USA
25. Creswell JW, Clark VLP (2011) Designing and conducting mixed methods research, 2nd edn. Sage Publication, Los Angeles, USA
26. Kshetri N (2007) Barriers to e-commerce and competitive business models in developing countries: a case study. *Electron Commer Res Appl* 6(4):443–452
27. Kapurubandara M, Lawson R (2006) Barriers to Adopting ICT and e-commerce with SMEs in developing countries: an Exploratory study in Sri Lanka. University of Western Sydney, Australia
28. Kabanda S, Brown I (2010) 'Factors That Affect e-Commerce Adoption in Tanzanian SMEs'. In: International conference on information management and evaluation, academic conferences international limited, p 153
29. Dwivedi YK, Papazafeiropoulo A, Scupola A (2009) SMEs'e-commerce adoption: perspectives from Denmark and Australia. *J Enterp Inf Manag* 22(1/2):152–166
30. Rowe F, Truex D, Huynh MQ (2012) An empirical study of determinants of e-commerce adoption in SMEs in Vietnam: an economy in transition. *J Global Inf Manag (JGIM)* 20(3):23–54
31. Scupola A (2003) The adoption of Internet commerce by SMEs in the south of Italy: An environmental, technological and organizational perspective. *J Global Inf Technol Manag* 6(1):52–71. <https://doi.org/10.1080/1097198X.2003.10856343>



Trust in Tourism via Blockchain Technology: Results from a Systematic Review

Davide Calvaresi^(✉), Maxine Leis, Alevtina Dubovitskaya, Roland Schegg,
and Michael Schumacher

University of Applied Sciences Western Switzerland, Sierre, Switzerland
{davide.calvaresi,maxine.leis,alevtina.dubovitskaya,
roland.schegg,michael.schumacher}@hevs.ch

Abstract. Trust-free and trust-regulated systems based on blockchain technology (BCT) are currently experiencing the maximum hype and promise to revolutionise entire domains. Tourism products (intangible services) are highly dependent on trust and reputation management that is traditionally centralised and delegated to “expected” reliable third-parties (e.g., TripAdvisor). Although BCT has only recently started approaching the tourism industry and being employed in real-world applications, the scientific community has already been extensively exploring the promises of BCT. Therefore, there is an impending need for organising and understanding current knowledge and formalise societal, scientific, and technological challenges of applying BCT in the tourism industry. This paper moves the first step, presenting a systematic scientific literature review of studies involving BCT for tourism purposes. Providing a comprehensive overview, actors, assumptions, requirements, strengths, and limitations characterising the state of the art are analysed. Finally, advantages and future challenges of applying BCT in the tourism area are discussed.

Keywords: Blockchain · Tourism · Systematic review · Trust
Transparency

1 Introduction

Technological growth cyclically revolutionise entire domains. Concerning the tourism industry, the digitisation played a crucial role in the last decades, paving the way for commercial interactions among private individuals on large scale and establishing trends re-shaping the market. The digitisation of the communication channel shifted from being a marginal driver to being the key market-enabler [1]. The tourism domain is composed of several distinct sub-sectors (e.g.,

e-business, information retrieval, online purchasing, marketing, website analysis, and e-research methods). The rise of digital consumers, the growth of artificial intelligence (AI) techniques, the heterogeneity of digital platforms are defining a new dimension for trust and security. Considered to be “the key building block of society”, trust plays an essential role in the formation and consolidation of business interactions and relationships [2]. For example, renting out a unit on Airbnb requires multiple levels of trust. From the *host* side, there is the need for trusting potential guests (e.g., respect toward both the host and the unit). From the guest side, it is essential to trust the host and the offered unit or service (e.g., to be adequate to their expectations). Both parties have to trust Airbnbs ability, integrity, and benevolence regarding booking and payment processes. In such a scenario, Airbnb is the provider of the technical infrastructure, user interfaces, and the guidance/monitoring process. Moreover, it is also responsible for providing services such as insurance and user’s reputation management. By doing so, Airbnb is the only responsible for establishing and maintaining trust among users. Unfortunately, current mechanisms cannot cope with strategic lies, malicious behaviours, and formation of deceiving coalitions. Therefore, there is the need for a pivotal technological innovation, since not a centralised entity nor an intermediary cannot address these problems [3]. Broadly acknowledged as the driver of a next technological revolution [4], blockchain technology (BCT) can create unique opportunities for the companies in the tourism sector. However, there is the need for downsizing the hype, because BCT are not going to change everything. For domains in a state of continuous transition, a reconciling and practical analysis of if, where, and how BCT can be employed to generate benefits is still missing.

Contributions: This paper proposes a systematic literature review to identify and analyse both theoretical perceptions and practical implementations of the BCT in the tourism domain. Moreover, it proposes a discussion of the results of the analysis, to enhance the understanding of the current state of the art, benefits, and challenges of applying BCT in tourism. The paper is organised as follows: Sect. 2 summarises the review methodology and data collection, Sect. 3 organises and presents the obtained results, Sect. 4 discusses the results presented in Sect. 3, lists open challenges, and details the elaborated features. Finally, Sect. 5 concludes and presents possible future works.

2 Review Methodology

To provide a comprehensive study, it has been opted for a systematic, rigorous and reproducible process of retrieval, selection, and analysis of relevant literature. This paper adheres to the procedure adopted and adapted by [5] (see Fig. 1). Following the Goal-Question-Metric (GQM) [8], the generic free-form question “*What does involve the employment of BCT in tourism-related systems?*” is broken-down in the following structured research questions (SRQs).

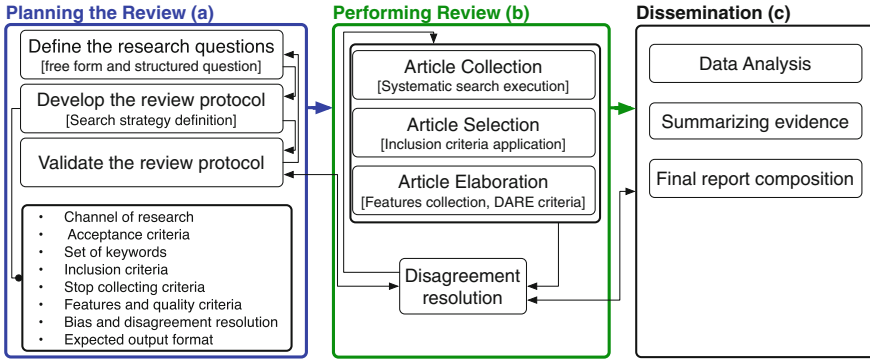


Fig. 1. Review methodology structure according to [6, 7]

- SRQ1: How has the employment of BCT in tourism applications evolved over the years in terms of when (year) and where (geographical indication of the scientific institute) such research took place?
- SRQ2: What are the requirements and motivation demanding BCT in tourism?
- SRQ3: What are the scenarios/areas used to design, test, or employ the blockchain technology? What are the requirements such approaches aimed at meeting?
- SRQ4: Who are the entities subject to the trust evaluation?
- SRQ5: What are the features and functionalities provided by the BCT that are relevant in the tourism area?
- SRQ6: What are the strengths (improvements) and limitations of employing BCT in tourism-related systems?
- SRQ7: What are the stated future research directions and challenges identified by the scientific community?

To perform a more accurate semi-automatic research, some keywords have been contextualised (keeping some keywords fixed in the performed queries). Based on the reviewers rooted backgrounds on BCT and tourism domains, the following keywords have been defined: **Fixed keywords:** (blockchain) * (hospitality or tourism) * **Variable Keywords:** (trusted systems + dmo + transportation + accommodation + services + hotel distribution + hotel industry + loyalty programs + travel + airline industry + publicity + restaurant + activity, transparency + event + e-governance + feedback + reviews + sharing economy).

The research of the articles has been conducted using the following sources: IEEEExplore, Science Direct, Research Gate, and Google Scholar. The initial collection counted 70 papers, then reduced to 29 by performing a further coarse-grained examination. In particular, it has been analysed the compliance of the selected abstracts following the inclusion criteria listed below:

- (A) Context: The primary studies should define their contributions in the context of blockchain technology employed in the tourism-related systems.

- (B) Purpose: The purpose of primary studies has to refer to applying BCT seeking for transparency, loyalty, traceability, commitment, security, and trust in tourism.
- (C) Theoretical foundation: The primary studies should provide at least one of the following elements: [visionary formulation, theoretical definition, system design].
- (D) Practical contribution: The studies should provide at least one of the following elements: [practical implementation, tests, critical analysis, evaluations or discussion].

The main features extracted are: Article’s abstraction¹, publication year, geolocalisation, application scenario, requirements, motivations, system features, functionality, assumptions, strengths, limitations, identified future challenges, players.

3 Results Presentation

This section presents the outcomes of the features collection process. Referring to question **SRQ1**, the distribution of works tackling BCT in tourism is represented in Fig. 2a – temporal and Fig. 2b – geographical. It is worth to remark a booming interest on the topic. The lower amount of the selected paper written in the year 2018 is solely due to the delay in the indexing performed by the selected sources and to the period of the selection².

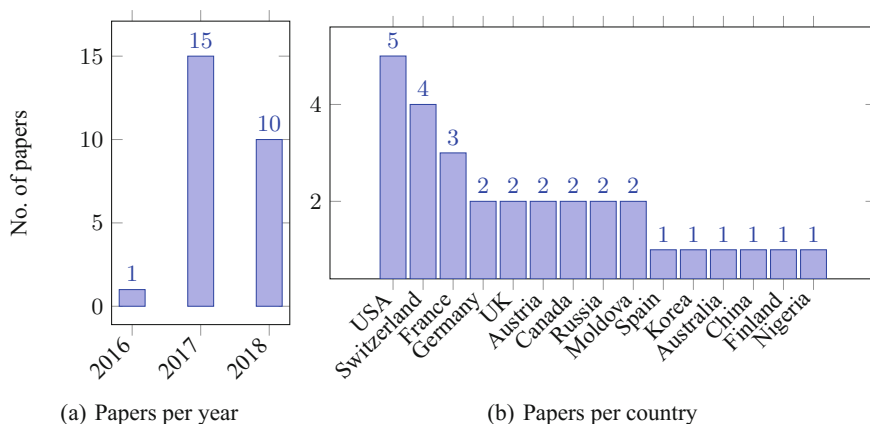


Fig. 2. Papers distribution

SRQ2 focuses on the requirements and motivation that demand the use of BCT in systems operating in tourism. The primary studies elaborate on the

¹ Conceptual (C), Prototype (P), and Tested (T).

² Selection performed in June 2018.

Table 1. Mapping domain - application primary studies

Domain	Application	Paper(s)
Airport/Hotel/Restaurant Industry	E-commerce platform for employees of HNA group	[23]
	Airline case study (e.g., flight planning, luggage chain)	[24]
	Customer loyalty programs; airline and hotel points	[11, 22]
	Identity management/Digital ID (passenger terminal, hotel, restaurant)	[11, 25]
	Tracking hotel guests, food	[11]
	Transactions in the hospitality industry	[11]
Sharing economy	Resource for sale, rental or co-usage	[2]
	Sharing App	[26]
	Online platforms for collaborative housing	[27]
	Online taxi-hailing platform	[15]
	Privacy in home sharing/room sharing	[10, 16]
Financial transactions	Crypto-currency	[9, 28, 29]
	Left-over currency exchange framework	[14]
Identity management	E-residency	[11]
Medical/Health tourism	Management system of Electronic Health Record (EHR)	[18]
Travel loyalty programs	Loyalty program in connection with using Credit Card	[30]
	POINTS (blockchain-based token)	[31]
Other categories	Online consumer reviews	[9]
	Regional tourism market	[19]
	Mid- and long-term-tourism industry	[1, 21]
	Tourism as poverty alleviation	[32]
	Mobility as a Service (MaaS) ecosystem	[12]
	Concert tickets	[25]
	Pay-as-you go car insurance	[33]
	Online travel platform (travel trade)	[9]

challenges faced by the current solutions, indirectly addressing the requirements, which emerge to be tightly coupled with the application scenarios. In [2], the authors are driven by the promises and hype given by the new technologies. Improving *trustworthiness* [9–13] and resolving *security concerns* [10–12, 14–17] are the common needs identified by most of the authors of the selected papers. The intention to *standardise* and *enforce the cooperation* between various actors are mentioned as other incentives [11, 17, 18]. The latter are linked to the intention of enabling *automation* and fostering *processes simplification* [11, 12]. In [11, 19–22] authors highlight the use of BCT to enhance the customer experience.

Addressing **SRQ3**, Table 1 sums up the mapping between the primary studies and their domains and applications. It is worth to mention that some studies focus on specific applications (e.g., [18, 22, 23]), and that others present more superficial contribution addressing various application scenarios in which

BCT are employed (e.g., [11]), thus appearing several times in Table 1. Moreover, [20, 34] have not been listed in Table 1 since they provide already aggregated information from third sources. Finally, to classify the typology of the contribution, the papers are categorised according to the maturity of their contribution (abstraction level³). The results show that the majority of the papers (20 out of 27) are still at the conceptual level.

A high potential for using blockchain technology is claimed to be possibly observed in the airline and hotel industry. The authors of [22–25] focus on use-case scenarios in the airline industry that are characterised by their complex systems consisting of a large conglomerate of different players. Whereas [23] elaborates the successful implementation of a blockchain-enabled E-commerce platform that offers more flexibility to employees of the Hainan Airlines (HNA) group, [22] focuses on the positive impact of BCT on enhancing customer loyalty programs in the airline business. Both application scenarios require the integration of multiple actors in one system. In the context of the E-commerce platform, the necessary standardisation tackles the inconsistency of options made available by the large number of subsidiaries [23]. Regarding the customer loyalty programs, the standardisation is required to overcome the missing cooperation between different providers [22]. The successful integration of various players in the network depends also on the ability to trust each other: without an intermediary present, the system itself needs to establish trust by its crowd of nodes on the blockchain network [22]. The provision of trust must be compliant with the concern of privacy and security [22, 23].

In other works, the authors consider not only the improvement of an existing platform/program but also the optimisation of larger components of the air transport industry. One of these components is the passenger terminal discussed in [25]. Exploring the opportunities and challenges, the author identifies blockchain as one of the emerging technologies that will migrate into the aviation sector and will provide identity management solutions and organisation. Using blockchain for authentication is also accounted for in [24] together to the possibility to automatically connect the digital ID to loyalty programs and hotel booking for flight crews. Other use-case scenarios evaluated in [24] are the following: implementing tokens for payments (replacing credit cards), using blockchain for tracking baggage and automatised compensation using smart contracts. Overall, the authors expect that these applications will reform the entire airline industry and will lead to a more collaborative platform beyond the realm of a single airline.

In the hotel industry, the proposed use-case scenarios remain similar. The authors in [11] suggest using blockchain for tracking guests records, which is comparable to tracking information about the luggage in the airline industry. In the restaurant industry food traceability is of high interest. However, in all the cases, for the application to be successful, the privacy of the customer has to be ensured [11, 24]. Another way of using BCT in the hotel industry is proposed in [11], and again, similar to the airline industry, it is concerning the loyalty

³ Conceptual (C), Prototype (P), and Tested (T).

programs on a blockchain platform. The advantages and opportunities of using BCT for loyalty programs in general are elaborated from a more mature perspective in [30,31]. In [31] the authors propose blockchain-based tokens, called POINTS. In [30], the author takes a step further and proposes a model for integrating royalty-based tokens in the offline stores by connecting it with use of credit cards. Likewise, standardisation and privacy have to be ensured. Another BCT application in relation to the hotel and air industry, but not limited to it, is the improvement of online customer reviews of tourism products (such as hotels, restaurants, flights, events etc.) evaluated in [9,21]. With respect to the current application, thereby, there is a demand for technological systems able to certify that the reviews are original and that cannot be manipulated by hoteliers nor by consumers [9]. Another important, if not essential, impact of blockchain on the hotel and air industry is seen in changing the structure of online travel platforms: shifting from relying on centralised intermediaries, to decentralised governance [9].

Looking at the implementation of blockchain technology in the sharing economy, the decentralisation is identified as an essential feature of the network. In [2], the authors examine the complex notion of trust in the sharing economy and the promise of the blockchain as a trust-free technology points at the replacement of trusted third parties (TTP) such as platform intermediaries. From a more practical perspective, the authors in [26] propose a decentralised sharing app based on BCT. In particular, it uses the ethereum blockchain, for regulating the renting of private assets. The app promises the non-involvement of TTP as well as the non-disclosure of personal information. From a touristic point of view, the adaption of BCT for applications in the sharing economy is especially interesting when looking at the example of home/room sharing. With regard to the issue of trust, the authors in [10,16] look at the user's privacy requirements and how BCT can fulfil them while ensuring the systems safety. Whereas the majority of the works speak about the advantages of using BCT and its positive impact on online platforms for collaborative housing, in [27] the authors underline potential negative side effects such as higher rents for local people and so the reduction of access to affordable housing. Another application possibility, where data security requirements such as integrity and audibility of sensitive data are concerned, is discussed in [15] in the framework of an online taxi-hailing platform. The authors argue that a technical solution for privacy protection needs to consider various aspects such as for example the need of anonymity. As shows in Table 1, further works have identified specific application possibilities in other domains in tourism such as a blockchain-based management system of the e-health record in health tourism [18] and using blockchain for the distribution of concert tickets in event tourism [17].

SRQ4 investigates the entities subject to the trust evaluation (see Fig. 3). Papers referring to end-user mapped into the system, mention employees, organisers, and suppliers [12,23,30] (e.g., hotels, and airlines [11,25]), the tourists (e.g., business-man/woman), and local people operating in the destination as entities to be trusted [1,14,28] (e.g., BnB hosts, rentals [10,15,26], government insti-

tutions, and law-regulators [13]). In the case of healthcare/medical tourism - patients and care-providers [18]. Aligned with such an approach, Onder et al. [9] classify the users in: (i) novel consumers (tourists making their decisions based on online reviews), (ii) transfer partners who have no previous business relationships, and (iii) small tour operators vs. online travel agencies. Dudin et al. [19] increase the end-user granularity classifying user in (i) among those who live in this region, (ii) tourists coming from another country region and (iii) foreign tourists. Hoang et al. [33] add insurance providers as a layer on top of these entities. Tackmann et al. [17] consider also third parties involved in different points of the tourism chain. Moreover, they invite to consider the customer not only as the final beneficiary of a given good/activity but also as a potential provider: in the case a re-sell (possibly deregulated) takes place. Concerning more technical analysis, Xu et al. [16] discuss the involvement of owners, users and related privacy, physical properties, in the technological drive blockchain compliant. Hawlitschek et al. [2] produced an analysis of trust in peers, trust in platforms, and trust in other targets (including products).

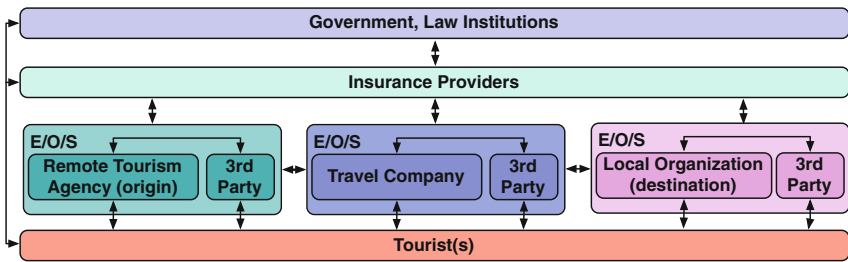


Fig. 3. Classes of the entities subject to trust evaluation

The **trust in peers** is intended as the trust between consumers and providers. It is a central element and main enabler of many sharing economy business models (e.g., the Airbnb scenario is possible only when hosts and guests trust each other). From the *consumer perspective*, the **trust in providers** is typically captured by a complex trust-scale (e.g, how trustworthy can a host be by combining the feeling generated by the profile picture and the obtained feedback). From the *provider perspective*, it can be conceptualised as a reflective construct covering trusting beliefs towards the host. Investigating car owners attitude in a peer-to-peer car-sharing vehicle provision, the results highlight a lack of trust in others with regard to their personal belongings [2]. The **trust in the platform** can be interpreted as the beliefs towards the performance of an institution or organisation rather than an individual. It has been hypothesised that trust in the platform is a direct antecedent of the intention to participate in the sharing economy. The authors suggested to measure trust as the belief that a platform is honest, reliable, and competent. From the *consumer perspective*, it is important to conceptualise the trust in two distinct constructs: the guests trust

in the host and in the platform (e.g., distinguishing between trust in the platform provider such as Couchsurfing and trust in accommodation providers). In [2], the authors also note the transfer of the trust from the platform to the peers (e.g., trust in the Airbnb platform positively affects the trust in hosts, given a certain fit of the user, platform, and host characteristics). From the *provider perspective*, it has been validated that the trust in the platform also drives trust in renters.

SRQ5 examines features and functionality that the BCT provides or that are expected from the BCT in tourism systems. Some authors state that security, reliability, transparency, immutability, and privacy can change radically the options and their perception in the tourism market [11,23].

Authenticity of the data and privacy of the users can be provided by encrypting and signing the blockchain transactions [9,28]. In [16], the authors propose privacy respecting blockchain based sharing economy platform with the following basic operations: generating agreements, making payments, and (in the future) make cancellations.

The renting agreement (generated by the owner) and payment (generated by the user) are not linked with each other directly on the blockchain. Instead, they are submitted to corresponding pools first. Two temporary agents pull out corresponding records and commit to the blockchain again in a new form. Although the new agreement and payment are connected on the blockchain, the adversary cannot learn the relationship between original ones (preserving the privacy). Pilkington et al. [18] discuss the use of blockchain technology to enhance medical tourism, by providing trust and transparency. To do so, different IT can be used: digital signature, hash functions, public key cryptography, and syncing algorithms to allow the exchange of data off-chain [18]. BCT can be beneficial for reliability and quality of existing services [1] and can enable a broad set of new services (e.g., new mobile apps for cash-back, points, and discounts in marketing loyalty systems [34]). Payments and cash-back can generate controversial situations which in BCT-enable systems can be easily settled [2]. Dogru et al. [11] proposed *(i)* instant update of hotels regarding whereabouts of hotel guests, *(ii)* buy, sell, exchange loyalty points, *(iii)* store information (ID, birth certificates, driver's licenses, social security numbers, passports) on platform; give permission to access, *(iv)* automatic recording and sharing of all transactions and automatic procession of contractual terms, *(v)* execution of franchise agreements and managements contracts, *(vi)* assignment of hotel rooms to guests and use of digital keys, and *(vii)* automatic execution of payments if a flight is delayed or cancelled. Zhang et al. [12] presents the concept of TravelToken: The data are stored on a blockchain according to the user-name and travel data (travel destination and value). The employee receives a ticket as a QR code (TravelToken), that includes all travel data required for the whole travel. As the user submits the data, the program retrieves the travellers name and customer number from the smart contract to verify that the customer data are appropriately stored in the smart contract. If the travel method is cancelled, the value is automatically compensated back to the client. If the travel is completed, the

smart contracts calculate and compensate the allowances. Moreover, Robinson et al. [25] mention the use of tokens for biometric-enabled single passenger information. Tackmann [17] uses digital signatures to protect all transactions, and allows users to manage, sell, and use concerts' tickets via smartphone. The most relevant functionality of the chaincode (based on Hyperledger Fabric) is tracking the owner and the state of each ticket. In [26], the blockchain technology is used to share and rent private belongings. The users are identified with related Ethereum public key. Therefore, who owns a corresponding private key can use the application (no sign up or additional information are required). Employing Ethereum, all the details of the rental agreement are executed as specified in the smart contract, thus avoiding the need for TTP. Akmeemana et al. [24] propose to use BCT to solve the overbooking practice, supporting the airport collaborative decision making (ACDM), flight planning and air traffic control charges, maintenance/repair/overhaul (MRO) - (e.g. BC4A industry), and hotel booking for flight crews. Concerning the luggage loss rates, historically (according to SITA) is 5.73 bags per 1,000 passengers for a total of 21.6 million cases. The passengers are unable to track their luggage after the check-in. The arrival is the only moment in which the passengers can realise if a problem occurred. Possible scenarios are (i) stolen bags, (ii) damaged items, and (iii) bags delayed or sent to a wrong destination. In a possible blockchain-enabled scenario, a bag could be monitored in several key-points updating the record in the ledger. In case of a damage occurred, smart contracts could be written to automatically trigger compensation pay-outs.

SRQ6 deals with the strengths as well as limitations of the BCT employment in tourism-related systems. To begin, the strengths identified by the authors are summarised. A list of the limitations will follow in a second step. It is broadly agreed on that blockchain technology is able to replace centralised organisations structures while still ensuring trust and safety related issues. Safety concerns include not only the reliability that changes can only be undertaken when the whole network agrees but also the protection of data regarding the privacy of the user [15,18]. This leads to a higher quality of services which allows a higher satisfaction [11]. Moreover, the replacement of the middleman allows to reduce additional transaction costs and improve the operational efficiency all in once [17,23]. A reduction of costs and improvement of efficiency is furthermore reached by the automation of processes based on smart contracts [24]. Whereas there are various advantages of the employment of BCT, many authors agree that the technology finds itself still in a very early phase with challenges ahead [9,28]. In the context of the airline use-cases, an identified challenge lies in the lower transaction speed due to the higher processing power required. In a centralised system with today's standards compared to an equivalent blockchain solution, the number of transactions of the latter will be outperformed by the former [24]. Additionally, the benefits and the effectiveness of the implementation of blockchain still depends on the industry and sector. Moreover, currently, standardisation is mostly missing [22,30].

The last question, **SRQ7**, finally proposes the future challenges. As already identified as a limitation by several authors, the lack of concrete applications claim the implementation as implicit challenge. Only by testing, yet unknown implications can be discovered [10,12–15]. Regarding the implementation, there are also legal aspects that need to be taken into account [13]. Finally, others argue that there is also still plenty of space for further theoretical and methodological research [2,9].

4 Discussion

In both 2016 and 2018, *the world economic forum* and *Gartner* identified blockchain as one of the “top 10 emerging technologies” of the year. An observed rising interest in tourism and the booming of scientific work in that field seems therefore only logical.

Research Community vs. Industry

Contrary to the activity identified in the academic community, several authors claimed that the missing implementation of blockchain solutions is among the main future challenges. Data-based support for this argument can be found in [20], that analysed a data set of 1140 start-ups using blockchain technology as part of their business models in 2016. The start-ups included in the analysis span across diverse industry branches (e.g., education, health-care, and tourism). Unlike the identification of 483 young businesses in the finance and insurance sector, the analysis counts only three start-ups in the tourism sector. In 2018, a study [20], sheds, however, a different light on the perspective when briefly analysing the blockchain market in the field of tourism. Firstly, the authors differentiate between applications improving already existing market loyalty systems vs. applications based on new ideas for services in the systems. Then, the authors listed 38 Apps grouped by reference in the following scenarios: accommodations, outdoor industry, catering, transport and “general”. The list includes apps such as “Winding Tree”⁴. It is a decentralised travel ecosystem based on the idea of building a public blockchain for the travel market. On the one hand, the goal is to make travelling more affordable for the travellers. On the other hand, the start-up aims to increase the profit for the suppliers by replacing OTAs and thereby challenging their monopoly in the market. Thus, the application correlates directly the possibilities for the implementation of blockchain in tourism suggested in [9]. Another solution regarding the hotel industry is named “Lockchain”⁵. An alpha version of the marketplace allows customers to book rooms directly with hotels for a small fee (or without if paying with LOC tokens) [34]. The aim is to bypass travel agencies minimise extra costs. Therefore, multiple applications have already implemented some of the solutions proposed at a conceptual level.

⁴ <https://windingtree.com/>.

⁵ <https://alpha.locktrip.com/hotels>.

The Lack of Understanding as Barrier

It does not mean, however, that there is no need for pushing theoretical analysis towards actual development and testing. According to Akmeemana [24], there still is a lack of understanding in which cases blockchain solutions lead to actual improvements. The claim is that a lack of expertise hinders the implementation of further solutions due to the cost of expertise and resources.

Customer Advantage vs. Supplier Advantage

The high costs combined with required expertise, lead to a further discussion. SRQ3 identified one of the most important factor motivating the use of BCT: both service providers and suppliers can benefits from BCT-based systems. Two existing examples of already implemented applications are WindingTree and Lockchain. The positive impact from the perspective of the supplier is: “by replacing the intermediary, the company will profit from saving costs and overcoming inefficiencies”. The profit is thereby expected to be higher than the required investments. From a customer point of view, the benefits are less clear on a first sight. The replacement of the intermediary does not automatically promise that the prices for the customers will be reduced, especially bearing in mind the high input costs. On a second sight, it has to be accounted for other important but less visible advantages for the customer, what is gained due to the introduction of BCT. As analysed in SRQ6 the elimination of a third party implies that a system relying on trust-based BCT promises a higher level of security for private data. Thus, especially if trust has been identified as one of the highlighting requirements as well as benefits, improvement can also be expected from the standpoint of the customer.

5 Conclusions

This paper presented an SLR of 29 primary studies addressing BCT in tourism systems. An overview of domains, functionalities, application scenarios, motivations, assumptions, element of trust, strengths, limitations, and identified future challenges has been provided. It has also been discussed hype and reality, the perception of BCT from tourism researchers and industry perspective, the lack of understanding as a factor hampering this technology, and the advantages for the users in turn. However, it has also been acknowledged that to successfully employ BCT and takes advantage from its added-value, the data security and privacy, and scalability (among others) have to be guaranteed. BCT itself does not guarantee them, therefore, more research/building new mechanisms on top has to be studied and applied to real-word use-cases. Proved the interest of different communities in the tourism-related areas, it confirms the potential of BCT in tourism. Ongoing works focus on addressing open challenges of employing BCT in tourism scenarios. Future work focus on implementing the visionary designs.

References

1. Inkson C, Minnaert L (2018) Tourism management: an introduction
2. Hawlitschek F, Notheisen B, Teubner T (2018) The limits of trust-free systems: a literature review on blockchain technology and trust in the sharing economy. *Electron Commer Res Appl* 29:50–63
3. Mittendorf C (2016) What trust means in the sharing economy: a provider perspective on airbnb.com
4. Davide C, Alevtina D, Paul CJ, Kuldar T, Michael S (2018) Multi-agent systems and blockchain: results from a systematic literature review. In: *Proceedings of the 16th international conference on practical applications of agents and multi-agent systems*
5. Davide C, Appoggetti K, Lustrissimini L, Marinoni M, Sernani P, Dragoni AF, Schumacher M (2018) Multi-agent systems negotiation protocols for cyber-physical systems: results from a systematic literature review. In: *Proceedings of ICAART*
6. Kitchenham B, Pearl Brereton O, Budgen D, Turner M, Bailey J, Linkman S (2009) Systematic literature reviews in software engineering - a systematic literature review. *Inf Softw Technol* 51(1):7–15
7. Calvaresi D, Cesarini D, Sernani P, Marinoni M, Dragoni AF, Sturm A (2016) Exploring the ambient assisted living domain: a systematic review. *J Ambient Intell Humaniz Comput*, 1–19
8. Kitchenham BA, Brereton P, Turner M, Niazi MK, Linkman S, Pretorius R, Budgen D (2010) Refining the systematic literature review process-two participant-observer case studies. *Empir Softw Eng* 15(6):618–653
9. Önder I, Treiblmaier H (2018) Blockchain and tourism: three research propositions. *Ann Tour Res*
10. Nazmul Islam Md, Kundu S (2018) Preserving iot privacy in sharing economy via smart contract. In: *2018 IEEE/ACM third international conference on Internet-of-things design and implementation (IoTDI)*. IEEE, pp 296–297
11. Tarik D, Makarand M, Christie L (2018) Blockchain technology & its implications for the hospitality industry
12. Anni K, Kimmo H (2018) Smart contracts for a mobility-as-a-services ecosystem. In: *2018 IEEE International conference on software quality, reliability and security Companion (QRS-C)*, pp 135–138. IEEE
13. Sullivan C, Burger E (2017) E-residency and blockchain. *Comput Law Secur Rev* 33(4):470–481
14. Rituparna B, Martin W, Natalia B, (2017) A blockchain based peer-to-peer framework for exchanging leftover foreign currency. In: *Computing conference, 2017*
15. Zhang N, Zhong S, Tian L (2017) Using blockchain to protect personal privacy in the scenario of online taxi-hailing. *Int J Comput Commun Control* 12(6)
16. Xu L, Shah N, Chen L, Diallo N, Gao Z, Lu Y, Shi W (2017) *Proceedings of the ACM workshop on Blockchain, Cryptocurrencies and contracts*
17. Tackmann B (2017) Secure event tickets on a blockchain. In: *Data privacy management, Cryptocurrencies and Blockchain technology*, pp 437–444
18. Pilkington M (2017) Can blockchain technology help promote new tourism destinations? the example of medical tourism in moldova
19. Dudin MN, Burkaltseva DD, Tsohla SY, Voronin IN, Yanovskaya AA, Guk OA (2017) Peculiarities of sustainable tourism development in the Russian federation. *J Environ Manag Tour*, 1559–1566

20. Friedlmaier M, Tumasjan A, Welp I (2016) Disrupting industries with blockchain: the industry. In: Venture capital funding, and regional distribution of Blockchain ventures
21. Lam C (2017) Applying blockchain technology to online reviews. LSE Bus Rev Blog
22. Udegbe SE, Impact of blockchain technology in enhancing customer loyalty programs in airline business
23. Ying W, Jia S, Du W (2018) Digital enablement of blockchain: evidence from hna group. *Int J Inf Manag*
24. Akmeemana C (2017) Blockchain takes off
25. Robinson J (2017) Passenger terminal development in the digital age. *J Airport Manag* 11(4):355–368
26. Bogner A, Chanson M, Meeuw A (2016) A decentralised sharing app running a smart contract on the ethereum blockchain. In: Proceedings of the 6th international conference on the internet of things, pp 177–178. ACM
27. Nasarre-Aznar S (2018) Collaborative housing and blockchain. *Administration* 66(2)
28. Seigneur J-M (2018) Towards geneva crypto-friendly smart tourism. In: *Etats Généraux du Tourisme*
29. Zsarnoczky M (2018) The digital future of the tourism & hospitality industry
30. Choi J, Modeling the intergrated customer loyalty program on blockchain technology by using credit card
31. Crnojevic S, Katzela I (2017) Chain of points: transforming loyalty into rewards
32. Pilkington M, Crudu R, Grant LG (2017) Blockchain and bitcoin as a way to lift a country out of poverty-tourism 2.0 and e-governance in the republic of moldova. *Int J Internet Technol Secured Trans* 7(2):115–143
33. Vo HT, Mehedy L, Mohania M, Abebe E (2017) Blockchain-based data management and analytics for micro-insurance applications. In: Proceedings of the 2017 ACM on conference on information and knowledge management. ACM
34. Chakhova DA, Kosheleva AI (2018) Challenges and perspectives for the development of blockchain tourism in the Russian regions (case study of the kaluga region). *Reg Econ Manag Electron Sci J*, 2018–53

Social Media



What's Vs. How's in Online Hotel Reviews: Comparing Information Value of Content and Writing Style with Machine Learning

Seunghun Shin^(✉), Qianzhou Du, and Zheng Xiang

Howard Feiertag Department of Hospitality & Tourism Management, Pamplin College of Business, Blacksburg, VA, USA
{ssh15, qiand12, philxz}@vt.edu

Abstract. Writing style is an important rhetorical feature of textual information. However, its value has not yet been well understood within the context of social media. This research compares two major aspects of textual content, i.e., content and style, to determine the information value of online hotel reviews. Using TripAdvisor hotel reviews, several machine learning techniques based on natural language processing (NLP) are applied to predict review helpfulness. The results indicate that textual features are core features of online reviews; that style is a more influential aspect than content; and, that combining both features produces the best results. This study contributes to the understanding of user-generated content in the textual format within the hospitality and tourism contexts. Limitations and directions for future research are also discussed.

Keywords: Writing style · Textual content · Online hotel reviews
Machine learning · Natural language processing (NLP)

1 Introduction

The current United States President Donald Trump is considered one of the most famous Twitter influencers. Although his popularity could be attributed to his presidency, writing style in his tweets is one of the major reasons why he is successful on the social media platform. With provocative and incendiary words, his rhetorical package is shown in the feeds of over 50 million followers and retweeted averagely over 1,600 times. New York Times found that his tweets are composed of “constant repetition of divisive phrases, harsh words, and violent imagery that American presidents rarely use” [1]. Especially, the incident of “covfefe” shows well that sometimes what one says (i.e., content) does not matter as much as how he says it (i.e., style) in online communication.

Non-verbal cues are less available in the online world and, therefore, text plays a crucial role in online communication and language usage is a core factor influencing how individuals express and interpret information [2]. Particularly in hospitality and tourism, online textual content has been recognized as a primary information format in the whole travel process [3]. For example, travellers read online reviews before or during the travel to obtain information and write reviews after the travel to share their

experiences [4]. According to the linguistics literature, text is composed of two major aspects: content (i.e., what to say) and style (i.e., how to say) [5]. Style refers to the way text is written, namely specific choices of functional words (e.g. pronouns, prepositions, articles, and so on) [6]. Although there has been growing interest in collecting, analysing, and interpreting online reviews, the impact of style in these textual contents has not been well understood [7, 8].

This research aims to understand information value of style in online textual reviews in the hospitality and tourism context. In order to do this, machine learning methods were adopted to predict review helpfulness of online reviews extracted through a computerized text analysis program called Linguistic Inquiry and Word Count aka LIWC. The predictive power of style is compared with that of content and discussed the findings in relation to both theory and practice.

2 Research Background

In social media, a piece of online information such as product reviews provides a variety of features including text, sound, photo, and video [9]. Although various types of features are available, the core information is text [5]. Travellers evaluate online reviews by carefully reading the textual content [10]. As such, text plays an essential role in online information content [2]. Thus, to effectively understand information value of online content, it is important to understand text compared to other peripheral features [11].

Text is composed of what is being said (content) and how is being said (style), so both aspects are highly relevant decision inputs which help readers to evaluate its information value [5]. At the word level, while nouns, regular verbs, and adjectives or adverbs usually substitute content, pronouns, prepositions, articles, and other esoteric categories represent style [6]. While content and style indicate different aspects of text, both need to be considered in order to fully grasp the text's meaning [12]. However, previous research on online reviews has ignored the style aspect despite of its importance in determining information value of textual content [5, 13, 14]. Although a few recent studies examined information value of style, most of them considered style as a supporting feature, focusing on its complementary role [7, 15–17]. In other words, style's information value has been hardly examined as an independent aspect [5]. Some studies argued that style could be more influential for readers to perceive information value of textual content because readers tend to identify writers mainly through the use of style words rather than content words [18, 19]. Also, higher degree of synchronization in style makes communication participants approve and trust each other [20]. Thus, a lack of research on style appears to be a deficiency in our understanding of textual information [19].

Particularly in hospitality and tourism, understanding online textual information is critical because travel products are difficult to be previewed before actual consumption, and text-based communication such as online reviews plays an essential role in the consumption process [3]. A great number of studies have examined significant impacts of online reviews on travellers' choices (e.g., [21, 22]) and firms' economic performances (e.g., [23, 24]). In spite of greater number of studies of online reviews in

hospitality and tourism, our understanding of the nature and utility of online reviews remains limited owing to the lack of research on important linguistic characteristics such as style.

3 Research Methodology

In order to examine the information value of style in online textual reviews within the hospitality and tourism context, machine learning techniques are used to examine the predictability of text on perceived helpfulness of reviews in terms of both content and style.

3.1 Research Design

We defined the understanding of the information value of style as an inference problem of machine learning: to what extent can the helpfulness of online reviews be effectively explained and predicted by style compared to that by content? As a number of previous studies have shown, in general, the number of helpfulness votes tends to show skewed distribution [2, 9]. Specifically, a greater number of online reviews received either no helpfulness votes or one vote. Therefore, predicting whether online reviews received helpfulness votes or not makes sense as an inference problem of machine learning [9, 17, 25]. Since it is hard to predict review helpfulness from scratch for a computer program, the number of helpfulness votes in the raw data was used for training classifiers.

Under the premise that a textual review has two major aspects (i.e. style and content), we (1) extracted the two aspects from each online review with NLP techniques and labelled each review as a helpful or non-helpful review based on its number of helpfulness votes, (2) trained four helpfulness classifiers (i.e. baseline-, topic-, style-, and hybrid classifier), and, (3) measured and compared each classifier's performance to decide which aspect is more influential in predicting review helpfulness.

3.2 Data Collection

Online hotel reviews written in English were used as research data. Specifically, reviews about the hotels located in 18 US cities (Americus, Georgia; Myrtle Beach, South Carolina; Aiken, South Carolina; Bradenton, Florida; Champaign, Illinois; Pueblo, Colorado; Chattanooga, Tennessee; Orlando, Florida; Las Vegas, Nevada; Fort Worth, Texas; Baltimore, Maryland; Memphis, Tennessee; San Francisco, California; Indianapolis, Indiana; San Jose, California; Dallas, Texas; Chicago, Illinois; New York, New York) were collected from TripAdvisor using a web crawler written in Python and Java programming languages in summer 2016. Among all the searchable hotels in TripAdvisor in the 18 cities, specific number of hotels were randomly selected from each city, with on average approximately 13 hotels per city (a total of 232 hotels). Reviewer ID, reviewer level, overall rating, review text, and the number of helpfulness votes were collected. Although in total 148,575 reviews were collected, 8,461 cases were removed due to their lack of sufficient length (i.e., less than 50 words) or required

features (i.e., no helpful votes due to short review age (less than 12 months)), resulting in 140,114 cases for the analyses. For the purpose of prediction, each review was labelled as helpful- or non-helpful based on the number of helpfulness votes: reviews of no helpfulness votes as “non-helpful reviews (0)” otherwise “helpful review (1).” To achieve training and prediction precision, the data set was divided into a training (70%) and test set (30%) and a stratified partition was used to construct a balanced data set including the same number of helpful and non-helpful reviews (Table 1).

Table 1. Datasets for analysis

	Overall	Helpful reviews	Non-helpful reviews
Training set	98,080 (70%)	49,040 (70%)	49,040 (70%)
Test set	42,034 (30%)	21,017 (30%)	21,017 (30%)
Total	140,114 (100%)	70, 057 (100%)	70, 057 (100%)

3.3 Extracting Textual Features and Measure

To extract content features, topic modelling was used. Topic modelling is a machine learning tool for identifying major topics in text by analysing a collection of documents. Besides identifying major topics, it calculates associated probabilities indicating the likelihood of specific topics to appear in a specific document. Among different algorithms, the Latent Dirichlet Allocation (LDA) algorithm was adopted [26]. The LDA algorithm assumes that a hidden structure exists, which consists a set of topics in the whole text corpus. To infer the hidden structure, the algorithm utilizes the co-occurrence of observed words in different documents and calculates mathematically the posterior distribution of the unobserved topics in the documents [26]. Topic modelling with the LDA algorithm was performed and five groups of topics were identified. After checking the topics in each group, each group was labelled as “Basic service,” “Landmark & Attraction,” “Value,” “Dining & Experience,” and “Core Product” (Table 2). For groups which include a few irrelevant topics (e.g., “Breakfast” and “Staff” in “Value” group), they are labelled primarily based on most of the other topics. Each review was assigned with five topic scores, which were then used as content features for training and testing classifiers.

Table 2. Identified groups of topics

Basic service	Landmark & Attraction	Value	Dining & Experience	Core Product
Desk (0.044)	Square (0.072)	Great (0.107)	Bar (0.030)	Room (0.081)
Front (0.040)	Times (0.060)	Location (0.080)	View (0.018)	Free (0.027)
Room (0.040)	Central (0.042)	Staff (0.076)	Trip (0.018)	Bed (0.026)
Service (0.035)	Park (0.039)	Good (0.062)	Restaurant (0.017)	Small (0.022)
Air (0.011)	Station (0.023)	Breakfast (0.029)	Service (0.013)	Size (0.020)
Check (0.010)	Building (0.019)	Nice (0.021)	Experience (0.012)	Area (0.020)
Business (0.009)	Subway (0.018)	Place (0.021)	Visit (0.010)	Coffee (0.019)
Rate (0.008)	Empire (0.017)	Excellent (0.018)	Wonderful (0.010)	Nice (0.016)
Door (0.007)	State (0.016)	Price (0.016)	Lovely (0.009)	Bathroom (0.015)
Customer (0.007)	Broadway (0.014)	Friendly (0.015)	Top (0.009)	Shower (0.014)

Note. The numerical values in parentheses represent posterior probabilities of topics

To extract style features, LIWC was utilized. LIWC is a text analysis program and its results show what categories of words (i.e. part of speech) is used in text [27, 28]. With its predefined dictionaries, LIWC reads each word in text, compares the word against the dictionaries, and identifies which words are associated with which categories. After the processing, it calculates the proportion of specific categories of words and determines style of text based on the proportion [6]. With its higher reliability and validity, LIWC has been adopted in a number of studies in different fields such as language, social psychology, consumer behaviour, and social media [27]. Drawing from findings of linguistics literature [5, 7, 9, 15–17, 29–31], five categories were selected which have been examined as valid indicators of major style aspects: pronouns (social-oriented language), article and preposition (concrete information), auxiliary verb (passive voice), and affective words (emotional language) (Table 3). Actually, affective words were regarded as either content or style aspect in other studies [6, 13, 14]. In our study, ‘what to say’ is primarily about product attributes rather than emotional expressions, so affective words are considered as style features. Each review was assigned to five numerical variables and the five values were used as style features for training and testing classifiers.

Table 3. Explanation of selected categories of style words

Category	Examples	Psychological correlates
Pronoun	I, Them, Itself	Social-oriented language
Article	A, An, The	Concrete information
Preposition	To, With, Above	Concrete information
Auxiliary verb	Am, Will, Have	Passive voice
Affective words	Happy, Love, Ugly, Hate, Cried, Abandon	Emotional language

Other than the competing helpfulness classifiers (i.e., topic and style classifier), a baseline classifier was constructed to examine the effectiveness of proposed aspects. Several features of online reviews were used for the baseline classifier: reviewer level (how many contributions have been made by individual reviewers), review age (for how long reviews have been exposed to other users), overall rating (from terrible (1) to excellent (5)), and review length (text length). As the four features have been examined as significant in influencing review helpfulness, they were utilized as control features [32]. As for reviewer level and overall rating, the raw numerical values were used. In the cases of review age and review length, the number of months from upload time to data collection time and the number of words in review text was used, respectively. Finally, a hybrid classifier was created by including all the control and textual features and tested to examine the joint effects between topic and style features. In the hybrid classifier, all the features were included without standardization.

3.4 Training and Testing Helpfulness Classifiers

To examine the prediction accuracies of the proposed aspects, four helpfulness classifiers were trained and tested. In these processes, machine learning for classification was implemented in R programming language. For each classifier, four different

machine learning methods (i.e. Decision Trees (DT), Naïve Bayes (NB), Logistic Regression (LG), and Random Forest (RandF)) and four different estimation metrics (i.e. Accuracy, Recall, Precision, and F1) were adopted for testing. The major difference between the four methods is how each classifies reviews into helpful or non-helpful: (1) DT classifies by using the most significant features followed by the next significant one, and so on. In this way, it makes a tree structure [33]; (2) NB is based on Bayes' Theorem assuming independence between features, and it considers every extracted feature's contribution to review helpfulness independently [13, 34]; (3) LG predicts review helpfulness by fitting data to a logit function. It finds the best fitting model to explain possible relationships between features and helpfulness [15]; (4) RandF is described as an ensemble of DT. Different from DT using a single tree structure, it utilizes a collection of trees, called forest, and selects the best classification result by comparing trees [35]. Since each method has its pros and cons and produces different performance depending on data format, many studies have adopted more than one method to obtain reliable results [9, 14, 16]. As for hyper-parameters of RandF (i.e., number and maximum depth of trees), random search method was used for finding the optimal number and maximum depth of trees. The following results were found: baseline classifier (number of trees: 5, maximum depth of trees: 2), topic and style classifier (number of trees: 5, maximum depth of trees: 5), hybrid classifier (number of trees: 5, maximum depth of trees: 6). Finally, 10-fold cross-validation was performed for each method to obtain unbiased error estimate: (1) the whole data set was randomly divided into training and testing data set 10 times, resulting 10 different data split cases; (2) each split case was tested, producing 10 different performance results; (3) the 10 different results were averaged.

4 Results

4.1 Descriptive Analysis

Table 4 shows the descriptive statistics of the data set. In case of review helpfulness, since a balanced data set was used as shown in Table 1, both the mean value and standard deviation are 0.5.

4.2 Predicting Review Helpfulness

Table 5 shows the overall results. In all methods, consistent trends appear: (1) both topic and style classifiers produce higher scores than the baseline model; (2) style classifier outperforms topic classifier; (3) hybrid classifier produces the highest score (bolded text in Table 5). All the improvements from baseline- to topic classifier, from topic- to style classifier, and from style- to hybrid classifier were significant. Thus, it is found that (1) textual features of online reviews have their own information value as core features; (2) among the textual features, style features have higher information value than content features in predicting review helpfulness; (3) combining two major textual features is the most effective way to estimate review helpfulness.

Table 4. Descriptive Statistics

	Features (Unit)	Mean	Std.	Min.	Max.
Control	Reviewer level (1–6)	4.01	1.75	1	6
	Review age (Number of months)	87.02	35.73	12	183
	Overall rating (1–5)	4.09	1.04	1	5
	Review length (Number of words)	117.86	79.17	50	3,844
LIWC	Pronoun (Percentage)	9.47	4.90	0.25	66.67
	Article (Percentage)	9.32	3.94	0.31	45.45
	Preposition (Percentage)	12.46	4.40	0.76	66.67
	Auxiliary verb (Percentage)	8.47	3.77	0.41	42.86
	Affective words (Percentage)	6.92	4.96	0.32	71.43
Topic modelling	Topic 1 (Probability score)	0.1995	0.0336	0.0486	0.6776
	Topic 2 (Probability score)	0.1956	0.0306	0.0486	0.4900
	Topic 3 (Probability score)	0.2038	0.0330	0.0405	0.4851
	Topic 4 (Probability score)	0.2020	0.0341	0.0679	0.8057
	Topic 5 (Probability score)	0.1992	0.0349	0.0456	0.5982
Result	Review helpfulness	0.50	0.50	0	1

Table 5. Testing results of prediction of baseline-, topic-, style-, and hybrid classifier

Methods	Results	Baseline	Topic	Style	Hybrid
Decision trees	Accuracy	0.7008	0.7020	0.7046	0.7070
	Recall	0.5545	0.5640	0.5663	0.5698
	Precision	0.8600	0.8635	0.8678	0.8720
	F1	0.6766	0.6812	0.6840	0.6871
Naive Bayes	Accuracy	0.5822	0.5838	0.5843	0.5865
	Recall	0.9115	0.9257	0.9300	0.9398
	Precision	0.5812	0.5823	0.5831	0.5852
	F1	0.7113	0.7155	0.7162	0.7222
Logistic regression	Accuracy	0.6195	0.6214	0.6222	0.6235
	Recall	0.8955	0.8965	0.8973	0.9201
	Precision	0.6110	0.6125	0.6133	0.6143
	F1	0.7270	0.7272	0.7280	0.7286
Random forest	Accuracy	0.6297	0.6347	0.6399	0.6464
	Recall	0.9222	0.9379	0.9435	0.9473
	Precision	0.5849	0.5954	0.6141	0.6312
	F1	0.7221	0.7284	0.7373	0.7565

Since the RandF method is able to show each feature's importance, we computed each feature's importance to further understand information value of style. As shown in Fig. 1, all style features appear as better predictors. Thus, the higher information value of the style features was further corroborated. With respect to the representation of each

style feature, the results suggest that providing information concretely (preposition, article), sharing travel experiences with social-oriented language (pronoun), passive voice (auxiliary verb), or emotional language (affective words) could be more important for readers to perceive online travel reviews than attributes of hotel products (i.e., topics).

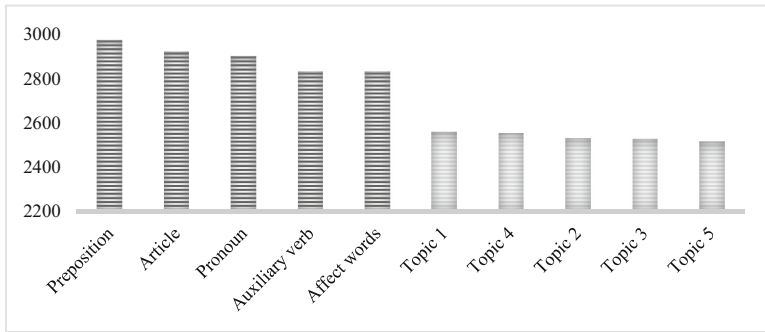


Fig. 1. Feature importance

5 Discussion and Conclusions

Motivated by a lack of understanding of the role of style in online textual reviews in hospitality and tourism, this study assesses its information value contributing to online review helpfulness by applying machine learning methods with NLP techniques. The findings show that although two major textual features have their own information value, style seems to contribute to review helpfulness more than the content does. The high performances of style classifier are consistently supported by different methods and further corroborated through computation of each feature's relative importance. These results suggest that style is an important aspect of textual reviews in the hospitality and tourism context, as has been shown within other contexts [7, 12, 15–17]. Indeed, style can be a more influential aspect than the content in consumers' evaluation of review helpfulness [18–20].

It must be recognized that human language is complex and the evaluation of textual reviews could be a complex process as well. Both content and style may play significant roles in readers' perception and evaluation of others' experience in relation to their own experiences and preferences. To illustrate this, we draw two examples from the original data to contrast hotel reviews (see Table 6). Although both reviews are perceived as helpful by others, they are quite different: the review in the left column (style-leaning) is written with persuasive style (i.e., the higher usage of preposition and pronoun) but less include the information demanded by New York traveller (i.e., landmark and attraction) [6], while the review in the right column (topic-leading) focuses more on the demanded information but its style is not highly persuasive due to the lower usage of prepositions and pronouns.

Table 6. Examples of reviews from style and topic perspectives

Style-Leaning	Content-Leaning
The Ritz-Carlton New York, Central Park (New York, New York)	The Michelangelo hotel (New York, New York)
5 out of 5 points (Excellent)	5 out of 5 points (Excellent)
<p><i>We stayed at this hotel for 1 night on our way to Paris and then for 3 nights on our way back from London. We have nothing but wonderful things to say about the hotel, the staff and the facilities. In typical Ritz Carlton fashion, the staff went out of their way to welcome us. This whole trip was a 25th wedding anniversary. Upon returning to our room the first night, after dinner, we found the entrance to our suite paved in rose pedals. The path of pedals led to the bedroom and there on the bed were more pedals in the shape of a heart. Upon our return from 2 weeks in Europe, the staff had placed a plate of cookies and chocolates including a chocolate picture frame that contained a chocolate "picture" saying "NEW YORK PARIS LONDON NEW YORK". Now, I have stayed at many fine hotels, but for a hotel to (1) ask their guests why they were staying and what their plans were and (2) actually listen to their guests and (3) take the initiative to act upon what their guests said is incredible. We would stay here again without question. The staff we interacted with was attentive, polite and professional. The Club was excellent with diverse food offerings and incredible staff. The only issue we had was resolved promptly and if anything the hotel over compensated us for the problem.</i></p>	<p><i>My husband and I have just returned from a 3 night stay at this hotel. One of the other reviews mentioned something about being treated rudely based upon how they were dressed, but I have to say that we didn't experience this at all. We were both dressed very casually and had lots of questions about parking our car, checking in, etc. and Carlos, the wonderful doorman, couldn't have been nicer. He actually was much more pleasant and helpful than the people at the front desk, but we saw him a lot and were more comfortable asking him questions. Our room was on the 5th floor and faced 51st and the corner of 7th Ave., which could be a little noisy for some I'm sure. We noticed the noise but after walking all over the city each day, we still slept well. We didn't try the breakfast or room service so I can't comment on that. However, we did eat at the Europa Cafe which is across the street, and that was good. The room itself was very clean and spacious, and the turn-down service was a nice treat. I also liked our personal doorbell, but that's probably because I like the little things.:) As others have mentioned, the location is great, and I definitely agree. We were steps away from Radio City, Rockefeller Center, Times Square, the subway, etc. We will definitely return to the Michelangelo...hopefully getting the same great rate we had this time (\$195/night)!</i></p>

- The usage of prepositions indicates ‘concrete information’ and its higher usage tends to increase the quality of text [6]. Style-leaning example has much higher proportion of prepositions (21.78%) than average (12.76%)
- The usage of pronouns indicates ‘social-oriented language’ and its higher usage tends to increase the quality of text [6]. Style-leaning example has much higher proportion of pronouns (11.32%) than average (9.52%)
- For New York travellers, the information about the city’s famous place and attraction is highly demanded (topic 2: landmark & attraction) [8]. Such information is more provided in content-leaning example than average (28% > 19%)
- For New York travellers, the information about restaurants or inner facilities within hotels is less demanded (topic 4: dining & experience) [8]. Such information is less provided in content-leaning example than average (15% < 20%)

Theoretically, this study improves our understanding of online textual reviews' information value by providing empirical grounds for consideration of the overlooked aspect of textual content. Although needs of understanding style have been emphasized by a number of studies, only content has been frequently focused in hospitality and tourism field [4, 9]. As one of the early studies investigating style aspect of textual content, this study can serve as the basis for further unpacking the communicative effects of online reviews [11, 36]. Also, by using NLP techniques (i.e. LIWC) and machine learning methods, this research shows the potential of these tools to gain a more comprehensive understanding of textual content. More importantly, the adopted analytic framework can be applied to other forms of textual contents.

Practically, these findings offer useful insights for review platforms and hospitality marketers. On the one hand, review platforms continuously aim to add useful information features for readers or create reliable algorithm for predicting review helpfulness. The empirical importance of specific categories of words can be valuable knowledge for such development. On the other hand, marketers of restaurants, hotels, or destinations can create more persuasive rhetorical messages.

This research also has several limitations. First, several problems in data analysis need to be addressed: (1) the higher variation in results of topic modelling (i.e. it produces different results on every run); (2) the unstandardized scales of features (i.e., control- (raw number), topic- (probability score), style features (percentage); and (3) the "black box" problem in machine learning (i.e. it is unknown how the functions of machine learning work). Second, the improvements that were found between classifiers are extremely small. Although the improvements were significant statistically, it is difficult to see them as actual improvements in a practical sense. The research design, data processing, and robust check have to be improved in future research. Finally, although five features were adopted for representing style aspect based on established literature on language [24], the selected features have some limitations in fully representing 'how to say.' Thus, future research needs to adopt features that fully represent the communicative style in online reviews.

References

1. Healy P, Haberman M (2015) 95,000 Words, many of them ominous, from Donald trump's tongue. *New York Times*. <https://www.nytimes.com/2015/12/06/us/politics/95000-words-many-of-them-ominous-from-donald-trumps-tongue.html>. Accessed 04 Aug 2018
2. Krishnamoorthy S (2015) Linguistic features for review helpfulness prediction. *Expert Syst Appl* 42:3751–3759. <https://doi.org/10.1016/j.eswa.2014.12.044>
3. Xiang Z, Du Q, Ma Y, Fan W (2017) A comparative analysis of major online review platforms: implications for social media analytics in hospitality and tourism. *Tour Manag* 58:51–65. <https://doi.org/10.1016/j.tourman.2016.10.001>
4. Wang D, Xiang Z, Fesenmaier D (2016) Smartphone use in everyday life and travel. *J Travel Res* 55:52–63. <https://doi.org/10.1177/0047287514535847>
5. Zhao Y, Xu X, Wang M (2019) Predicting overall customer satisfaction: big data evidence from hotel online textual reviews. *Int J Hosp Manag* 76:111–121. <https://doi.org/10.1016/j.ijhm.2018.03.017>

6. Wang Z, Tchernev J, Solloway T (2012) A dynamic longitudinal examination of social media use, needs, and gratifications among college students. *Comput Hum Behav* 28:1829–1839. <https://doi.org/10.1016/j.chb.2012.05.001>
7. Al-Mosaiwi M, Johnstone T (2018) Linguistic markers of moderate and absolute natural language. *Personal Individ Differ* 134:119–124. <https://doi.org/10.1016/j.paid.2018.06.004>
8. Xu S (2018) Bayesian Naïve Bayes classifiers to text classification. *J Inf Sci* 44:48–59. <https://doi.org/10.1177/0165551516677946>
9. Magno F, Cassia F, Bruni A (2018) “Please write a (great) online review for my hotel!” Guests’ reactions to solicited reviews. *J Vacat Mark* 24:148–158. <https://doi.org/10.1177/1356766717690574>
10. Hlee S, Lee H, Koo C (2018) Hospitality and tourism online review research: a systematic analysis and heuristic-systematic model. *Sustainability* 10:1141–1167. <https://doi.org/10.3390/su10041141>
11. Tan H, Lv X, Liu X, Gursoy D (2018) Evaluation nudge: effect of evaluation mode of online customer reviews on consumers’ preferences. *Tour Manag* 65:29–40. <https://doi.org/10.1016/j.tourman.2017.09.011>
12. Ma Y, Xiang Z, Du Q, Fan W (2018) Effects of user-provided photos on hotel review helpfulness: an analytical approach with deep leaning. *Int J Hosp Manag* 71:120–131. <https://doi.org/10.1016/j.ijhm.2017.12.008>
13. Ngo-Ye T, Sinha A (2014) The influence of reviewer engagement characteristics on online review helpfulness: a text regression model. *Decis Support Syst* 6:47–58. <https://doi.org/10.1016/j.dss.2014.01.011>
14. Shin S, Chung N, Xiang Z, Koo C (2018) Assessing the impact of textual content concreteness on helpfulness in online travel reviews. *J Travel Res*. <https://doi.org/10.1177/0047287518768456>
15. Ludwig S, De Ruyter K, Friedman M, Brügger E, Wetzels M, Pfann G (2013) More than words: the influence of affective content and linguistic style matches in online reviews on conversion rates. *J Mark* 77:87–103. <https://doi.org/10.1509/jm.11.0560>
16. Menner T, Höpken W, Fuchs M, Lexhagen M (2016) Topic detection: identifying relevant topics in tourism reviews. In: *Information and communication technologies in tourism 2016*. Springer, Cham, pp 411–423. https://doi.org/10.1007/978-3-319-28231-2_30
17. Zhang Z, Liang S, Li H, Zhang Z (2018) Booking now or later: do online peer reviews matter? *Int J Hosp Manag*. <https://doi.org/10.1016/j.ijhm.2018.06.024>
18. Chung C, Pennebaker J (2007) *The psychological functions of function words*. Social communication. Psychology Press, New York
19. Ireland M, Pennebaker J (2010) Language style matching in writing: synchrony in essays, correspondence, and poetry. *J Pers Soc Psychol* 99:549–571. <https://doi.org/10.1037/a0020386>
20. Giles H, Smith P (1979) *Accommodation theory: optimal levels of convergence*. Language and social psychology. University Park Press, Baltimore
21. Gao B, Li X, Liu S, Fang D (2018) How power distance affects online hotel ratings: the positive moderating roles of hotel chain and reviewers’ travel experience. *Tour Manag* 65:176–186. <https://doi.org/10.1016/j.tourman.2017.10.007>
22. Malik M, Iqbal K (2018) Review helpfulness as a function of Linguistic Indicators. *Int J Comput Sci Netw Secur* 18:234–240
23. Gössling S, Hall C, Andersson A (2018) The manager’s dilemma: a conceptualization of online review manipulation strategies. *Curr Issues Tour* 21:484–503. <https://doi.org/10.1080/13683500.2015.1127337>

24. Tausczik Y, Pennebaker J (2010) The psychological meaning of words: LIWC and computerized text analysis methods. *J Lang Soc Psychol* 29:24–54. <https://doi.org/10.1177/0261927X09351676>
25. Ludwig S, De Ruyter K, Friedman M, Brügger E, Wetzels M, Pfann G (2013) More than words: the influence of affective content and linguistic style matches in online reviews on conversion rates. *J Mark* 77:87–103. <https://doi.org/10.1509/jm.11.0560>
26. Blei D, Ng A, Jordan M (2003) Latent dirichlet allocation. *J Mach Learn Res* 3:993–1022
27. Gil-Lopez T, Shen C, Benefield G, Palomares N, Kosinski M, Stillwell D (2018) One Size fits all: context collapse, self-presentation strategies and language styles on Facebook. *J Comput-Mediat Commun* 23:127–145. <https://doi.org/10.1093/jcmc/zmy006>
28. Schindler R, Bickart B (2012) Perceived helpfulness of online consumer reviews: the role of message content and style. *J Consum Behav* 11:234–243. <https://doi.org/10.1002/cb.1372>
29. Bird H, Franklin S, Howard D (2002) ‘Little words’—not really: function and content words in normal and aphasic speech. *J Neurolinguistics* 15:209–237. [https://doi.org/10.1016/S0911-6044\(01\)00031-8](https://doi.org/10.1016/S0911-6044(01)00031-8)
30. Hernández-Ortega B (2018) Don’t believe strangers: online consumer reviews and the role of social psychological distance. *Inf Manag* 55:31–50. <https://doi.org/10.1016/j.im.2017.03.007>
31. Schmunk S, Höpken W, Fuchs M, Lexhagen M (2013) Sentiment analysis: extracting decision-relevant knowledge from UGC. In: *Information and communication technologies in tourism 2014*. Springer, Cham, pp 253–265. https://doi.org/10.1007/978-3-319-03973-2_19
32. Hong H, Xu D, Wang G, Fan W (2017) Understanding the determinants of online review helpfulness: a meta-analytic investigation. *Decis Support Syst* 102:1–11. <https://doi.org/10.1016/j.dss.2017.06.007>
33. Zhang Y, Lin Z (2018) Predicting the helpfulness of online product reviews: a multilingual approach. *Electron Commer Res Appl* 27:1–10. <https://doi.org/10.1016/j.elerap.2017.10.008>
34. Yeo B, Grant D (2018) Predicting service industry performance using decision tree analysis. *Int J Inf Manag* 38:288–300. <https://doi.org/10.1016/j.ijinfomgt.2017.10.002>
35. Ghose A, Ipeirotis P (2011) Estimating the helpfulness and economic impact of product reviews: mining text and reviewer characteristics. *IEEE Trans Knowl Data Eng* 23:1498–1512. <https://doi.org/10.1109/TKDE.2010.188>
36. Lee Y, Gretzel U (2014) Cross-cultural differences in social identity formation through travel blogging. *J Travel Tour Mark* 31(1):37–54. <https://doi.org/10.1080/10548408.2014.861701>



An Exploratory Analysis of Travel-Related WeChat Mini Program Usage: Affordance Theory Perspective

Ao Cheng¹, Gang Ren², Taeho Hong², Kichan Nam³,
and Chulmo Koo^{1(✉)}

¹ College of Hotel and Tourism Management, Kyung Hee University,
Seoul, South Korea

chengao2613@gmail.com, helmetgu@khu.ac.kr

² College of Business Administration, Pusan National University,
Busan, South Korea

{mregan1314, hongth}@pusan.ac.kr

³ Department of Marketing and Information Systems, School of Business
Administration, American University of Sharjah, Sharjah, United Arab Emirates
kchnam@gmail.com

Abstract. A WeChat mini program is an application that users can use without downloading and installing. After it was officially released in 2017, many travel enterprises have launched their own mini programs. This study applies affordance theory to investigate the role of WeChat mini programs in tourism activities through social network analysis using Rstudio. The authors searched for the topic “how do you perceive travel related WeChat mini program”, 200 comments were crawled and 180 comments were analysed after data cleaning. Results show that travel-related WeChat mini programs play a very important role in Chinese social network tourism activities. Moreover, the results suggest how the affordance theory has to be applied to the usage of WeChat mini programs.

Keywords: WeChat mini program · Affordance theory
Social network analysis · Rstudio

1 Introduction

In recent years, the rapid spreading of smartphones is pushing the mobile Apps market to become a fast-paced media outlet in the field of consumer technology [1, 2]. With the increasing popularity of smartphones, tourists are widely using mobile applications to book accommodations, transportation tickets, tourist attraction tickets and so on. In the mobile Apps market, travel-related Apps ranked seventh as most popular category of being downloaded [3]. As stated by TripAdvisor, 60 percent smartphone users have downloaded travel Apps and 45 percent of those individual users plan to use Apps to design their trips [2, 3]. Mobile Apps have changed the way of how Chinese tourists travel and all of those statistics can demonstrate the importance of mobile Apps in the

travel field. Based on the report of TripAdvisor, travellers from the US, UK and Italy stand out as online booking channel users, whereas the Chinese are most likely to make bookings via mobile Apps [4].

However, it is well known that travel-related Apps are used at a low frequency, but development costs are quite high (e.g., Booking.com, Airbnb, C-trip). And often, travel Apps take up lots of phone memory. According to reports of the mobile Apps analytics firm Flurry, travel Apps are used on average only 2.6 times per week and keep 45 percent of their users over a 90-day period [5]. Previous researches also studied smartphone Apps usage patterns, and most of those studies have analysed how to design Apps to attract users [6–10]. However, not many studies focus on the low usage frequency and high storage capacity of travel-related Apps.

In view of this situation, WeChat, the giant among Chinese instant messaging and social media Apps, launched the function of mini programs in 2017. After the release, the WeChat mini program received great attention in tourism context. Meanwhile, OTAs (Online Travel Agents) and others have launched their own mini programs to attract travel users (e.g., Booking.com, C-trip, Qunar.com, Tongcheng Lvyou), which has been growing rapidly. From a theoretical point of view, some researchers believe that the WeChat mini programs not only have most of the functions of the original Apps but also integrates the advantages of authentication, payment, sharing, and communication [11]. Surprisingly, the WeChat mini programs have abandoned the cumbersome procedures of past Internet products and have leveraged user experience better than websites and general Apps [12]. In this study these mini programs are examined through affordance theory, which studies not only object itself and spatial relationships but also an interaction with the object and “action (affordances)” [13].

Most related previous studies have investigated general information systems design based on affordance [14–16] and social media affordance [17–19]. However, surprisingly, not many papers have explored the tourism context yet. Meanwhile, the WeChat mini program seem to be a “revolutionary” innovation, the potential of which have not yet been exploited so far [20]. Therefore, in this study an exploratory analysis will be conducted to test how the theory of affordance proposed by Gibson and developed by Norman (see Sect. 2.2) could fit into the WeChat mini programs among Chinese traveller networks from the users’ perspective. Hence, the following research questions are proposed:

RQ1: Do WeChat mini programs play a very important role in Chinese tourism activities? If so, how do they become so important?

RQ2: Among the tourism original functions, have tourism activities been more actively fulfilled through various tourism-related interactions within the WeChat mini programs?

2 Theoretical Background

2.1 WeChat and WeChat Mini Program

Either domestic tourism or outbound tourism, China has become a huge tourism market in the world. Under the guarantee of a stable economic and social environmental change, the demand for national tourism is continuously soaring, thus, Chinese tourism consumption continues to heat up. As stated by the ‘2016–2017 China Tourism Consumer Market Development Report’ issued by the China Tourism Academy, in 2016, the number of tourists in China’s domestic, inbound and outbound tourism markets was 4.7 billion, and the scale of tourism consumption was more than 800 billion US dollars [21].

Moreover, with the rapid development of mobile smart devices, Chinese tourists intensely use smartphones for travel planning and communicating in their Chinese social networks to enhance the design of their user experience [4]. According to Travelpoint, the average British traveller uses 14 smartphone Apps while traveling, where maps and weather-related Apps are the most used [22]. However, the number of Apps used by Chinese traveller is on average 20 Apps [22]. In such an environment industrial investment and innovation have become extremely active, and the profit margin also can be imagined. As one of the giants in China’s Internet industry, Tencent also gained its large profit in the travel industry.

WeChat is a free application launched by Tencent in 2011 to provide instant messaging services for smart devices. As of the second quarter of 2016, WeChat has covered more than 94% of the smartphones in China, with 806 million active users monthly [23]. A few years later, WeChat mini programs were released; the first batch of WeChat’s mini programs was officially launched in 2017 and users were able to experience various mini programs. A WeChat mini program appears to be similar to general Apps, however, there is no need to install or uninstall them on the smartphone. They are embedded in WeChat and do not use any mobile storage, and WeChat users can access the mini programs directly within the WeChat App. As specified by the latest report of Tencent, more than 1 million mini programs have been launched, the total number of users of mini programs has reached nearly 400 million, and on average a WeChat user opens mini programs four times per day, 54% of which are active accessed [24] (Fig. 1).

2.2 Affordance Theory

The statement of “rhetoric of inevitability” makes users feel that technological change is not controllable, making people sense powerless to affect technology, or to select from various technologies [25]. Travel-related Apps not only change how travellers plan their trips; they may also change which online travel agency (OTA) a traveller chooses, how often travellers go on a trip and where they want to travel to.

Affordance theory states that perception could be explained not only by the object itself and spatial relationships but also in terms of an interaction with the object by “action (affordances)” [13]. As stated by Gibson [13], individuals are animals cognizing and acting in the specific environment [26]. Gibson proposed the concept of

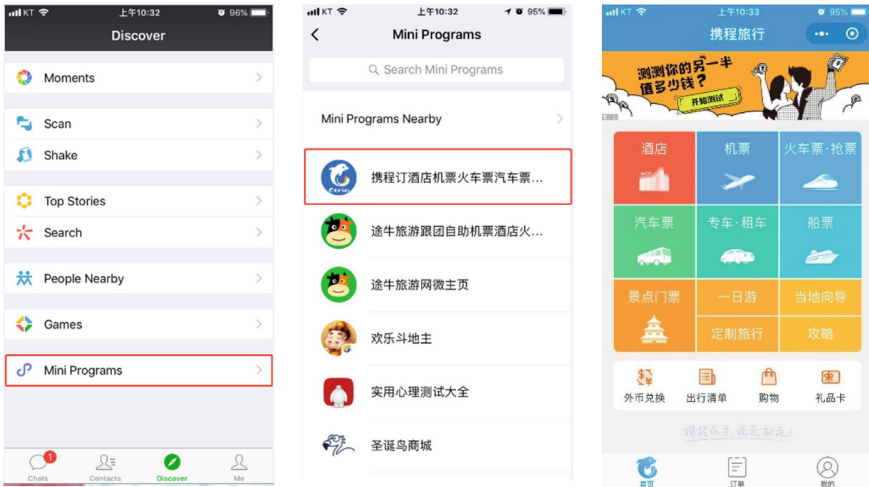


Fig. 1. WeChat mini programs

affordance, which addresses both the individuals and the environment as well as the interaction between them. The view of abilities for action offered by the environment is the central idea of the concept of affordance.

Ecological psychology and the concept of affordance have influence in many fields [25]. Hutchby [27] took the concept of affordance to technology and studied the functional aspects of affordance as possibilities for an action. Cabiddu, De Carlo, and Piccoli [19] studied the affordance of social media and identified three distinctive social media affordances. Leonardi [28] investigated the relationship between human and material agencies while in flexible routines and flexible technologies environment. Majchrzak and Markus [29] discussed the importance of technology affordance and constraints theory in management information systems. Faraj and Azad [30] argued that affordance perspective is a promising approach to study the importance of organisational technology.

Norman [31] attempted to research how individuals can interact with thousands of other objects. Norman argued that affordance provided by an object should be regarded as “real affordance” and “perceived affordance”. A coffee cup, for instance, could provide a function for pouring coffee, pouring popcorn, decorating, and even being a weapon. All of those kinds of functions can be considered as perceived affordances while people using the coffee cup for different purposes. However, it does not change the real affordance of a coffee cup that is a coffee container.

WeChat, the affordance provider, is essentially an instant messaging tool. However, it provides a lot of other embedded functions. Such as payment services, instant messaging, financial management, hospital registration and so on. A WeChat mini program can be seen as an affordance offered by WeChat, however, interestingly, a WeChat mini program has been extended to other purposes by the interaction between Chinese social networks, which can be considered as an affordance sub-provider. WeChat mini program provides a platform for enterprises to release their own mini

programs to access the huge amount of WeChat users. Simultaneously, it also offers a channel for WeChat users to achieve their goal more easily. The mini programs can provide an intermediary function in travel, simplifying unnecessary processes from the travel processes. For example, travellers can easily book hotel and traffic tickets through specific interaction via mini program without downloading and installing different kinds of Apps.

3 Methods

The authors adopted a network analysis approach, which is a proper method for conducting a social network analysis of posts related to the usage of WeChat mini programs. Moreover, text mining and social network analysis enable researchers to study various topics that appear in the posts, taking into account large amounts of text data [32]. Therefore, with the goal of investigating the users' posts after using WeChat mini programs, the data was analysed using Rstudio [33], a free and open source environment for the statistical language R (<https://www.r-project.org>).

3.1 Data Collection

The data was crawled from Zhihu.com, a popular question and answer website where questions are asked, answered, edited and organized by the community of its users. Zhihu is more like an Internet forum where users engage in relevant discussions around a topic of interest. The topic "how do you perceive travel related WeChat mini program after using it" was searched, 200 posts were crawled and those data were stored in Excel. After the check, some duplicate posts and advertisements that use the mini program as gimmicks were found. Therefore, a total of 20 posts was removed and only 180 posts were analysed after data cleaning.

3.2 Analysis Method

The data was analysed using network analysis. In this study the betweenness centrality C_B was used to calculate network centralization indices for the nodes:

$$C_B(v) = \sum_{s \neq v \neq t} \frac{\sigma_{st}(v)}{\sigma_{st}} \quad (1)$$

where $C_B(v)$ denotes the betweenness centrality of node v ; σ_{st} denotes the total number of shortest paths from node s to node t , whereas $\sigma_{st}(v)$ denotes the total number of the shortest paths from node s to node t via node v . In addition, a clustering method was adopted to classify the extracted words into groups in order to make the visualization more intuitively. The three clusters were obtained based on a walktrap algorithm proposed by Pons and Latapy [34]. This algorithm computes communities (i.e., dense subgraphs of sparse graphs) in large networks using random walks.

4 Data Analysis & Results

Before conducting the network analysis, the authors implemented a word segmentation process for the collected Chinese-written comments. The segmentation process was conducted using the “jiebaR” package [35] in the R programming language. In the preprocessing step, a user-defined stop-word list was employed for the removal of stop words. Then, the network analysis was implemented using the “igraph” package [36] in R to find co-occurrence relationships among the terms of the comments. Therefore, the top 150 words (see Table 1) were first extracted. This also helps to interpret the importance of WeChat mini programs through visualization. As mentioned above, the terms were clustered into three sub-groups, which are represented by three different

Table 1. Top 150 words extracted from the comments

qq	calendar	reading	fast	future
Startup	ecology	technology	install	demand
Appropriate	chance	delivery	moment	no need
produce	chat	system	development	Tencent
convenient	visiting card	related	ability	offline
associated	take-out food	Ctrip	operation	download
authentication	business	attraction	program development	time
auditing	formal	CPU	easy	phone
group	subscribe	Mini-game	open	query
information	exchange rate	latest	developer	tour
view	calculator	movie	payment	internet
venture capital investment	website	customized	choose	company
money management	bicycle	name	game	message
field	traffic	shopping	social contact	QR code
improve	food	education	recommend	share
articles	dictionary	media	promotion	tool
connect	image	release	issue	experience
remind	flight	cost	mode	scene
food and beverage	travel agency	news	data	industry
automobile	register	official	support	hotel
add	Didi Chuxing	consumption	electronic commerce	corporate
magazine	click	online	video	search
travel guide	edition	focus on	marketing	flow
train ticket	emotion	bonus	reservation	public
scan the code	manage	space	page	develop
scan	solve	travel	aid	function
restaurant	introduce	friends	content	trip
review	push	shopping mall	life	service
precise	flight ticket	customer	merchant	app
goal	brand	gain	market	program

on a trip. These function-based nodes are connected through two nodes (“venture capital investment”, “calculator”) with a higher betweenness centrality of the travellers clustering group.

Second, the WeChat mini programs provide travellers with necessary information on demand on a trip. These keywords were marked in pale blue in Fig. 2 and are connected through the node “information” in the network. In general, people search the information regarding hotels, restaurants, and attractions of a destination through images and videos on websites, and friends’ moments, and online travel agencies such as Ctrip.com. From Fig. 2, the authors conclude that such travel related mini programs could share all necessary information (e.g., routes, guides) between travellers. This is another affordance aspect, of which an object (WeChat) is actionable by the travellers on instant and demand basis.

Third, drawing on the extracted keywords labelled in purple in Fig. 2, the authors also found that travellers gave some suggestions and their expectations for the development of WeChat mini programs. Theoretically, actionable affordance is made. These words were connected through the key nodes “travel agency”, “travel guide”, “mini-games”, “goal”, and “auditing”. (1) Travel-agencies and some attractions were expected to develop their own style WeChat mini programs in order to provide travellers in different contextual situations with a more convenient trip. The travel agencies could promote their business through a well-developed mini program. (2) The graph showed that more mini games are involved in many comments, implying that game-related mini programs should be developed or embedded in the future. Many travellers hope to fill extra time through mini games during the trip. (3) Travel agencies are recommended to have an official account of WeChat, aiming to push more travel related news, guides, and their own business. Travellers could subscribe to the official accounts of the travel agencies to obtain more travel-related suitable information. (4) They suggested that the mini programs should simplify the procedures of auditing and authentication. However, the security and convenience of the payment system should be guaranteed, but the ability of solving problems should be further improved. Such suggestions were connected through two key nodes, i.e., “auditing” and “goal.” In general, travellers pursue convenient-fast-easy payments and customized trips via WeChat mini programs.

Fourth, many users believed that the mini program development is beneficial for a startup business. It can be regarded as another perceived affordance from the perspectives of entrepreneurs and their enterprises. Relying on the huge amounts of WeChat users, those entrepreneurs and tourism organisations can receive alert and attention from their target customers relatively easy. In addition, for developers, the threshold for developing WeChat program is relatively low, the development difficulty level is not as high as that of general Apps. The WeChat program can satisfy simple basic applications and is suitable for offline service shops and non-rigid demand low-frequency applications, such as travel-related applications.

5 Discussion and Conclusion

This paper has applied affordance theory for travel-related WeChat mini programs. A WeChat mini program is not just an open platform for some quality services, but also starting point of many travel enterprises on the basis of their own WeChat mini programs. Norman [31] argued that affordance offered by an object should be regarded as “real affordance” (i.e., functioning services) or “perceived affordance” (i.e., various actions via the functions). In the context of WeChat, the “real affordance” of mini programs is that an open platform should connect users and service providers. Meanwhile, from different perspectives, “perceived affordances” would be slightly different. For instance, WeChat mini programs can be regarded as a channel for travellers to design a customized trip more convenient due to mini programs that do not have to be downloaded and installed. Moreover, a WeChat mini program is born with the label of the offline scene, and the connection between online and offline can be achieved by a simple QR code. In addition, relying on WeChat’s huge database, mini programs can better combine both online scene and offline scene. For example, travellers can search for mini programs nearby when traveling to other cities or scenic spots. Mini programs also can be shared with WeChat friends and forward valuable information. General travel Apps lack an effective social channel, user sharing behaviour is limited, and the penetration range is small. However, WeChat has reached more than 94% of smartphones in China, with monthly active users of 806 million [23]. Based on the strong WeChat ecosystem, information can more easily spread in WeChat and mini programs naturally have this advantage.

Therefore, based on the results of the analysis, the research questions can be addressed. WeChat mini programs are reflecting the important role of the tourism industry and create potential tourism activities more actively through various interactions within the WeChat mini programs. The WeChat’s role in the tourism ecosystem has become essential as the interaction within WeChat mini programs is expanded to go beyond tourism function services. Thus, like Google’s function in the world’s tourism environment, WeChat was found to play an important role in the Chinese tourism ecosystem.

In addition to the practical contributions, this study also provides some theoretical implications. This paper is based on the use of new technology. Regarding the acceptance and use of new technologies, most of the previous research approached the question by using the technology acceptance model (TAM) [37–39] and the unified theory of acceptance and use of technology (UTAUT) [40–42], or other models derived from those two. This study attempted to explore the acceptance and use of new technology from a new perspective, which jumped out of the theory about adoption. Therefore, the authors hope that this research can give some inspiration to future studies.

Since this paper is still an exploratory study, it also has its limitations. First, because the object of analysis are the 180 comments written by users who have experienced travel related WeChat mini programs, it could be very subjective and biased. Thus, future study should continue this line of research on the basis of larger datasets.

Acknowledgements. This work was supported by the Ministry of Education of the Republic of Korea and the National Research Foundation of Korea (NRF-2016S1A3A2925146).

References

1. Newark-French C (2011) Mobile app inventory hungry enough to eat internet display ad spend. <http://blog.flurry.com/bid/71285/Mobile-App-Inventory-Hungry-Enough-to-EatInternet-Display-Ad-Spend>
2. Kennedy-Eden H, Gretzel U (2012) A taxonomy of mobile applications in tourism
3. Mickael I (2011) Mobile the new black for travel. ZDNet. <http://www.zdnet.com.au/mobile-the-new-black-for-travel-339321469.htm>
4. TripBarometer (2016) <https://www.tripadvisor.com>
5. Michelle Saettler (2018) TripAdvisor boosts non-transactional mobile travel with offline app features. <https://www.mobilemarketer.com/ex/mobilemarketer/cms/news/strategy/18161.html>
6. Hwang K-H, Chan-Olmsted SM, Nam S-H, Chang B-H (2016) Factors affecting mobile application usage: exploring the roles of gender, age, and application types from behaviour log data. *Int J Mobile Commun* 14(3):256–272
7. Qiao Y, Zhao X, Yang J, Liu J (2016) Mobile big-data-driven rating framework: measuring the relationship between human mobility and app usage behavior. *IEEE Netw* 30(3):14–21
8. Baltrunas L, Church K, Karatzoglou A, Oliver N (2015) Frappe: understanding the usage and perception of mobile app recommendations in-the-wild. [arXiv:1505.03014](https://arxiv.org/abs/1505.03014)
9. Santo K, Kirkendall S, Chalmers J, Chow C, Redfern J (2017) Mobile phone usage patterns in an acute coronary syndrome cohort. *Heart Lung Circ* 26:S87–S88
10. Li H, Lu X (2017) Mining device-specific apps usage patterns from large-scale android users. [arXiv:1707.09252](https://arxiv.org/abs/1707.09252)
11. Quanzhong G (2017) Mini program and its future. *News Writ* 3:28–30
12. Qi Y, Liping Z (2017) Viewing the development of WeChat mini program from the internet ecology. *News Trib* 2:22–24
13. Gibson J (1977) The theory of affordances. *Perceiving, acting, and knowing: toward an ecological psychology*, pp 67–82
14. Maier JR, Fadel GM (2009) Affordance based design: a relational theory for design. *Res Eng Design* 20(1):13–27
15. Beynon-Davies P, Lederman R (2017) Making sense of visual management through affordance theory. *Prod Plan Control* 28(2):142–157
16. Lintern G (2000) An affordance-based perspective on human-machine interface design. *Ecol Psychol* 12(1):65–69
17. Treem JW, Leonardi PM (2013) Social media use in organizations: exploring the affordances of visibility, editability, persistence, and association. *Ann Int Commun Assoc* 36(1):143–189
18. Majchrzak A, Faraj S, Kane GC, Azad B (2013) The contradictory influence of social media affordances on online communal knowledge sharing. *J Comput-Mediat Commun* 19(1):38–55
19. Cabiddu F, De Carlo M, Piccoli G (2014) Social media affordances: enabling customer engagement. *Ann Tour Res* 48:175–192
20. Guoming Yu, Siqi Cheng (2018) From “connection” to “scene”: an important step in the development of the Internet: examining the value logic and market territory of WeChat applet. *Journal Bimon* 1:121–127
21. 2016–2017 China tourism consumer market development report (2017) <http://www.ctaweb.org/html/2017-1/2017-1-10-11-15-58731.html>

22. Simon-Calder (2017) Why smartphone APPs are changing the future of travel. <https://www.independent.co.uk>
23. Tencent Big Data (2016) <http://data.qq.com/reports>
24. TechWeb (2018) <http://www.techweb.com.cn/data/2018-07-11/2684850.shtml>
25. Sadler E, Given LM (2007) Affordance theory: a framework for graduate students' information behavior. *J Doc* 63(1):115–141
26. Pozzi G, Pigni F, Vitari C (2014) Affordance theory in the IS discipline: a review and synthesis of the literature
27. Hutchby I (2001) Technologies, texts and affordances. *Sociology* 35(2):441–456
28. Leonardi PM (2011) When flexible routines meet flexible technologies: affordance, constraint, and the imbrication of human and material agencies. *MIS Q* 147–167
29. Majchrzak A, Markus ML (2012) Technology affordances and constraints in management information systems (MIS)
30. Faraj S, Azad B (2012) The materiality of technology: an affordance perspective. In: *Materiality and organizing: social interaction in a technological world*, vol 237, p 258
31. Norman DA (1988) *The psychology of everyday things. The design of everyday things.* Basic Books
32. Eddington SM (2018) The communicative constitution of hate organizations online: a semantic network analysis of “Make America Great Again”. *Soc Media Soc* 4(3). <https://doi.org/10.1177/2056305118790763>
33. Rstudio. <https://www.rstudio.com/>
34. Pons P, Latapy M (2006) Computing communities in large networks using random walks. *J Graph Algorithms Appl* 10(2):191–218
35. “jiebaR” package. <https://cran.r-project.org/web/packages/jiebaR/index.html>
36. “igraph” package. <https://cran.r-project.org/web/packages/igraph/index.html>
37. Wu JH, Wang SC (2005) What drives mobile commerce? an empirical evaluation of the revised technology acceptance model. *Inf Manag* 42(5):719–729
38. Vijayarathy LR (2004) Predicting consumer intentions to use on-line shopping: the case for an augmented technology acceptance model. *Inf Manag* 41(6):747–762
39. Pavlou PA (2003) Consumer acceptance of electronic commerce: integrating trust and risk with the technology acceptance model. *Int J Electron Commer* 7(3):101–134
40. Zhou T, Lu Y, Wang B (2010) Integrating TTF and UTAUT to explain mobile banking user adoption. *Comput Hum Behav* 26(4):760–767
41. Im I, Hong S, Kang MS (2011) An international comparison of technology adoption: testing the UTAUT model. *Inf Manag* 48(1):1–8
42. Carlsson C, Carlsson J, Hyvonen K, Puhakainen J, Walden P (2006) Adoption of mobile devices/services—searching for answers with the UTAUT. In: *Proceedings of the 39th annual Hawaii international conference on system sciences, 2006. HICSS 2006*, vol 6. IEEE, p 132



Do Hotels Talk on Facebook About Themselves or About Their Destinations?

Berta Ferrer-Rosell^(✉), Eva Martín-Fuentes, and Estela Marine-Roig

Department of Business Administration, University of Lleida,
Lleida, Catalonia, Spain

{berta.ferrer,eva,estela.marine}@aegern.udl.cat

Abstract. Social media have become essential for firms in the hospitality industry to promote their brands, generate engagement and create sales. Using Facebook more than any other social media, hotels mobilise Facebook pages as platforms for communicating, interacting and networking with customers and potential guests, as well as for providing adequate content to consumers as an essential component of users' overall satisfaction. The aim of the study was to analyse the message strategy that hotels in different hotel classes use in content related to services offered by individual firms compared to content related to the destination. A total of 4,725 Facebook posts by hotels in Barcelona were analysed, and compositional data analysis was applied to account for the relative importance of different data (i.e. proportions of different types of content). Findings show that higher-class hotels promote themselves by highlighting their facilities, whereas lower-class hotels promote themselves by promoting the destination.

Keywords: Compositional data analysis (CoDa) · E-marketing
Facebook · Social media · Hotel class · Content analysis

1 Introduction

Social media have not only revolutionised communication in travel and tourism [1] but also become major marketing tools for companies and organisations worldwide [2]. Tourists and travellers use social media to access information about tourist products and receive recommendations; they consider such information to be especially credible and trustworthy as it proceeds from other users and is spread via electronic word of mouth (eWOM) [3]. eWOM thus bears significant effects on travel experiences and influences not only tourists' decision-making processes and destination selection [4] but also the image of destinations and the attitudes of tourists towards it [5]. At the same time, social media communication and eWOM have also changed the relationship and interaction of customers with hospitality companies by influencing their purchase decisions and behaviour when they travel [6].

Social media have become essential for firms in the hospitality industry to promote their brands, generate engagement with users and create sales. Among all social media platforms, Facebook was found to be the most-used social media by hotels [6]. Facebook has special value as an effective marketing tool for hotels, with which

marketers can create specific content strategies to meet customers' needs, generate positive behaviours and achieve their satisfaction [7]. However, although some scholars have focused on analysing hotels' strategies for generating interactivity and engagement with Facebook posts [6, 8], the thematic content of the posts themselves has received far less attention [9]. As it has been suggested, scholars interested in the topic should analyse the Facebook communication and brand communities of various types of hotels, for different hotels are liable to practise different strategies and exert different amounts of effort into those strategies [7]. Useful to that end, the star-rating classification system is the most common customer segmentation pattern in the hotel industry [10], while the reviews of guests are also sources of segmentation that allow each hotel to better position itself among competitors [11]. Hotels use Facebook pages as platforms for communicating, interacting and networking with customers and potential guests [12], as well as for providing adequate content for each consumer as an essential component of users' overall satisfaction [7]. For those reasons, and because one size no longer fits all, hotels using Facebook as a marketing tool apply different strategies depending on their hotel class [13]. Giving specific attention to each guest can help hotels to maintain and improve relationships with customers, reduce marketing costs and the boost the overall satisfaction of customers by interacting with them on social media [7].

The effectiveness of marketing strategies used by companies on Facebook requires continual attention from scholars [14]. As [15] have recommended, researchers should analyse real hotel brands and live Facebook pages in order to provide stronger insights into hotel marketing models on Facebook. Following that advice, the study reported here involved analysing differences in the use of hotel and tourism content on Facebook by hotels in different hotel classes. The goal was to examine the various marketing content that hotels promote in terms of cognitive content, related to both the services that they offer as companies and content promoting the destination where the company is located (i.e. micro- versus macro-content), and to observe variations according to hotel class. In that sense, the study focussed on hotel business practices as well as on product differentiation.

To that end, separate analyses of internal (i.e. hotel facilities and services) and external information (i.e. tourist destinations) were first performed to, for example, know how much more often content about heritage appears than content about gastronomy. Second, a comparative analysis of internal versus external content was also performed in order to observe differences in content posted on Facebook according to hotel class. An important question in that analysis was whether higher-class hotels post more content related to the destination or to the services that they offer. Ultimately, by comparing Facebook posts with different compositions in terms of content, the most effective ways of e-marketing and customer engagement can be found.

In web content analysis, the interest of researchers most often lies in the proportion of each relevant piece of content. After all, long pages can have more of each type of content [16]. In statistical terms, that trend is known as *compositional* and compositional data analysis (CoDa) is the standard method of investigating data purporting relative information [17]. Scholars in the social sciences, including in communication [18], marketing [19], and in tourism and hospitality [20–23], have recently begun to use CoDa. [8, 24] considered the compositional nature of content posted on Facebook

in terms of categories of message type or post topics to assess, for instance, which types of content were more effective. However, because no authors have used CoDa to analyse Facebook posts, the aim of the study reported here was to provide a useful, straightforward method for players in the hospitality sector of assessing and comparing marketing content strategies on social networks. The analysis considered 4,725 Facebook posts on Facebook pages of 189 three-, four- and five-star hotels in Barcelona, Spain.

2 Literature Review

Of all social media, Facebook is the most used by firms in the hotel industry [6]. With 2.23 billion monthly active users, Facebook is also the most popular social media network worldwide [25], and its users vary in age more than those of any other online social network, including Twitter [26]. Facebook pages offer great potential for travel companies to execute their digital worldwide marketing strategies, particular by allowing them to inform their followers, promote their products and services and respond to their customers [27]. Being in touch with customers via Facebook pages ‘costs you little time and could generate a good sense of community for them’ [28]. Facebook content is shared by hotels not only to promote their brands but also to generate sales [6]. Hotels devote more effort to managing their Facebook pages than to managing any other online social network [29], and their active participation on Facebook pages has improved the satisfaction of their users, which has made their online communities more successful in allowing members to get what they want [7].

Research has shown that hotel marketing via Facebook affects hotel booking intentions as well as intentions of spreading word of mouth about travel experiences with hotel firms [15]. In other studies, scholars have observed that engaging users with the Facebook pages of hotels and with their online brand communities generates positive behaviours in relation to the companies, including the spread of positive eWOM [7, 30, 31]. However, whereas most research on the Facebook-based communication of hotels has focused on consumer engagement and behaviour [7, 15, 30, 31], far fewer has focused on content posted by hotels. Findings of research on the content of hotels’ Facebook posts suggest that hotels of different classes use their Facebook pages to mobilise message strategies in different ways [13]. These authors classified hotels into six classes—luxury hotels, upper-upscale hotels, upscale hotels, upper-midscale hotels, midscale hotels and economy hotels—and detected differences in how hotels in those classes post messages on their Facebook pages, as well as the formats in which they post messages. Whereas luxury hotels posted messages to raise brand awareness, economy hotels did not seem to have clear strategies, for they used their Facebook pages in diverse ways [13].

Concerning the content of posts, [6] conducted a content analysis on European hotels’ Facebook posts and confirmed that hotels post content to promote both their hotels and the destinations where they are located, often at the detriment of interacting with users. However, how cognitive image content is distributed and concentrated on the micro-level of the company (i.e. about the company’s services) and at the macro-level of the destination (i.e. about the destination) has yet to be studied. Exploring how

hotels communicate cognitive content, however, could illuminate the marketing strategies of hotels and possible synergies that they create with their destinations. Briefly, cognitive images consist of the knowledge and beliefs about the attributes of the company or destination and affect users' perceptions of brands and their decision making [32].

3 Data & Method

3.1 Case Study

The setting of the study was Barcelona, Spain, which ranks among the most-visited cities of the world. According to [33] Barcelona is the third top city in Europe and the 10th worldwide in terms of number of visitors and spending in international tourism, as well as the fifth most-visited city in Europe and 20th worldwide with more than 11 million tourists and more than 30 million overnight stays in 2017 [35, 36]. In terms of number of hotels, Barcelona has 310 three-, four- or five-star hotels and 92 one- or two-star hotels [35]. The most-valued aspects of Barcelona according to its tourists are the city's architecture, culture and entertainment. Tourists visit Barcelona for leisure (67.6%), for work (21.3%) or for personal reasons [34].

3.2 Data

Facebook posts were content-analysed to observe which sort of information hotels had posted. Data were collected via browsing and recoding posts on currently operating hotels' official Facebook pages and were recorded manually. Hotels included in the analysis were selected because they had active Facebook accounts, that is, had made at least three posts per month. All hotels were located in Barcelona, and the official Catalan register of hotels in Barcelona was used [35]. In total, 189 hotels (i.e. 41 three-star hotels, 125 four-star hotels and 23 five-star hotels) were included in the analysis, which represents 61% of all three-, four- and five-star hotels in the city. One- and two-star hotels were not observably active on their Facebook pages, if they had such pages in the first place, and were therefore excluded from the sample. Data collection and coding were performed from February to June 2017 and from February to June 2018.

The 25 latest posts (i.e. from a specific date depending on the period of data collection) on the Facebook pages of hotels were analysed and coded in terms of the number of posts featuring two types of composition. Composition about tourism-related content, in the categories of content about gastronomy (dining), heritage, nature and sport and urban sites and events, formed one type; whereas the other composition was related to content posted about hotel services, in the categories of rooms, restaurants and other facilities (e.g. lobbies, halls or athletic facilities). For posts containing multiple contents, all content types were coded.

A total of 4,725 posts were included in content analysis. Only the 25 latest posts were analysed because analysing posts in temporal terms (e.g. analysing publications posted in the last 6 months) does not produce the same number of posts per hotel, since

some companies are more active (e.g. publish twice a day) than others (e.g. publish once a week).

3.3 Compositional Data Analysis

In analysing content on a webpage, what matters is how much more prominent content of one type is than content of another type (i.e. relative weight). Proportions represent so-called ‘compositional data’ and lie in a constrained space. A composition of D different contents (i.e. components) measured online—here on Facebook—represented as $i x_{i1}, x_{i2}, \dots, x_{iD}$, is constrained between 0 and 1, and the sum has to be 1—that is, 100% [17]. Web content analysis data examined in the study fit that definition.

Treating compositional data with standard statistical techniques is subject to both interpretational and statistical problems [17, 36, 37]. In particular, standard statistical analysis assumes that the pair of proportions 0.01 and 0.10 are as mutually distant as 0.51 and 0.60; however, in the first pair, the difference is 900%, whereas in the second it is less than 20%. Problems also arise because compositional data are non-normal; proportions are bound between 0 and 1, whereas normal distribution has a total real range from $-\infty$ to $+\infty$. When interpreting the results of analysis, effects cannot be understood in the standard way—that is, by keeping everything else constant—because one component can increase only if at least one other decreases. Compositional data can be transformed by means of the logarithms of ratios, so that they can be subject to standard statistical techniques [e.g. 21, 38]. Logarithms of ratios present several advantages including that they focus on relative instead of absolute values, that is, $\ln(0.1/0.01) = \ln(0.6/0.06)$. Moreover, log-ratios recover the whole unconstrained real space, and they make explicit what increases (i.e. the numerator) at the expense of all else (i.e. the denominator).

In general, an interpretable set of log-ratios is easy to compute when there is an interpretable sequential binary partition of components according to their conceptual similarity or simply according to which components the researcher wishes to compare to another. Those partitions are best imagined in partition trees or dendrograms [39]. A meaningful log-ratio transformation involves using ratios of the geometric means of the subsets of two components. To create the first log-ratio, the complete composition is partitioned into two groups of parts: one for the numerator and the other for the denominator. Next, one of the two groups is further split into two new groups of parts to create the second log-ratio, in which D components require $D - 1$ log-ratios.

The objective of the study was first to analyse tourism-related content and content about hotel services, and Fig. 1 shows the partition trees of the two compositions. The one on the left relates to content about the destination (i.e. external information). With four types of content (i.e. four components), three log-ratios were constructed, as shown in Eq. 1. The first log-ratio, y_1 , compared the proportion of content about heritage and all other content: larger values indicated more heritage content posted by the hotel. The second log-ratio, y_2 , compared the proportion of city-related (urban)

content and the combined content about dining (gastronomy) or nature and sport: larger values indicated more city-related content or less content related to dining or nature and sport. Last, the third log-ratio, y_3 , compared the proportion of content about dining and that about nature and sport: larger values indicated more content about dining or less content about nature and sport. Heritage has been placed at the top level of the partition tree because was the most prominent content.

$$y_1 = \ln\left(\frac{x_4}{\sqrt[3]{x_1x_2x_3}}\right), y_2 = \ln\left(\frac{x_3}{\sqrt{x_1x_2}}\right), y_3 = \ln\left(\frac{x_1}{x_2}\right) \tag{1}$$

By contrast, the partition tree on the right shows composition related to content about hotel facilities (i.e. internal information). With three types of content (i.e. three components), two log-ratios (y_4 and y_5) were constructed, as shown in Eq. 2. The fourth log-ratio compared the proportion of content about rooms and the combined content about restaurants and other hotel facilities; larger values indicated more content about rooms. The fifth log-ratio compared the proportion of content about restaurants or other hotel facilities; larger values indicated more content about restaurants or less content about other hotel facilities. In this case, rooms content has been placed at the top level of the partition tree since they are the main activity of accommodation establishments.

$$y_4 = \ln\left(\frac{x_3}{\sqrt{x_1x_2}}\right), y_5 = \ln\left(\frac{x_1}{x_2}\right) \tag{2}$$

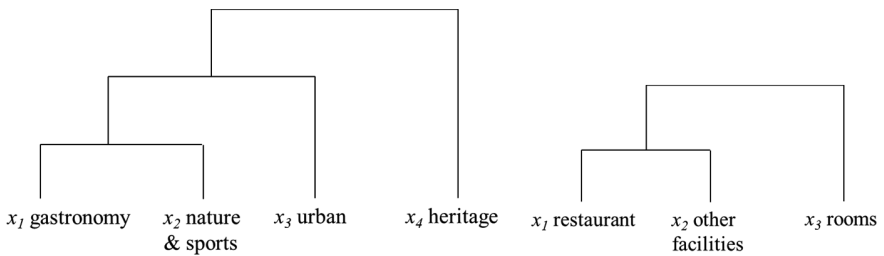


Fig. 1. Partition trees of compositions: tourism-related and hotel-services contents

Once the analyses of each composition were performed, both compositions were compared, in which each composition was considered to be a component (x_1 : internal hotel-related information; x_2 : external tourism-related content). Of the total number of posts published on Facebook by hotels, the proportion of posts dedicated to infor-

mation about hotel services and that dedicated to information about the destination could be determined. The log-ratio to compare those types of information was $y_6 = \ln(x_7/x_2)$.

Zero replacement. When some components contained zeros, neither the log-ratios nor the geometric mean could be constructed [40]. The presence of different types of content on webpages—here, on Facebook pages—conformed to a particular case of compositional data called *count compositional data*. Each Facebook page had S_i posts classified to obtain counts of posts with a specific type of content and divided into S_i to obtain the proportion. For each i th page, counts represented a realisation of a multinomial distribution with $\theta_{i1}, \theta_{i2}, \dots, \theta_{iD}$ unobserved non-zero probabilities. Even if those probabilities were non-zero, a combination of a small probability and a small S_i sum could have resulted in some counts being zero for no discernible reason. The common approach for coping with count zeros is the Bayesian multiplicative approach [41] with equal uninformative Bayesian priors for $\theta_{id} = 1/D$. According to the Monte Carlo experiment performed in [41] Bayes–Laplace’s replacement rule is the best. As a result, zero counts were replaced with $x'_{id} = 1/(S_i + D)$, for $x_{id} = 0$. Next, non-zero values were reduced in order to preserve the unit sum:

$$x'_{id} = x_{id} \left(1 - \sum_{x_{id}} x'_{id} \right), \text{ for } x_{id} > 0 \quad (3)$$

Once log-ratios were computed and zeros replaced, analysis of variance of each log-ratio was used to compare three-, four- and five-star hotels regarding the average balance between internal and external information posted. Analyses were performed with Microsoft Excel 10 and the SPSS version 20.0.

4 Results

Table 1 shows the mean and standard deviation of each log-ratio per hotel class. In general, all hotel classes posted more content related to their restaurants and other hotel facilities (i.e. negative values) than about their rooms. In fact, the higher the hotel class, the lower the weight of content about rooms. Regarding the log-ratio y_5 to compare the content of restaurants and content of other facilities, three-star hotels posted more content about their other facilities (−0.615) than about their restaurants.

Concerning the composition of information about the destination, results revealed that the first log-ratio comparing content about heritage and content about other tourism activities was larger among four- and five-star hotels. Higher-class hotels put comparatively more weight on content about heritage, whereas three-star hotels put more weight on content about other tourism activities. Regarding the second log-ratio, three-star hotels posted more content about the city’s sites and events (1.172) than four- and

five-star hotels did. Regarding the third log-ratio, four- and five-star hotel posted less content related to dining and more about nature and sport.

Last, regarding the average balance between internal and external information posted (i.e. y_6), results revealed that five-star hotels put more weight on internal information (i.e. hotel services), whereas three-star hotels posted more content about the destination.

Table 1. Means and standard deviations of all log-ratios per hotel class, and p values of F tests (ANOVA)

		Content about the destination			Content about hotel services		Hotel services versus the destination
		y_1	y_2	y_3	y_4	y_5	y_6
Three-star hotels	<i>M</i>	0.418	1.172	0.106	-0.373	-0.615	-0.129
	<i>SD</i>	0.975	0.935	1.011	1.052	0.812	1.139
Four-star hotels	<i>M</i>	1.139	0.431	-0.312	-0.853	-0.241	0.252
	<i>SD</i>	0.712	0.787	0.898	0.767	0.745	1.087
Five-star hotels	<i>M</i>	0.901	0.366	-0.304	-0.993	-0.290	0.739
	<i>SD</i>	0.686	0.718	0.752	1.081	0.823	1.041
Total	<i>M</i>	0.953	0.584	-0.220	-0.758	-0.329	0.229
	<i>SD</i>	0.823	0.867	0.919	0.898	0.764	1.114
p value		0.000	0.000	0.051	0.000	0.027	0.010

The null hypotheses were that hotel class did not make a difference in the relative importance of each type of content posted compared to others. Last row of Table 1 shows the p values of each log-ratio. Both log-ratios representing composition about hotel services (y_4 and y_5) were significant ($p < .05$), and the null hypotheses were therefore rejected. Such results indicate that hotel class affected how much content about hotel services offered was posted. Regarding composition with external information, all three log-ratios were significant ($p < .05$) as well, and the null hypotheses were also rejected as a result. Hotel class thus affects the relative importance of destination-related content posted on Facebook. Last, the sixth log-ratio comparing content related to hotel services and that of the destination was also significant ($p < .05$). The relative importance of content posted about hotel services compared to that about the destination varied among hotel classes.

Even though groups differed sharply in size, the results could be interpreted according to standard deviation. Outliers were also treated; however, non-extreme outliers were kept in order not to distort the sample. Figure 2 shows the box plots of the log-ratios for each hotel class.

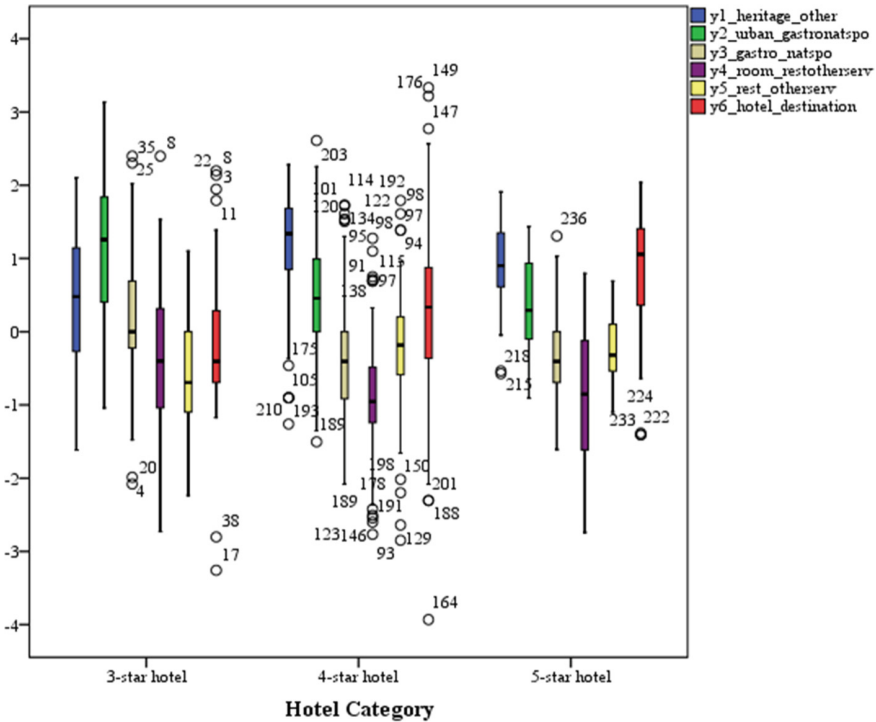


Fig. 2. Box plots of all log-ratios

5 Conclusions

The aim of the study was to identify differences in the promotional messages (i.e. content posted) of hotels posted on Facebook among hotels in different hotel classes in one of the most-visited cities worldwide. In terms of internal information (i.e. hotel facilities) posted, results showed that, on the one hand, the higher the hotel class, the lower the prevalence of content about rooms because such hotels post more content about other facilities at their hotels (e.g. restaurants and athletic facilities). Such results could support previous findings that luxury hotels use Facebook pages to develop their brands [13]. On the other hand, three-star hotels more often promoted their hotel facilities instead of their restaurants.

Regarding posted content about the destination instead of the hotel and its facilities and services, five-star hotels presented more content about heritage than about anything else, whereas three-star hotels presented more content on the city’s attractions than anything else. Concerning internal versus external information, results clearly revealed that higher-class hotels prefer to emphasise their facilities instead of promoting information about the destination. For lower-class hotels, the opposite was true. Three-star hotels offer fewer services to guests, and their strategies are therefore to promote the surroundings and the destination instead. Since the services and facilities offered by higher-class hotels are more complete, such hotels do not need to promote the

destination where they are located but instead encourage guests to spend as much time as possible using their services and facilities. Hotels of higher class also tended to post content oriented to guests most interested in culture and heritage. The results additionally showed that content provided by hotels in different classes differed from what previous findings indicate—namely, that high-revenue companies use different message strategies than low-revenue companies [42].

The findings provide insights into the use of Facebook as a marketing tool, especially about how hotels use their Facebook pages to disseminate messages. To date, studies about hotels using Facebook have focused on consumers' engagement and behaviour, not on the specific content-oriented strategies used by hotels. Thus, the findings also provide much-needed information to fill that gap in research about hotels and social media marketing [7, 14].

Regarding the practical implications of the results, hoteliers should keep in mind that not all customers are the same, and they should therefore direct their messages on social media to targets according to strategies of differentiation. It is important for hotel managers to know their customers in order to target messages suitable to them and thereby maximise their overall satisfaction [7]. Actual and potential customers use social media to make travel decisions, therefore, it is not only important to have a social media profile, but to keep the account active and to curate content with a clear target public in mind. In this respect, users could know where to find information about hotel services and/or destinations depending on hotel class. Moreover, the differential communication strategy found in this research according to hotel class could generate a better brand image and customer attachment to the company, as the hotels are branded in relation to their "strengths" in the eyes of tourists: the destination itself (for lower class) or their own services (for higher class).

The appeal of CoDa to analyse types of content posted on webpages or social media lies in the fact that once the data have been transformed into log-ratios, any standard statistical tool can be used, which ensures the coherence of results and the support of standard statistical assumptions. This study contributes by providing a detailed but straightforward method of assessing and comparing e-marketing content strategies in the hospitality industry, one which allows researchers to assess proportions of types of differentiated content and enables segmentation as well as modelling. The usefulness of the method stems from the fact that it accounts for the relative information of data and treats such information appropriately. Furthermore, CoDa allows researchers to construct tailor-made log-ratios according to their objectives and questions, which facilitates the interpretation of their findings. To that end, partition trees of components are useful tools as well. Researchers are encouraged to use such approaches when the proportions of types of content published on webpages or social media are fundamental to their research questions.

The study also involved a few limitations. Chief among them, the low number of hotels with active Facebook accounts limited the sample size to three-, four- and five-star hotels. Consequently, one- and two-star hotels were not represented in the sample—they were not observably active on their Facebook pages, if they had such pages—meaning that the results are not generalisable to populations and settings outside Barcelona. In response to that limitation, researchers could form larger samples in order to afford a more general overview of the use of social media as an e-marketing tool by

hospitality companies ranging from luxury accommodations to economy hotels. Another way to enlarge the sample size would be to include hotels from other cities and other destinations, which would allow researchers to compare the social media marketing strategies deployed in various destinations.

Although the focus of the study was analysing cognitive content promoted on Facebook by hotels differentiated by hotel class, in the future scholars could focus on the multimedia used in posts (i.e. image, video and text) to examine which generates higher engagement, as well as investigate other marketing strategies (e.g. promotions and contests) used by hotels on their social media pages. From another angle, categorical variables other than hotel class could be used, including whether the hotel is part of a chain, hotel size (e.g. big versus small hotels) and geographical location in a particular city (i.e. to observe differences among neighbourhoods).

Acknowledgements. Authors are pleased to acknowledge the support of the Spanish Ministry of Economy, Industry and Competitiveness (grant ID's ECO2017-88984-R and TIN2015-71799-C2-2-P), the support of the Catalan Government for the accreditation as Consolidated Research Group TURESCO (2017 SG4 49) and the University of Lleida grant 2017-TR265. Finally, the authors wish to thank Marc Alimbau, Anna Tkach and Alice Florina Ghencea from University of Lleida, for their help with data collection.

References

1. Öz M (2015) Social media utilization of tourists for travel-related purposes. *Int J Contemp Hosp Manag* 27:1003–1023. <https://doi.org/10.1108/IJCHM-01-2014-0034>
2. Kaplan AM, Haenlein M (2010) Users of the world, unite! The challenges and opportunities of Social Media. *Bus Horiz* 53:59–68. <https://doi.org/10.1016/j.bushor.2009.09.003>
3. Dickinger A (2011) The trustworthiness of online channels for experience- and goal-directed search tasks. *J Travel Res* 50:378–391. <https://doi.org/10.1177/0047287510371694>
4. Yan Q, Zhou S, Wu S (2018) The influences of tourists' emotions on the selection of electronic word of mouth platforms. *Tour Manag* 66:348–363. <https://doi.org/10.1016/j.tourman.2017.12.015>
5. Jalilvand MR, Samiei N, Dini B, Manzari PY (2012) Examining the structural relationships of electronic word of mouth, destination image, tourist attitude toward destination and travel intention: an integrated approach. *J Destin Mark Manag* 1:134–143. <https://doi.org/10.1016/j.jdmm.2012.10.001>
6. Minazzi R, Lagrosen S (2013) Investigating social media marketing in the hospitality industry: Facebook and European hotels. *Information and communication technologies in tourism 2014*. Springer International Publishing, Cham, pp 145–157
7. Kang J (2018) Effective marketing outcomes of hotel Facebook pages: the role of active participation and satisfaction. *J Hosp Tour Insights* 1:106–120. <https://doi.org/10.1108/JHTI-10-2017-0003>
8. Yoo KH, Lee W (2017) Facebook marketing by hotel groups: impacts of post content and media type on fan engagement. In: *Advances in social media for travel, tourism and hospitality: new perspectives, practice and cases*. Taylor and Francis, pp 131–146
9. Huertas A, Marine-Roig E (2016) User reactions to destination brand contents in social media. *Inf Technol Tour* 15. <https://doi.org/10.1007/s40558-015-0045-9>

10. Dioko LAN, So S-I (Amy), Harrill R (2013) Hotel category switching behavior—Evidence of mobility, stasis or loyalty. *Int J Hosp Manag* 34:234–244. <https://doi.org/10.1016/j.ijhm.2013.04.002>
11. Martin-Fuentes E (2016) Are guests of the same opinion as the hotel star-rate classification system? *J Hosp Tour Manag* 29:126–134. <https://doi.org/10.1016/j.jhtm.2016.06.006>
12. Hsu Y-L (2012) Facebook as international eMarketing strategy of Taiwan hotels. *Int J Hosp Manag* 31:972–980. <https://doi.org/10.1016/j.ijhm.2011.11.005>
13. Leung XY, Bai B, Erdem M (2017) Hotel social media marketing: a study on message strategy and its effectiveness. *J Hosp Tour Technol* 8:239–255. <https://doi.org/10.1108/JHTT-02-2017-0012>
14. Leung XY, Jiang L (2018) How do destination Facebook pages work? An extended TPB model of fans' visit intention. *J Hosp Tour Technol*. <https://doi.org/10.1108/jhtt-09-2017-0088>
15. Leung XY, Baloglu S (2015) Hotel Facebook marketing: an integrated model. *Worldw Hosp Tour Themes* 7:266–282. <https://doi.org/10.1108/WHATT-03-2015-0011>
16. Russell MA (2014) Mining the social web: data mining Facebook, Twitter, LinkedIn, Google+, GitHub, and More. O'Reilly, Sebastopol, CA
17. Aitchison J (1986) The statistical analysis of compositional data, monographs on statistics and applied probability. Chapman and Hall, London
18. Blasco-Duatis M, Sáez Zafra M, García Fernández N (2018) Compositional representation (CoDa) of the agenda-setting of the political opinion makers in the main Spanish media groups in the 2015 General Election. *Commun Soc* 31:1–24
19. Vives-Mestres M, Martín-Fernández J-A, Kenett RS (2016) Compositional data methods in customer survey analysis. *Qual Reliab Eng Int* 32:2115–2125. <https://doi.org/10.1002/qre.2029>
20. Ferrer-Rosell B, Coenders G, Martínez-García E (2016) Segmentation by tourist expenditure composition: an approach with compositional data analysis and latent classes. *Tour Anal* 21:589–602. <https://doi.org/10.3727/108354216X14713487283075>
21. Ferrer-Rosell B, Coenders G (2017) Airline type and tourist expenditure: are full service and low cost carriers converging or diverging? *J Air Transp Manag* 63:119–125. <https://doi.org/10.1016/j.jairtraman.2017.06.014>
22. Ferrer-Rosell B, Coenders G, Martínez-García E (2015) Determinants in tourist expenditure composition—The role of airline types. *Tour Econ* 21:9–32. <https://doi.org/10.5367/te.2014.0434>
23. Marine-Roig E, Ferrer-Rosell B (2018) Measuring the gap between projected and perceived destination images of Catalonia using compositional analysis. *Tour Manag* 68. <https://doi.org/10.1016/j.tourman.2018.03.020>
24. Kwok L, Yu B (2013) Spreading social media messages on Facebook: an analysis of restaurant business-to-consumer communications. *Cornell Hosp Q* 54:84–94. <https://doi.org/10.1177/1938965512458360>
25. Statista (2018) Number of monthly active Facebook users worldwide as of 2nd quarter 2018 (in millions)
26. Kim J, Hastak M (2018) Social network analysis: characteristics of online social networks after a disaster. *Int J Inf Manage* 38:86–96
27. Leung D, Law R, van Hoof H, Buhalis D (2013) Social media in tourism and hospitality: a literature review. *J Travel Tour Mark* 30:3–22. <https://doi.org/10.1080/10548408.2013.750919>
28. Pantelidis IS (2010) Electronic meal experience: a content analysis of online restaurant comments. *Cornell Hosp Q* 51:483–491. <https://doi.org/10.1177/1938965510378574>

29. Chan NL, Guillet BD (2011) Investigation of social media marketing: how does the hotel industry in hong kong perform in marketing on social media websites? *J Travel Tour Mark* 28:345–368. <https://doi.org/10.1080/10548408.2011.571571>
30. Wang C (Renee), Kubickova M (2017) The impact of engaged users on eWOM of hotel Facebook page. *J Hosp Tour Technol* 8:190–204. <https://doi.org/10.1108/jhtt-09-2016-0056>
31. Yen C-L (Alan), Tang C-H (Hugo) (2015) Hotel attribute performance, eWOM motivations, and media choice. *Int J Hosp Manag* 46:79–88. <https://doi.org/10.1016/j.ijhm.2015.01.003>
32. Baloglu S, McCleary KW (1999) A model of destination image formation. *Ann Tour Res* 26:868–897. [https://doi.org/10.1016/S0160-7383\(99\)00030-4](https://doi.org/10.1016/S0160-7383(99)00030-4)
33. BarcelonaActiva (2018) The tourism sector in Barcelona. Barcelona City Council
34. Observatori de Turisme de Barcelona (2018) Barcelona Tourism Activity Report
35. Catalan Government (2018) Guia d'establiments i activitats turístiques
36. Pawlowsky-Glahn V, Buccianti A (2011) Compositional data analysis. Theory and applications. Wiley, New York
37. Pawlowsky-Glahn V, Egozcue JJ, Tolosana-Delgado R (2015) Modeling and analysis of compositional data. Wiley, Chichester
38. Ferrer-Rosell B, Coenders G (2018) Destinations and crisis. Profiling tourists' budget share from 2006 to 2012. *J Destin Mark Manag* 7:26–35. <https://doi.org/10.1016/j.jdmm.2016.07.002>
39. Pawlowsky-Glahn V, Egozcue J (2011) Exploring compositional data with the codadendrogram. *Austrian J Stat* 40:103–113. <https://doi.org/10.17713/ajs.v40i1&2.202>
40. Martín-Fernández J-A, Palarea-Albaladejo J, Olea RA (2011) Dealing with zeros. In: Pawlowsky-Glahn V, Buccianti A (eds) Compositional data analysis. Theory and applications. Wiley, New York, pp 47–62
41. Martín-Fernández JA, Hron K, Templ M et al (2015) Bayesian-multiplicative treatment of count zeros in compositional data sets. *Stat Model* 15:134–158. <https://doi.org/10.1177/1471082X14535524>
42. Hwang J-S, McMillan SJ, Lee G (2003) Corporate web sites as advertising: an analysis of function, audience, and message strategy. *J Interact Advert* 3:10–23. <https://doi.org/10.1080/15252019.2003.10722070>

Sustainability and Responsibility



Perceived Impacts of Artificial Intelligence and Responses to Positive Behaviour Change Intervention

Iis Tussyadiah^(✉) and Graham Miller

School of Hospitality and Tourism Management, University of Surrey, Guildford
GU2 7XH, UK

{i.tussyadiah, g.miller}@surrey.ac.uk

Abstract. Artificial intelligence (AI) technologies have a great potential to aid not only in promoting tourism products and services, but also in influencing responsible travel behaviour to support sustainability. The effectiveness of using AI for positive behaviour change interventions depends on consumers' attitudes toward AI. This study found three underlying views of AI impacts: Beneficial AI, Destructive AI, and Risky AI. Based on these, three consumer segments were identified: The Laggards, The Aficionados, and The Realists. The first two segments hold opposing views: the former averaging higher in negative impacts, while the latter in positive impacts of AI. The Realists are aware of both benefits and risks of AI. These segments differ in their intention to follow recommendations from AI. It is suggested that mainstream consumers, those belonging to The Realists, are likely to respond positively to AI systems recommending responsible behaviour, signifying the positive role of AI in sustainable tourism.

Keywords: Artificial intelligence · Segmentation · Profiling · Positive behaviour change · Sustainable tourism

1 AI and its Potentials

Consumers increasingly use artificial intelligence (AI) technologies for everyday activities, whether they realise it or not [1–3]. With the prevalent use of smartphones, digital personal assistants powered by natural language processing (NLP) and speech recognition program, such as Apple's Siri and Google's Allo, gradually become the apps of choice when it comes to searching for information and personalised recommendations for products and services [1]. In travel and tourism, using a combination of NLP and machine learning, chatbots (typically integrated into popular messaging apps such as WhatsApp and Facebook Messenger) and robot concierges are readily available to assist tourists in making decision on flights, hotels, tour packages, attractions, etc. From the industry perspective, the advancement in AI capabilities translates into business advantages as AI systems could assist in streamlining business processes, increasing productivity, and providing better customer experience [2, 4]. As a result, the pace of adoption of AI by companies is accelerating, with 75% executives surveyed in 2016 revealing the plan to actively implement AI within the three-year planning horizon [5].

As some of future AI implementations will be consumer-facing, the advancement and business adoption of AI in various industries will, in turn, provide more opportunities for consumers to enjoy the benefits offered by sophisticated service tools.

Importantly, the promise of improvements in AI performance is not limited to its economic value, but also its societal benefits. Indeed, AI researchers have advocated the importance of efforts to recognise and optimise the positive impacts of AI in society beyond economic interests, while avoiding its potential pitfalls [6]. For example, AI has been touted to have the potentials to expand opportunities and access to education and vital services (legal, medical, transportation, etc.) for disadvantaged communities [4], and, due to its social and proactive features that could lead to trust and reliance [7], play a role in influencing positive behaviour change [8, 9]. In tourism context, intelligent systems can be designed to influence consumer choices, not only from a marketing point of view, but also from a social perspective, such as promoting socially desirable choices to tourists [10]. Hence, in order to support sustainable tourism development, chatbots and companion robots can be designed as persuasive agents in behaviour modification and intervention efforts involving travel consumers (e.g., promotion of responsible travel behaviour).

The success of such behaviour intervention depends highly on consumers' intention to rely on AI systems for recommendations. To that end, tourism researchers found a paradox in tourist behavioural responses to intelligent agents [11]. While perceived proactivity, intelligence and social ability of agents lead to trust, perceived reactivity and control often result in anxiety and, eventually, lessen consumers' intention to rely on intelligent agents for recommendations while travelling [11]. Hence, understanding consumers' perception of AI is important in anticipating the effectiveness of implementing AI for behaviour modification.

Public discourse about the future of AI holds two opposing visions: optimistic (e.g., AI will spur innovation and provide greater conveniences) and pessimistic (e.g., AI will raise issues of surveillance and displace workers) ones [3, 12]. By analysing public engagement and impressions expressed about AI over time in various media, a study found that although discussions around AI have grown more optimistic in recent years, specific concerns regarding AI, such as fear of loss of control of AI, have persisted and even increased recently [12]. More specifically, based on a study with consumers and business decision makers in the US [5], it was found that the majority of consumers are more optimistic about AI, in that they believe AI could solve complex problem in society (63%) and help people live more fulfilling lives (59%). However, some concerns regarding AI harming people by taking away jobs (46%), and having serious, negative implications (23%) were also identified. Most of those who hold negative sentiments toward AI have not used AI technologies before [2]. These findings imply that there are distinct groups of consumers holding opposing views of AI in society and that these groups will respond differently to AI systems designed to influence positive behavioural change.

In order to tap into the potentials of using AI systems to facilitate more responsible tourism, understanding consumers in terms of their perception of AI will be a necessary first step in developing positive behaviour change intervention strategies targeting travel consumers. While researchers have started to assess awareness of and attitude toward AI systems and predict their behavioural outcomes [13, 14], there is limited effort to explore meaningful, recognisable characteristics that differentiate consumers in terms of their

perception of AI. Therefore, the aim of this research is to identify consumers' perception regarding what AI will bring to society and how this perception plays a role in better understanding their behaviour. Specifically, the research objectives are threefold: (1) to identify the underlying dimension(s) of perceived impacts of AI, (2) to segment and profile consumers based on their perceived impacts of AI, and (3) to explore whether perceived impacts of AI explain consumer behaviour with AI systems. The findings will inform travel and tourism destinations, hospitality companies, and government agencies with appropriate consumer typologies for effective targeting in implementation of positive behavioural change intervention utilising AI systems.

2 Attitudinal Segmentation in AI Adoption

The advancement in AI capabilities presents a great potential for tourism destinations and hospitality companies to implement AI not only to promote their products and services to consumers, but also to influence responsible travel behaviour and achieve other social marketing goals in support of sustainability. As suggested in previous studies, behaviour change interventions could be more effective if tailored to consumer groups based on key factors likely to support the target behaviour to materialise [15]. Given that consumers seem to derive their confidence and trust in intelligent agents from perceived consequences of using (and interacting with) the technologies [11], it is important that behaviour interventions targeting consumers' reliance on AI (i.e., whose target behaviour is consumers following recommendations from AI) pay particular attention to the perceived positive and negative impacts of AI adoption. This calls for consumer segmentation and profiling based on detailed understanding of shared attitudes toward AI.

Studies have shown the importance of targeting lead users for diffusion of innovative products, services, and technologies [16, 17]. In the environment where consumers are overwhelmed with the speed of technological innovation and the resulting technological solutions/products, behavioural responses associated with new technologies are ever more complex and harder to predict [18]. As a result, companies are facing new challenges to segment consumers into meaningful groups in order to predict technology adoption. To that end, attitudinal segmentation approach has been applied to identify homogenous groups within a heterogenous market with shared values toward adoption of self-service technology [19, 20], technology-enabled service delivery [21], and mobile marketing [18]. In these studies, attitudes toward technology were considered one of key determinants to classify consumers into adopter vs. non-adopter segments, or into Roger's five user categories in innovation diffusion [22]: innovator-laggard segments.

Since technology adoption decisions are linked to innovativeness [17], consumer segments have been profiled in terms of their personal characteristics as they relate to the levels of personal innovativeness in the domain of information technology. For example, age and gender have been associated with personal innovativeness: younger consumers tend to be more innovative [23] and men tend to adopt new technologies earlier than women [23, 24]. Several studies also linked income and education levels to innovative predispositions: consumers with higher income and education tend to be

more innovative and likely to adopt new products faster than their counterparts [24–26]. Therefore, identifying significant differences in personal characteristics between distinct consumer segments with differing views of AI impacts on society will assist in uncovering the basic attitudinal factors that explain AI adoption for behavioural interventions supporting sustainable tourism.

3 Method

In order to achieve the aforementioned research objectives, an online questionnaire was developed to capture travellers' perception of the impacts of intelligent systems (including AI and robotics) in society. A list of items representing benefits and risks of AI implementation was developed from a comprehensive industry research on consumer perception of AI tested in the US, Canada, the United Kingdom (UK), China, and Brazil [3]. The list consists of 13 items representing benefits and 13 items representing risks of AI. These items were presented in a 5-point Likert-type scale, anchored from 1 (strongly disagree) to 5 (strongly agree). To assess the predictive validity of the resulting consumer segments in terms of behavioural intention associated with reliance on AI, respondents were asked to state how likely they are to follow recommendations from AI systems implemented in a smart hotel room while traveling. This question was presented after a scenario asking them to imagine staying in a hotel room equipped with an intelligent virtual/robotic assistant (powered by AI) that gives feedback on resource consumption (i.e., promotion of resource-efficient behaviour to use water/energy more responsibly). The questionnaire also includes demographic characteristics and prior use of AI tools to facilitate consumer profiling.

The questionnaire was distributed online to a survey panel in June 2018 targeting residents of the UK and the US who have travelled domestically or internationally and have stayed in a hotel or other commercial accommodation within the past six months. A total of 621 responses were collected: 313 from the UK and 308 from the US. There is a relatively balanced distribution in terms of gender (51% male). Respondents are relatively older (59% of respondents are 55 years and over), mostly college-educated (42% have at least a Bachelor's Degree), and about 55% stated having annual income less than US\$60,000. In an attempt to explore consumer characteristics in association with their perception of impacts of AI, exploratory factor analysis (principal component analysis/PCA), cluster analysis, discriminant function analysis, and one-way analysis of variance (ANOVA) were implemented to analyse the data.

4 Result and Discussion

4.1 Identifying Perceived Impacts of AI

To identify important dimensions underlying consumers' perceived impacts of AI, PCA was conducted on the list of items representing perceived benefits and risks of intelligent systems. Three factors emerged from the analysis, accounting for about 70% of the total variance in the data (see Table 1). The Kaiser-Meyer-Olkin test yielded a

score of 0.941 ($p < 0.001$), indicating sampling adequacy for each of the variables in the model and for the complete model. The first dimension, labelled as *Beneficial AI*, explains travellers' perception about the benefits of intelligent systems for individuals and society, which include general positive impacts of AI on the economy and the environment as well as the practical benefits from time savings and conveniences. The second, labelled as *Destructive AI*, explains how AI was expected to cause destruction on infrastructure, endanger political stability, and cause accidents involving humans. The last dimension, labelled as *Risky AI*, reflects consumers' concerns that AI will facilitate crimes, invasion of privacy, and job losses. Two items, associated with AI lessening people's skills and causing humans to be lazy and less industrious, were dropped from the analysis due to high cross-loadings on the two risk dimensions.

Table 1. Principal components of perceived impacts of AI

Perceived Impacts of AI	Factor loading	Eigen-value	Cum. %	Cronbach's α
<i>Factor 1: Beneficial AI</i>		8.522	35.510	0.957
...easier decision-making for purchases of products or services	0.858			
...products and services that provide greater ease and convenience	0.851			
...improvements to human health and/or longevity	0.832			
...time savings, freeing up humans to pursue other activities or leisure	0.831			
...better skills at solving complex problems	0.831			
...a positive impact on our economy	0.826			
...better use of energy and natural resources	0.806			
...a positive impact on our environment	0.804			
...easier access of relevant news and information	0.792			
...greater social equality	0.774			
...lower-priced or more affordable products and services	0.750			
...companionship	0.746			
...completion of tasks that are too hard or too dangerous for people	0.728			
<i>Factor 2: Destructive AI</i>		4.311	53.471	0.907
...harmful impacts on our environment	0.859			
...transportation problems	0.834			
...disruptions to infrastructure	0.766			
...ease of going to war	0.746			
...accidents involving humans	0.740			
...manipulation of humans by intelligent machines or technologies	0.676			
<i>Factor 3: Risky AI</i>		3.871	69.599	0.900
...cyber-attacks or computer hacking	0.863			
...less security of personal data and privacy	0.793			
...criminal use of AI technologies	0.788			
...companies/government with more access to personal data/behaviour	0.786			
...job losses	0.694			

4.2 Segmenting Travel Consumers on Perceived Impacts of AI

To explore whether travel consumers can be categorised into meaningfully distinct groups based on their perception of the impacts of AI, hierarchical cluster analysis was performed on the three dimensions of perceived impacts of AI, using squared Euclidian distance measure and Ward’s agglomeration criterion. Initially, 1-, 2-, 3-, and 4-cluster solutions were compared. Finally, the 3-cluster solution was selected for its cluster distinctiveness and overall interpretability. Based on the mean scores of perceived impacts of AI amongst the three clusters (see Table 2), the groups are named: *The Laggards* ($n = 109$), *The Aficionados* ($n = 57$), and *The Realists* ($n = 455$). The Laggards and The Aficionados appear to be on the opposite ends of the continuum when it comes to perceiving positive and negative impacts of AI; The Laggards highly believe in Destructive AI and Risky AI, while The Aficionados in Beneficial AI. However, The Realists demonstrate awareness in both benefits and risks of AI implementation, with mean scores of Risky AI and Beneficial AI both above neutral.

Table 2. Consumer segments and perceived impacts of AI

Perceived impacts of AI	Mean (St. Dev.)		
	The Laggards	The Aficionados	The Realists
Beneficial AI	1.997 (0.575)	3.910 (0.861)	3.569 (0.606)
Destructive AI	3.789 (0.710)	1.620 (0.546)	3.062 (0.629)
Risky AI	4.389 (0.589)	2.217 (0.822)	3.836 (0.624)

This pattern is further illustrated in Fig. 1, where the three clusters are compared in terms of the individual items representing the benefits (on the left-hand side of the radar) and the risks (on the right-hand side of the radar) of AI. The Laggards (dashed

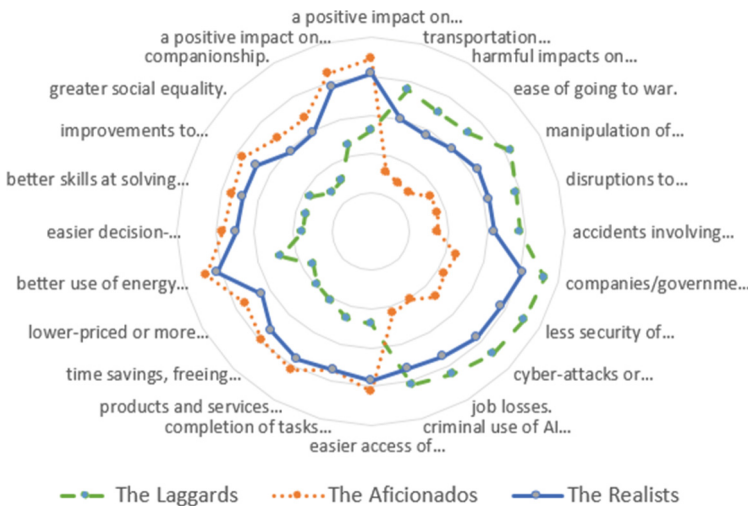


Fig. 1. Consumer segments and perceived benefits and risks of AI (Mean Scores)

line) score higher on the negative items, while The Aficionados (dotted line) on the positive ones. The Realists (solid line) score slightly lower than the highs in the other two clusters (on both ends).

To identify whether respondents are maximally separated into the three groups and that the variables contribute meaningfully to the classification, discriminant function analysis was performed. The Wilk's Lambda test for the discriminant function yielded 0.261 ($p < 0.001$), indicating a good discriminatory ability of the function, and Eigenvalue of 1.975, with the function accounting for 87.4% of variance in the dependent variables (i.e., consumer groups). Table 3 presents the tests of equality of group means and structure matrix to identify which variable contributes a significant amount of prediction to help separate the groups. The smaller the Wilk's Lambda, the more important the variable for the discriminant function. In the structure matrix, the coefficients with large absolute values correspond to variables with a greater ability to discriminate between the three groups. The contribution of the three variables are comparable, with Beneficial AI contributing slightly better to discriminate consumers into the three groups (from both Wilk's Lambda and structure matrix). Finally, Table 4 presents classification function coefficients (Fisher's linear discriminant functions), which can be used to predict group membership of travel consumers. Overall, the classification results show a high success rate; 93.1% of the original grouped cases were correctly classified into the three clusters.

Table 3. Test of equality of group means and structure matrix

Perceived impacts of AI	Wilk's lambda	F (2, 618)	Sig.	Structure matrix
Beneficial AI	0.505	302.514	<0.001	-0.643
Destructive AI	0.587	217.005	<0.001	0.568
Risky AI	0.582	221.808	<0.001	0.543

Table 4. Classification function coefficients

Perceived impacts of AI	The Laggards	The Aficionados	The Realists
Beneficial AI	3.611	9.321	7.877
Destructive AI	6.422	2.063	4.693
Risky AI	8.362	3.789	7.088
(Constant)	-35.221	-25.192	-35.932

4.3 Profiling Consumer Segments

To further uncover the profiles of the consumer clusters, Pearson Chi-Square tests were performed to detect significant differences in terms of demographic characteristics of the cluster members. Table 5 shows how the clusters are significantly different across gender, age, and country of residence. Characteristically, The Laggards are dominated by male (62%) and older (78% are 55 or older) travellers, while US residents are dominant in The Aficionados (70%). No significant differences were found in terms of

education and household income levels, although it is worth noting that while both The Aficionados and The Realists have a balanced distribution between respondents with a Bachelor’s Degree (or higher) and without, 60% of The Laggards have no higher degree (lower than Bachelor’s). Furthermore, about 62% of The Laggards have less than US\$60,000 in annual household income, while 61% of The Aficionados have US \$60,000 or higher. The percentages are balanced for The Realists.

Table 5. Demographic profiles

Profiles	The laggards	The aficionados	The realists	χ^2	Sig.
<i>Gender</i>				7.386	0.025
Male	62%	54%	48%		
Female	38%	46%	52%		
<i>Age</i>				26.020	0.004
18–24	1%	2%	4%		
25–34	2%	2%	9%		
35–44	6%	19%	12%		
45–54	19%	30%	18%		
55–64	44%	28%	33%		
65+	29%	19%	25%		
<i>Residence</i>				10.660	0.005
UK	53%	30%	52%		
US	47%	70%	48%		

Further, in order to confirm previous findings linking prior use of AI and perception, the tests were also performed on the use of AI systems in the past six months. As seen in Table 6, there are statistically significant differences in prior use of virtual assistant (such as Siri), voice search, real-time automatic translation, and other digital personal assistant(s) among the three groups. Unsurprisingly, the proportions of those who have used the tools are highest in The Aficionados and lowest in The Laggards. Notably, nearly half of The Aficionados have used voice search tools in the past six months. About a third of The Realists have used voice search and virtual assistants.

Based on the number of members in each cluster as well as the distinctiveness of their demographic characteristics and use behaviour, it can be suggested that The Realists represent the mainstream consumers when it comes to perception of AI impacts.

4.4 Consumer Segments and AI-Related Behavioural Intention

To assess whether cluster memberships can explain consumer behaviour associated with reliance on AI, one-way ANOVA was performed on intention to follow recommendation from AI-powered virtual/robotic assistant in a smart hotel room designed to

Table 6. Use of AI tools in the past six months

AI tools	The laggards	The aficionados	The realists	χ^2	Sig.
<i>Virtual assistant (e.g. Siri)</i>				7.783	0.020
No	82%	63%	70%		
Yes	18%	37%	30%		
<i>Voice search</i>				17.240	<0.001
No	82%	51%	67%		
Yes	18%	49%	33%		
<i>Real-time automatic translation</i>				10.034	0.007
No	93%	79%	80%		
Yes	7%	21%	20%		
<i>Other digital personal assistant(s)</i>				11.493	0.003
No	95%	79%	84%		
Yes	5%	21%	16%		

provide feedback and advice on resource consumption (i.e., energy and water). As shown in Table 7 and Fig. 2, there are significant differences in the mean intention to follow recommendation from AI system between the different clusters ($F(2,618) = 146.346, p < 0.001$). From the results of the Tukey post hoc test, it was identified that compared to The Laggards ($1.972 \pm 1.023, p < 0.001$), intention to follow recommendation from AI was statistically significantly higher for The Aficionados ($4.192 \pm 0.972, p < 0.001$) and The Realists ($3.670 \pm 0.994, p < 0.001$). Also, there is a significant difference between The Aficionados (higher) and The Realists ($p = 0.001$).

Table 7. Consumer segments and intention to follow recommendation from AI

Source	Sum of squares	Df	Mean square	F	Sig.
Between groups	290.960	2	145.480	146.346	<0.001
Within groups	614.344	618	0.994		
Total	905.304	620			

These results show that the consumer groups generated based on perception of AI impacts in general can be useful in predicting behaviour with regards to AI adoption in the travel contexts. That is, consumers who expect AI to bring positive impacts to society, economy, the environment, and people in general (i.e., not specific to travel, tourism and hospitality settings) will develop higher intention to rely on AI while traveling. That is, global perceptions of AI will manifest in specific (local) behaviour.

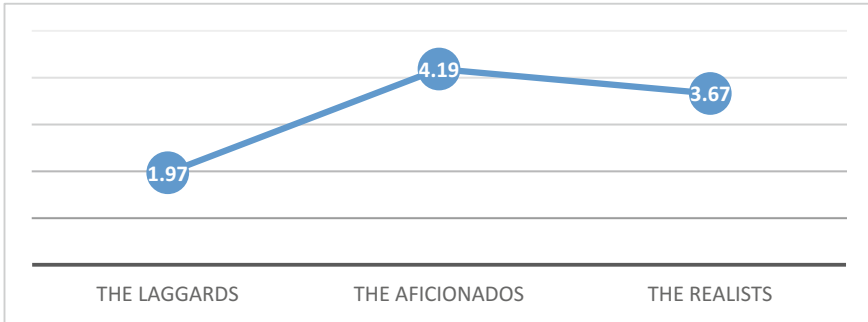


Fig. 2. Consumer segments and intention to follow recommendation from AI

5 Conclusion and Recommendation

This research explores consumers' perceptions with regards to the impacts of AI in society and segment consumers based on these perceptions. The ultimate goal was to assess whether differing perspectives of AI explain consumer behavioural responses to AI systems recommending responsible travel behaviour to support sustainability. Three underlying factors of perceived AI impacts emerged: Beneficial AI (optimistic), Destructive AI and Risky AI (pessimistic). The two pessimistic views of AI appear to differ in terms of AI as the source of harm, Destructive AI represents direct outcomes of AI implementation (e.g., AI damages society), while Risky AI represents indirect outcomes (e.g., AI facilitates other entities such as criminals to harm society). These further confirm and explain the two opposing views of AI impacts in society, as suggested in previous research [3, 12].

These factors successfully classified consumers into three distinct segments: The Laggards (who perceive high level of risks and low level of benefits of AI), The Aficionados (who perceive high level of benefits and low level of risks of AI), and The Realists (who are aware of both likely benefits and risks of AI). The majority of consumers belong to The Realists, with a small number belonging to The Aficionados and a slightly larger number to The Laggards. The Laggards are rather distinctive in their personal characteristics compared to the other two segments; they are dominated by male and older travellers, likely with lower levels of income and education, and most have not used any AI tools as of recent. Some of these findings are consistent with previous studies linking personal characteristics to level of personal innovativeness in the domain of information technology [23, 24].

Tested in terms of intention to follow recommendations from AI, the three groups demonstrated different behavioural responses. The Laggards are the least likely to follow recommendations from AI, while The Aficionados are the most likely to do so. The Realists exhibit significantly higher likelihood to adopt recommendations from AI when compared to The Laggards, but still lower than the Aficionados do. This implies that the use of AI for positive behaviour change will likely be effective in the majority of travel consumers. Behaviour change intervention efforts will be ineffective only in a small proportion of travel consumers who hold negative attitudes toward AI. Therefore,

it is highly suggested that travel companies and tourism destinations integrate pro-environmental and prosocial campaign efforts into the implementation of AI in order to balance the economic gains from AI adoption with sustainable tourism goals.

While contributing to explicating the roles of AI in positive behaviour change intervention, thus opening a pathway for policy and strategic implementation supporting sustainable tourism, this research has several limitations that should be accommodated in future research. First, albeit using pro-environmental behaviour as the intervention target in the research context, this research did not consider factors associated with responsible behaviour such as environmental concerns in the segmentation procedure. Future research should combine pro-environmental values and attitudes toward AI to classify consumers into more detailed segments in order to better predict the effectiveness of behaviour change interventions supporting sustainable tourism. Second, this research only tested the association between the segments and intention to follow AI recommendations, but did not test any causal relationships between the variables. Future studies should develop a predictive attitudinal and behavioural model to test the predictive validity of perceived impacts of AI on travellers' behaviour in various contexts. Lastly, future studies should experiment behaviour change interventions with actual consumers to empirically test the effectiveness of such interventions with in different consumer groups.

Acknowledgements. This work was supported by the University of Surrey's Faculty of Arts and Social Sciences (Pump Priming Fund 2017/2018).

References

1. An M (2017) Artificial intelligence is here-people just don't realize it. <https://research.hubspot.com/artificial-intelligence-is-here>. Last accessed: 10 Aug 2018
2. Krogue K, Larsen G, Parry B (2017) The state of artificial intelligence, 2017: public perceptions of the most disruptive technology (UK Edition). https://uk.insidesales.com/wp-content/uploads/2017/03/State_of_AI_UK.pdf. Accessed: 10 Aug 2018
3. Shandwick W (2016) AI-Ready or not: artificial intelligence here we come! What consumers think & What marketers need to know. <https://www.webershandwick.com/uploads/news/files/AI-Ready-or-Not-report-Oct12-FINAL.pdf>. Accessed: 10 Aug 2018
4. PwC (2017) Sizing the prize: What's the real value of ai for your business and how can you capitalise? <https://www.pwc.com/gx/en/issues/analytics/assets/pwc-ai-analysis-sizing-the-prize-report.pdf>. Last accessed: 10 Aug 2018
5. Economist (2016) Artificial intelligence in the real world. https://www.eiuperspectives.economist.com/sites/default/files/Artificial_intelligence_in_the_real_world_1.pdf. Last accessed: 10 Aug 2018
6. Russell S, Dewey D, Tegmark M (2015) Research priorities for robust and beneficial artificial intelligence. *AI Mag* 36(4):105–114
7. Lee JD, See KA (2004) Trust in automation: designing for appropriate reliance. *Hum Factors* 46(1):40–80
8. Tromp N, Hekkert P, Verbeek P-P (2011) Design for socially responsible behavior: a classification of influence based on intended user experience. *Des Issues* 27(3):3–19

9. Tussyadiah IP (2017) Technology and behavioral design in tourism. In: Fesenmaier DR, Xiang Z (eds) *Design Science in Tourism*. Springer International Publishing, Switzerland, pp. 173–191. https://doi.org/10.1007/978-3-319-42773-7_12
10. Gretzel U (2011) Intelligent system in tourism: a social science perspective. *Ann Tour Res* 38(3):757–779
11. Tussyadiah IP, Wang D (2016) Tourists' attitudes toward proactive smartphone systems. *J Travel Res*, 55(4):493–508. <https://doi.org/10.1177/0047287514563168>
12. Fast E, Horvitz E (2017) Long-term trends in the public perception of artificial intelligence. In: *Proceedings of the Thirty-First AAAI Conference on Artificial Intelligence*. International Joint Conferences on Artificial Intelligence, Inc.: Menlo Park, CA, pp. 963–969
13. Brougham D, Haar J (2018) Smart technology, artificial intelligence, robotics, and algorithms (STARA): employees' perceptions of our future workplace. *J Manag Organ* 24(2):239–257. <https://doi.org/10.1017/jmo.2016.55>
14. Tussyadiah IP, Zach FJ, Wang J (2017) Attitude toward autonomous on-demand mobility: the case of self-driving taxi. In: Schegg R, Stangl B (eds) *Information and communication technologies in tourism 2017*. Springer International Publishing, Switzerland, pp 755–766. https://doi.org/10.1007/978-3-319-51168-9_54
15. Hardcastle SJ, Hagger MS (2015) Psychographic profiling for effective health behavior change interventions. *Front Psychol* 6:1988. <https://doi.org/10.3389/fpsyg.2015.01988>
16. Morrison PD, Roberts JH, Midgley DF (2004) The nature of lead users and measurement of leading edge status. *Res Policy* 33(2):351–362
17. Schreier M, Oberhauser S, Prügl R (2007) Lead users and the adoption and diffusion of new products: insights from two extreme sports communities. *Mark Lett* 18(1–2):15–30
18. De Marez L, Vyncke P, Berte K, Schuurman D, De Moor K (2007) Adopter segments, adoption determinants and mobile marketing. *J Target, Measur Anal Mark* 16(1):78–95. <https://doi.org/10.1057/palgrave.jt.5750057>
19. Bobbitt LM, Dabholkar PA (2001) Integrating attitudinal theories to understand and predict use of technology-based self-service: the internet as an illustration. *Int J Serv Ind Manag* 12(5):423–450
20. Dabholkar PA, Bagozzi RP (2002) An attitudinal model of technology-based self-service: moderating effects of consumer traits and situational factors. *J Acad Mark Sci* 30:184
21. Walker RH, Craig-Lees M, Hecker R, Francis H (2002) Technology-enabled service delivery: an investigation of reasons affecting customer adoption and rejection. *Int J Serv Ind Manag* 13(1):91–106
22. Rogers EM (2003) *The diffusion of innovation* (5th Ed). Free Press: New York
23. Steenkamp J-BEM, Burgess SM (2002) Optimum stimulation level and exploratory consumer behavior in an emerging consumer market. *Int J Res Mark* 19(2):131–150
24. Tussyadiah IP (2016) The influence of innovativeness on on-site smartphone use among American travelers: implications for context-based push marketing. *J Travel Tour Mark* 33(6):806–823. <https://doi.org/10.1080/10548408.2015.1068263>
25. Im S, Bayus BL, Mason CH (2003) An empirical study of innate consumer innovativeness, personal characteristics, and new-product adoption behavior. *J Acad Mark Sci* 31(1):61–73
26. Tellis GJ, Yin E, Bell S (2004) Global consumer innovativeness: cross-country differences and demographic commonalities. *J Int Mark*: June 2009, 17(2):1–22



Towards a Measurement Scale for Digital Social Innovation: A Responsibility-Sustainability Framework

Pauline A. Milwood¹(✉) and Wesley S. Roehl²

¹ Pennsylvania State University, Reading, PA, USA
pam325@psu.edu

² Temple University, Philadelphia, PA, USA
wroehl@temple.edu

Abstract. The role of digital social innovation (DSI) factors linking socially responsible business climate to sustainable performance outcomes in hospitality and tourism businesses has been understudied. This paper introduces digital social innovation within the theoretical framework of relationships between organizational responsibility and sustainable business performance. Using Churchill's (1979) recommended approach for measurement scale development, the study reports preliminary scale purification results of DSI measures. The paper is among the first contributions to hospitality and tourism scholarship which explore conceptualization, measurement and application of DSI. Implications and next steps for the wider research study on responsibility-DSI-sustainability are presented.

Keywords: Digital social innovation (DSI) · Responsibility · Sustainability

1 Introduction

Digital social innovation (DSI) is an emerging phenomenon which broadly refers to the use of information technologies (e.g., broadband, mobile internet, artificial intelligence, machine learning) in social and collaborative innovations [1]. These innovations are created for the value they provide to society through their ability to solve complex social, cultural, environmental and economic challenges. While the concept of social innovation is emerging in the business and management fields, the idea is not altogether novel. Ideas of social responsibility, environmental sustainability, social justice, and ethical decision-making are increasingly important to business; serving to broaden entrepreneurial agendas beyond purely financial and economic measures of performance. Further, pervasive digital technologies in the era of The Internet and Big Data have called attention to ethical and social concerns related to business' responsible use of technologies (e.g., 'civic tech' or 'tech for good'), and in a manner which benefits both business and society. This has contributed to increased focus, in research and in practice, on business models which consider the value that accrues to not only the focal enterprise, but to the wider society within which that enterprise seeks to thrive.

Hospitality and tourism businesses and the service experiences they provide, create ideal platforms for digital social innovation concepts to be tested and applied, given the potential of these service experiences to impact local environment, society, culture, and the economy. The nature of hospitality and tourism business oftentimes involves subtle exploitation of destination resources through digital technologies. Recent developments involve the replication of human talent with artificial intelligence (AI) and robot technology; wireless/smartphone technologies; web-based platforms; and near field communication (NFC) infrastructure. Resulting innovations include facial recognition scanners in airport terminals and hotel lobbies; immersive virtual reality (VR) attractions; drone technology in leisure sports; and ride sharing mobile applications. These technology innovations have contributed to the collapse of production and consumption into a single activity and the empowerment of formerly passive consumers. Within a 'responsible technology' paradigm therefore, how do hospitality and tourism business perceive their responsibility in co-creating sustainable 'value-added' products and services which benefit local culture, society, and the natural environment? Further, how should seemingly opposing phenomena of responsibility-sustainability and technology be understood within academia and industry? This paper explores the mechanisms of digital social innovation as an initial step towards understanding the technology and 'responsibility-sustainability' linkages in the context of hospitality and tourism businesses.

2 Theory

2.1 Responsibility Climate and Sustainability Performance

The social responsibility of business is situated within theories and terminologies related to stakeholder management, corporate accountability, and social issues management; all of which fall within the corporate social responsibility (CSR) paradigm. Garriga and Melé [2] assert that most CSR theories may be confined to one of four broad theoretical classifications; *instrumental theories* where business is seen as meeting the economic objectives of wealth creation and long-term profits through CSR; *political theories* where business exercises its capacity to act, and does so in a responsible manner; *integrative theories* where business integrates social demands of a given period into its responsibility agenda; and *ethical theories* which view business as acting in a manner which meets ethical standards of 'correctness'.

Responsibility climate, for the purpose of this study, describes the openness of business to adopt standards and practices which reflect its ability to add value to society; and reflects the general orientation of the business' response to social needs. Responsibility climate comprises three dimensions. The first is the *decision-making* dimension, where the approach to decision-making places importance on how society benefits from the daily activities of the business. Decision-making may be considered a top-down phenomenon wherein management leads by example in taking for-profit decisions which consider intended (or unintended) consequences for society. Socially responsible decision-making considers the relative importance of the unwritten social contract [3] between business and society. The second dimension is *customer-relations*.

The business' approach to satisfying customer' service experience needs considers the responsibility to members of society. Moscardo and Hughes [4] acknowledge that guests rarely engage in the design of CSR strategies, and guests vary in their interpretations of responsibility. This depends on whether guests have inner versus outer directed goals, and the role that responsibility has as part of their self-identity [5]. Altruistic business practices which seek to educate visitors and guests about local culture and social norms, as well as introduce visitors to aspects of local life within the delivery of the service experience are demonstrative of responsibility climate. The third dimension of responsibility climate is *innovation*: the design implementation of new products and services which considers overall cost-benefit value to the environment, society, and local culture.

Taken together, there are two key points which help to both distinguish and link responsibility and sustainability. Firstly, *a genuine belief in sustainability creates responsibility climates that empower internal and external stakeholders to take ownership of CSR actions*. Font and Lynes [6] regard responsibility as activities pursued to achieve a social good and performed to meet social requirements [7]. They suggest that responsibility is linked to the concept of stakeholders, where individuals identify stakeholder demands on their organizations and negotiate their level of responsibility towards the collective wellbeing of society, environment, and economy [8]. From a stakeholder accountability standpoint, tourism business may vary in terms of how they choose to prioritize their responsibility to society. Some research suggests that long-term economic practices are considered more important than social and environmental responsibilities [9]. Secondly, *innovation is an important mechanism to achieve sustainability goals [10] as well as the involvement of key stakeholders in co-created value [11–13]*. The World Commission on Environment and Development (WCED) defined sustainable development as meeting the current society's needs without compromising the ability of future generations to do so [14]. Traditional understanding of sustainability emerged in terms of the impact on the environment. Sustainable tourism, in this tradition, emerged as eco-tourism, green tourism, and nature tourism. Today, sustainable tourism is defined in environmental, social, cultural, and economic terms. Pérez, Martínéz, and del Bosque [ibid.] developed a measurement scale for practical application of CSR using these concepts of sustainable development. From an innovation outcomes standpoint, sustainable performance outcomes by tourism business minimize ecologically irreversible impacts, preserve cultural heritage, maintain community structures, employment and human resources, and benefit the local community [15]. Such outcomes ensure environmental friendliness, respect for local society and culture, and economic benefit to the local community in the development of new products and services. Sustainable business performance outcomes reinforce responsibility of business to society, and outcomes related to environmental, social, cultural, and economic sustainability inform managerial decision-making, customer-relations, and innovation standards and practices.

Proposition 1: Sustainability performance will be greater the higher the level of responsibility climate within the focal organization.

This paper positions the above 'responsibility-sustainability' framework within the theoretical underpinnings of pervasive digital technologies. To better understand the impact of these technologies on how tourism business design and implement new

innovations for ‘responsible-sustainable’ outcomes which add value to local society, culture, economy, and the environment the authors propose that digital social innovation represents a mediating mechanism which links responsibility climate and sustainable performance outcomes.

2.2 Digital Social Innovation (DSI)

Gaggioli [ibid.] describes digital social innovation as an emerging approach in social innovation that leverages digital tools to address societal and environmental challenges. Technology and society scholars assert that the relationship of technology to society may be viewed as a feedback loop, arising from the search for solutions and resources. This search is in turn shaped by “the character of our social technique, by our economic institutions, our system of government, and the social psychology of everyday life.” “The loop,” they continue, “is closed by new technology innovation, ... resulting in a continuing interaction between social change and technological change” [16, p.1]. Conversely, urban studies theorists contend that social change lags behind technology “because we have not organized the same sharp search for new ideas” [17, p.9]. More recently, organizational science and technology scholars [18, 19] have emphasized trust and technology affordances, which focus on the range of potential interactions between groups, individuals, and technology. Others [20–22] and Orlikowski and colleagues [23–25] have coined the term ‘sociomateriality’ referring to the inextricable link between people, work, and technology, and have signalled the need for new methods of research to integrate ideas on how organizations effectively collaborate in a pervasively digital ecosystem, effectively. For the purpose of this study, the definition and indexing of digital social innovation used by the European-based DSI4EU project is adopted:

A type of digital and social collaborative innovation in which innovators, users, and communities collaborate using digital technologies to co-create knowledge and solutions for a wide range of social needs and at a scale and speed that was unimaginable before the rise of the Internet. [26]

According to Stokes et al. [ibid.] the past few years have seen a rapid growth in the number of people using digital technologies to tackle social challenges in areas ranging from healthcare and education to democracy and the environment. This phenomenon, referred to as digital social innovation (DSI), aims to harness digital technologies to improve lives and reorient technology towards more social ends; empower citizens to take more control over their lives, and to use their collective knowledge and skills to positive effect; make government more accountable and transparent; foster and promote alternatives to the dominant technological and business models—alternatives which are open and collaborative rather than closed and competitive; and the use of technology to create a more environmentally sustainable society. Examples of DSI include crowd-funding models to finance new projects; mobile applications linking host and visitors to tourist communities; and online technology platforms created for the freely accessible knowledge benefit afforded to society. Windrum et al. [ibid.], in their case study of an Australian nationwide public access defibrillation programme, suggest that certain types of service innovations have the transformative ability to become social innovations.

In hospitality and tourism, DSI involves pursuing business and technical models which provide solutions to complex social and economic challenges. In exploring social innovation success factors [27] find that *value proposition*, *appropriate market research*, and *stakeholder involvement* factors contribute to successful implementation of hospitality and tourism business models. The development of gang tourism—walking tours conducted by former gang members in their historically inner-city neighbourhoods in Casco Viejo, Panama—represent community-based tour experiences which enhance the visitor experience through cultural authenticity and technology engagement. Cloutier et al. [ibid.] provides a collaborative DSI case in the design of a mobile application linking Cider Route stakeholder business and visitors in the rejuvenation of a tourist cider route in Quebec, Canada. These types of innovations in experience design are created and sustained through the efforts of a diverse mix of actors from business, government, and society; and call for a different type of collaborative partnership: a reconceptualization of the role of stakeholders in innovation processes and a renewed look at innovation barriers and gateways McPhee [28].

2.3 Responsibility-Sustainability and the DSI ‘Black Box’

Responsibility climate has been described as the business response to the focal aim of building sustainable businesses; and is a relative choice in relation to first accepting that sustainability is important to the business. Responsibility of business to society is therefore a function of managerial standard and practices; and borne out in aspects of the business decision-making; how service-related issues are handled in the daily running of the operation; and in new product and service development activities. For these practices to lead to meaningful sustainability outcomes, this study proposes that digital social innovation mechanisms act as mediating factors between responsibility and sustainability. These four mediating factors are external collaboration, funding availability, civic engagement, and support infrastructure. External collaboration represents sources of new, diverse knowledge which is not resident in the organization. Managers who actively promote responsibility through the search for knowledge via online and offline collaborations with public, private, and third sector stakeholders will drive sustainability outcomes. Availability of funding represents grant and investment resources to support new business and volunteer projects which benefit the natural environment, local society and culture, and the local economy. This may take the form of earmarked land donated for community and local development projects, and for which management oversight is entrusted to the focal business in conjunction with local or state governments and agencies. Civic engagement represents the incorporation of local community members in the interests of the business and follows integrative and ethical theory approaches previously discussed. Support infrastructure provides the focal business with intermediary and system-level support such as legal advice and supportive government policy; and the incentive to engage management, employees, customers, and suppliers in social support initiatives. Examples might include promoting respect for local food, culture, the Arts, and entertainment in the production and consumption of hospitality and tourism products and services.

Proposition 2: Responsibility climate within the focal organization is positively associated with digital social innovation (DSI) mechanisms.

Adapting Pérez et al., [ibid.], sustainability performance is understood to exist across four commonly held pillars: the environment, society, culture, and the economy. For sustainability innovation to be meaningful (i.e., successful performance), external stakeholders such as consumers, suppliers, governmental and non-governmental agencies should be engaged in the development of new products and services which promote sustainability of the economy, natural, and socio-cultural environments. Funding availability is also critical to mobilize efforts aimed at sustainability projects earmarked for yielding positive returns to both the focal tourism enterprise and the local community. Civic engagement by business engenders trust, and the strengthening of the social contract between business and society. This minimizes the risk of public area and community development projects failing due to lack of credibility or community support. Relatedly, technological and non-technological support infrastructure is critical to the establishment of successful sustainability innovations, given that these provide direct access for the flow of resources between business, government, and the community.

Proposition 3: Digital social innovation (DSI) mechanisms are positively associated with sustainability performance within the focal organization.

Given the nascent stage of development within which DSI currently exists, the first step in the process of testing these proposed relationships is the development of a scale to measure the ‘black box’ of digital social innovation which connects responsibility climate with sustainability performance. The purpose of this paper therefore is to begin the process of developing a digital social innovation (DSI) instrument. The remainder of this paper reports ongoing investigation of a measurement scale for digital social innovation (DSI), preliminary results, and a discussion of next steps.

3 Methods

3.1 Pre-study and Scale Derivation of DSI

To understand the ‘black box’ construct of digital social innovation (DSI) in Fig. 1, the authors embarked on investigating the validity and reliability of measurement items associated with DSI. Following Churchill’s [29] recommended approach for scale development, the authors conducted on a literature search to specify the construct domain. It became increasingly evident that while social innovation literature was reasonably mature in its development [30], the digital social innovation concept is still developing. To generate an item pool for analysis, the authors searched for real-life examples and ‘critical incidents’ of DSI projects (e.g., NESTA, [31]; Stokes et al., [ibid.]). The authors then conducted a pre-study to better understand the nature of DSI practices. The pre-study would help to empirically clarify and detect the still-nascent concept of DSI. The group selected for the pre-study comprised tour operators. In addition to being accessible and available within resource constraints, prior research [32, 33] acknowledges service quality improvements by tour operator sectors as inherently innovative behaviors, given that services form a critical part of the tour operator’s offering. Further, tour operators were selected for three key reasons. First, tour operators have an intrinsic need to simultaneously engage both visitors to and residents of a host community in the provision of tour services which allows for examination within the

social sustainability performance pillar. Second, tour operators necessarily tap local culture to provide authentic visitor experiences which allows for examination within the cultural sustainability performance pillar. Third, tour operators exploit both the built and natural environments in the provision of tour services which allows for examination within the environmental sustainability and economic sustainability pillars.

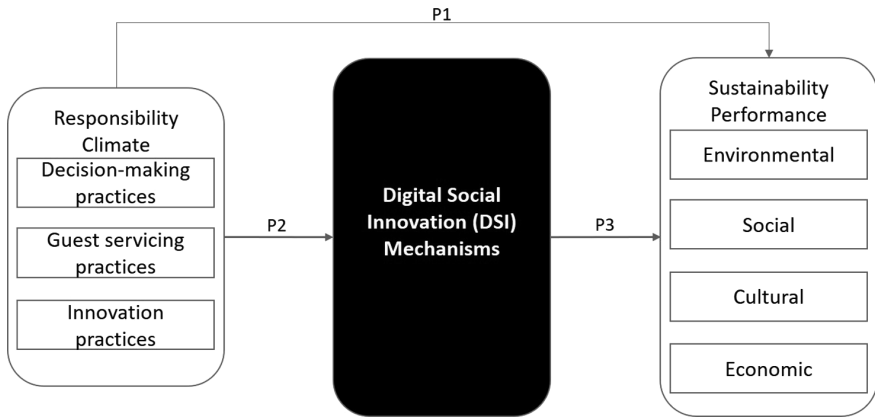


Fig. 1. Digital social innovation: A responsibility-sustainability framework

A total of six (6) interviews were conducted via telephone with owners/operators of community-based tour companies located across five Caribbean territories: Antigua, Barbados, Grenada, Jamaica, and St. Lucia. Interview length ranged from 45 to 75 min. Subjects were asked an initial screening question to gauge familiarity with DSI. Definitions were provided from the literature search, and the respondents asked to recall and share in-depth examples related to their business. A rigorous data coding and analysis process followed, using NVivo 12 software. Chunks of data were systematically coded and distilled into salient theoretical elements and related to the literature [34]. Table 1 shows a sample of the coding structure of the pre-study data. The results of the literature search, interviews, and coding processes informed the subsequent development of a set of 25 digital social innovation (DSI) items.

Table 1. Sample coding structure of pre-study data

Date element	DSI Mechanism
“We have a social conscience. When it comes to staff, we try to hire local people... We encourage visitors to eat, tour and shop, and experience local culture.” [Tour Operator, Grenada]	Society, culture, stakeholders
“We are really trying to establish credibility and legitimacy... [we have] a really good reputation on TripAdvisor.” [DIY Cooking Class, Antigua]	Reputation, infrastructure
“The new tour we opened last year was an abandoned garbage site... We hired a former university professor, who now conducts a historic walking tour and includes a mobile app.”[Tour Operator, Barbados]	Diversity, inclusion, technology

3.2 Scale Purification of Measurement Items

Following Churchill [ibid.], the 25-item DSI scale was developed and pre-tested among a group of undergraduate business students in May 2018. After further review, the list of 25 items was retained, corrected for grammatical flow, and distributed in August 2018 via an e-mail link from the principal researcher directly to tour operators. E-mail contacts were culled from a database of Caribbean-based tours, excursions, food and beverage establishments, and attractions operators. These operators are certified partners of Island Routes Caribbean Attractions, a portfolio of Sandals Resorts International, and attendees to a 2016 Island Routes Certified Partner symposium. From a sample of one hundred and one (101) potential respondents, thirty-four (34) responses were received. At the time of writing, the overall effective response rate was 15%.

4 Results

4.1 Scale Purification Results

Data analysis is currently in process. Preliminary analysis of the first wave of respondents is encouraging. Item analysis suggests that respondents are using the full range of responses on 23 of the 25 items (Table 2). As it relates to the five proposed DSI scales, preliminary analysis of internal consistence reliability reports coefficient alpha values of between 0.745 to 0.810.

5 Discussion

The goal of this research study is to understand the role of digital social innovation (DSI) in the relationship between responsibility climate and sustainability performance. This paper represents a preliminary step towards developing a measurement scale for DSI. The preliminary results presented here are encouraging to further data collection efforts; and suggest that digital social innovation could resemble a five-factor scale with dimensions supporting stakeholder engagement measures; social financing measures; society-related measures (marginally supported); diversity/inclusion measures; and support infrastructure measures. Stakeholder engagement and collaboration represents a key mechanism in collaborative innovation. By engaging external partners from business, government, and society through online and other forms of collaboration, the focal organization is able to create new products and services which are aligned to the needs of the needs of the local community while attracting visitors. Social financing DSI mechanisms are important to understanding the engine behind mobilizing new sustainable innovations. Public, private, and third sectors contribute capital, technological and non-technological resources, and volunteering to the development of sustainable outcomes. The civil society measures are being further analysed, based on preliminary results in Table 2. Diversity mechanisms ensure that different interests are represented across both process and outcome dimensions of sustainable innovations. This means that the socio-cultural needs of both host and visitor interests are met when new product and service innovations are being designed. Finally, technology support is

Table 2. Initial descriptive results of DSI measurement scale from EFA

Measurement Items	Min Max	Means (s.d.)
Stakeholder collaboration		
We engage in collaboration with civil society	1 5	3.89 (1.150)
We engage in collaboration with government	2 5	4.05 (0.911)
We engage in collaboration with the technology sector	2 5	3.89 (0.937)
We engage in online collaboration with private, public sectors	1 5	4.16 (1.068)
We participate in public events	2 5	4.26 (0.933)
Social funding availability		
Our business can easily access grant funding	1 5	2.72 (1.274)
Our business can easily access investment funding	1 5	3.00 (1.328)
Our business can easily access distribution channels	1 5	3.22 (1.003)
There is suitable funding for social innovation projects	1 5	3.29 (1.047)
Funding for new social projects is a problem for our business	2 5	3.29 (1.105)
Civil society/Civic engagement		
Our business can easily find volunteers for special projects	2 5	3.41 (1.121)
We have a positive attitude towards civil society	3 5	4.35 (0.702)
We promote social inclusion and civic togetherness	2 5	4.29 (0.849)
We do not consider engaging civil society our responsibility	2 5	3.06 (1.298)
We promote individual giving	1 5	4.24 (1.091)
Diversity and inclusion		
Our business promotes diversity and inclusion in civil society	1 5	4.29 (1.160)
We do not consider diversity and inclusion our responsibility	1 5	2.18 (1.510)
We always make innovation more diverse and inclusive	1 5	4.06 (1.144)
We always promote digital inclusion	3 5	4.06 (0.827)
Support infrastructure		
We have access to reliable broadband and mobile internet	1 5	3.94 (1.088)
There is open access to business and industry data	1 5	3.24 (1.033)
There is a presence of supportive government policy	1 5	3.29 (1.105)
Our business has access to socially focused business support	2 5	3.41 (1.064)
Our business has access to manufacturing and flexible spaces	2 5	3.29 (0.920)
It is easy to start a business here	1 5	3.12 (1.364)

critical for digital social innovations to thrive. These measures speak to the importance of creating innovation spaces for technology to be leveraged in the creation and implementation of new product and service innovations. The role of government in creating policy environments which support technological and social developments are arguably key mechanisms for sustainable performance.

To better support the reliability and validity of these initial results, additional data is being collected. This will be used to develop a final measurement scale for digital social innovation, and further the overall research objective: investigating the mediating role of digital social innovation within the 'responsibility-sustainability' propositional framework (Fig. 1).

6 Contribution and Next Steps

This study contributes the first steps towards developing a scale of measurement items for digital social innovation (DSI). To the authors' knowledge, no prior work has attempted to develop a scale for digital social innovation within the context of hospitality and tourism organizations. A second contribution that this study makes is to respond to calls within academia, policy, and industry for increased focus on both technological and non-technological innovation activities in business. Developing a measurement scale for DSI therefore provides an important opportunity for innovation research in hospitality and tourism business to encompass performance measures focused on social, cultural, and environmental solutions, instead of purely on financial and economic ones. A third contribution is that this study responds to calls for increased academic focus on corporate social responsibility (CSR) and sustainability among external stakeholders such as government and NGOs.

The results presented in this paper are preliminary. The work is representative of broader, ongoing research focused on the mediating role digital social innovation (DSI) mechanisms play in the relationship between responsibility climate and sustainable performance outcomes within hospitality and tourism businesses. It is expected that additional data collection will continue the testing and development of a measurement scale for DSI. Specifically, the authors' next steps include completion of the scale purification model and generation of additional data to assist with measuring reliability, criterion validity, and construct validity of the measurement scale for digital social innovation. A DSI instrument, once developed will be used to test the mediating role of DSI mechanisms in the responsibility-sustainability model proposed at the outset of this paper. Against this responsibility-sustainability framework, digital social innovation represents an important step towards using an emerging concept in business, innovation, technology, and society within hospitality and tourism scholarship.

Acknowledgements. The authors acknowledge, with appreciation, the role of Island Routes Caribbean Adventures/Sandals Resorts International, in supporting this research study.

References

1. Gaggioli A (2017) Digital social innovation. *Cyberpsychol Behav Soc Netw* 20(11):723–723
2. Garriga E, Melé D (2004) Corporate social responsibility theories: mapping the territory. *J Bus Ethics* 53(1–2):51–71
3. Donaldson T, Dunfee TW (1994) Toward a unified conception of business ethics: integrative social contracts theory. *Acad Manag Rev* 19(2):252–284
4. Moscardo G, Hughes K (2018) All aboard! Strategies for engaging guests in corporate responsibility programmes. *J Sustain Tourism*:1–16
5. Caruana R, Glozer S, Crane A, McCabe S (2014) Tourists' accounts of responsible tourism. *Ann Tour Res* 46:115–129
6. Font X, Lynes J (2018) Corporate social responsibility in tourism and hospitality. *J Sustain Innov* 26(7):1027–1042

7. McWilliams A, Siegel D (2001) Corporate social responsibility: a theory of the firm perspective. *Acad Manag Rev* 26(1):117–127
8. Dahlsrud A (2008) How corporate social responsibility is defined: an analysis of 37 definitions. *Corp Soc Responsib Environ Manag* 15(1):1–13
9. Pérez A, Martínez P, Del Bosque IR (2013) The development of a stakeholder-based scale for measuring corporate social responsibility in the banking industry. *Serv Bus* 7(3):459–481
10. Hallenga-Brink SC, Brezet JC (2005) The sustainable innovation design diamond for micro-sized enterprises in tourism. *J Clean Prod* 13(2):141–149
11. Buijtendijk H, Blom J, Vermeer J (2018) Eco-innovation for sustainable tourism transitions as a process of collaborative co-production: the case of a carbon management calculator for the Dutch travel industry. *J Sustain Tourism*:1–19
12. Cloutier LM, Arcand S, Lavolette EM, Renard L (2017) Collective economic conceptualization of strategic actions by québec cidemakers: a mixed methods-based approach. *J Wine Econ* 12(4):405–415
13. Windrum P, Scharfetter D, Rubalcaba L, Gallouj F, Toivonen M (2016) The co-creation of multi-agent social innovations: a bridge between service and social innovation research. *European J Innov Manag* 19(2):150–166
14. Horng JS, Hsu H, Tsai CY (2017) An assessment model of corporate social responsibility practice in the tourism industry. *J Sustain Tourism*:1–20
15. Eekels J, Roozenburg NF (1991) A methodological comparison of the structures of scientific research and engineering design: their similarities and differences. *Des Stud* 12(4):197–203
16. Rosenbloom RS, Marris R (1969) Social innovation in the city; New enterprises for community development. A Collection of Working Papers. Harvard University Program on Technology and Society
17. Drewe P, Klein JL, Hulsbergen E (eds) (2008) The challenge of social innovation in urban revitalization, vol. 6. Techné Press
18. Bailey DE, Leonardi PM, Barley SR (2012) The lure of the virtual. *Organ Sci* 23(5):1485–1504
19. Yoo Y, Boland RJ Jr, Lyytinen K, Majchrzak A (2012) Organizing for innovation in the digitized world. *Organ Sci* 23(5):1398–1408
20. Benkler Y (2006) The wealth of networks: how social production transforms markets and freedom. Yale University Press
21. Lessig L (2008) Remix: making art and commerce thrive in the hybrid economy. Penguin
22. Zittrain JL (2006) The generative internet. *Harv Law Review*, 1974–2040
23. Orlikowski WJ (2007) Sociomaterial practices: exploring technology at work. *Organ Stud* 28(9):1435–1448
24. Orlikowski WJ (2009) The sociomateriality of organisational life: considering technology in management research. *Camb J Econ* 34(1):125–141
25. Orlikowski WJ, Scott SV (2013) What happens when evaluation goes online? exploring apparatuses of valuation in the travel sector. *Organ Sci* 25(3):868–891
26. Stokes M, Baeck P, Baker T (2017) What next for digital social innovation. DSI4Europe report. Technical report
27. Alegre I, Berbegal-Mirabent J (2016) Social innovation success factors: hospitality and tourism social enterprises. *Int J Contemp Hosp Manag* 28(6):1155–1176
28. McPhee, C., Guimont, D, Lapointe, D. (2016). Editorial: Innovation in Tourism. *Technology Innovation Management Review*
29. Churchill GA Jr (1979) A paradigm for developing better measures of marketing constructs. *J Mark Research*:64–73
30. van der Have RP, Rubalcaba L (2016) Social innovation research: an emerging area of innovation studies? *Res Policy* 45(9):1923–1935

31. NESTA (2013). Digital social innovation. London, UK. Retrieved from <https://www.nesta.org.uk/project/digital-social-innovation/>
32. Mak BL (2011) ISO certification in the tour operator sector. *Int J Contemp Hosp Manag* 23 (1):115–130
33. Sheldon PJ (1986) The tour operator industry: an analysis. *Ann Tour Res* 13(3):349–365
34. Eisenhardt KM, Graebner ME (2007) Theory building from cases: opportunities and challenges. *Acad Manag J* 50(1):25–32



Double Gender Gap in Tourism High-Technology Organisations: Results and Corporate Actions

Cristina Figueroa-Domecq^{1(✉)}, Jesus Palomo²,
M^a Dolores Flecha-Barrio², and Mónica Segovia-Pérez²

¹ School of Hospitality and Tourism Management, University of Surrey,
Guildford, UK

c.figueroadomecq@surrey.ac.uk

² Business Dpt, Rey Juan Carlos University, Móstoles, Spain

{jesus.palomo, mariadolores.flecha, monica.segovia}
@urjc.es

Abstract. The actuality of the double gender gap, that confirms the underrepresentation in both decision-making and technological positions, has been hardly analysed in the tourism industry. Therefore, the aim of this paper is to identify women's position in top management positions in some of the most important tourism-high technological organisations and to evaluate these organisations' actions towards the improvement of women's participation. The analysis combines NASDAQ corporation data with content analysis on annual reports and corporate websites. Results confirm a low participation of women in NASDAQ tourism-technology board of director's corporations and companies increasing steps towards women incorporation in decision making positions. Results show that though there are important disparities among organisations, there is a direct relationship between the implementation of specific programs to increase women's participation in the organisation's decisions and the percentage of women on Board of Directors, the highest decision-making level.

Keywords: Women · Gender · Technology · Tourism
Double gender gap discrimination · Board of directors

1 Introduction

Although women are key decision-makers [1], gender balance is rarely reached in decision making positions, such as Board of Directors; at least it is absent in tourism organisation [2, 3] or in high-tech organisations [4]. When these two important global industries, Tourism and Technology, are combined from a gender perspective the Gender Double Gap can be identified and evaluated [5].

At a tourism level, this gap responds to a combination of factors. The framework "Gender as a Social Structure in the Hospitality Industry" [6] identifies several factors that cause discrimination among female executives in the tourism industry, can be classified in three different levels (individual, interactional and institutional), and a fourth, intersectional level. The application of these factors to the tourism industry

points out the influence of self-imposed barriers, gender roles, problems associated with work-life conciliation, and issues related to gendered organisations.

At a technological level, research [7] shows that although the gender gap in math course-taking and performance has narrowed in recent decades, females continue to be underrepresented in math-intensive fields of Science, Technology, Engineering, and Mathematics (STEM). This is the first step in reaching top management positions in this area, which certainly limits women's increasing participation on Board of Directors of Technological organisations.

The arguments to support balanced representation of women and men in decision-making positions are of several types and can be divided into social justice and business case arguments [8]. On one hand, the social justice argument is based on the fact that women and men each constitute approximately one half of the population, and approximately equally participate in the labour market; consequently, they should represent a proportional share of decision-making positions in the economy. On the other hand, the business case argument is based on studies that have proven the positive connection between the presence of women or diverse groups on company boards and the business results of these companies [9, 10]. Finally, women's participation in high-tech fields has implications both for individual companies and for the future of the industry, to avoid a projected shortage of talent, since attracting and retaining women is crucial for a continued growth [11]. Actually, 56% of women in the sector left over time, with quit rates more than double the rate for men, and most women with degrees in computer science end up working in other sectors [12].

As a result, the aim of this paper is to characterize women in top management positions in the most important tourism-high technological organisations, so as to evaluate the double gender gap and to compare it with organisations in other sectors. Also, the paper will evaluate these organisations specific actions towards women higher level of participation, within their Corporate Social Responsibility actions within the organisation.

The structure of the paper will be as follows. The literature review, concerning specifically the double gender gap, will be followed by the introduction of the methodology used, that will lead to the main results, ending up with the conclusions.

2 Literature Review

2.1 Double Gender Gap: Tourism and High Technology

One the major indices of inequality in female hiring and job status in industrialized countries is the gender wage gap [13]. Irrespective of the country selected and the variable used to measure remuneration, the findings show that men are paid higher salaries than women holding the same position [14]. In tourism, there are several studies that confirm this wage discrimination [14, 15] and in addition, women are also underrepresented in the type of tourist positions where remuneration is highest.

On the other hand, discrimination theories explain based segregation in two levels [16–18]: horizontal segregation (feminized or masculinized activities) and vertical segregation or women's scant presence in higher-ranking positions.

Technology is not neutral from a gender point of view. Computers are associated with masculine characteristics and women establish different relationships to men in relation to technology [19]. The impact of gender differences in technology is observed from two points of view. Firstly, regarding the use of technology [20, 21]; and, second, regarding the position of women as producers, employees and managers in the technology industry [21, 22].

A large number of variables are associated with the access and use of ICTs: socio-economic, demographic, educational and, of course, gender. These differences, in the case of gender, have made men become major users of the Internet, among other ICTs. The origin of this “gender gap” is attributed to the limitations of women’s access to technology and even to restricted access to decision-making positions related to telecommunications and ICTs [19].

For Faulker [23] from a theoretical point of view, there are two ways in which gender affects technology. First, it is the genre within technology; that is, the technological development of technology can take different paths, and the path they take will depend on social interactions and gender influences the latter. Consequently, there is what Turkle [24:41] calls computer reticence, wanting to stay away because the computer becomes a personal and cultural symbol of what a woman is not. Another way of looking at the influence of gender on technology and ICTs is through the positioning that women and men take when faced with the use of technology. In this case, women tend to underestimate their technical skills, which determines their personal interests, studies and career goals, far from the ICT sector. Even so, “gender gap” in the use of ICTs exists but evolves favourably [25].

2.2 Actions Towards Women’s Participation on Board of Directors

The incorporation of women into the tourism market is a transcendent fact, since their presence favour economic development of tourism and its sub-sectors, and for their role to build strong, stable and just societies [18]. Literature review shows the relevance of not only individual decision, but also environment [6], culture and heritage [26], but also organisational culture. According to Cook and Glass [27] diversity among decision makers, not firm performance, significantly increases women’s likelihood of being promoted to top leadership positions. Furthermore, the implementation of Corporate Responsibility Actions (CRS) become an important strategic action from corporations as a way to improve their image among different publics, since human values acts as a driver of CSR perceptions [28].

With respect to women at boards, at a policy level, literature faces three main challenges (data limitations, selection and causal inference) that makes recognising and dealing with these challenges basic for developing informed research and policy [29]. At a European Union level, countries have been negotiating the adoption of the directive that would interfere in this field since 2011 [9, 30]. The European Commission [31] has developed several actions in this area: Strategy for Equality between Women and Men, put the issue of women on boards high on the political agenda already in 2010. In 2011, it called for credible self-regulation by companies to ensure better gender balance in companies’ supervisory boards. One year later it became clear that progress was not visible, which is why in 2012 the Commission put forward a law,

a legislative initiative aiming to accelerate the progress towards a more balanced representation of women and men on boards of listed companies [30]. Consequently, from 2003 to 2010 the share of women on boards rose from 8.5% to 11.9%, an increase of 3.4% or an average of 0.5% per year. From October 2010 to April 2016, the share has risen 11.4% in five and a half years, an average of 2.1% per year, more than four times the previous rate of change. Nevertheless, the situation differs along European countries, with countries with a 37,1% representation of women on boards like France or a 5% in Malta [31].

By all means, better data and empirical techniques that address selection problems and other sources of endogeneity can help uncover the root causes of the problems and allow society to tackle them directly through policies that may or may not target boards of listed firms directly [29].

3 Methodology

The analysis will be based on a list of tourism-high technological organisations, selected from the NASDAQ-100 index, since this Index incorporates some of the most important High-Tech organisations, including those in the tourism industry. As main source of information, for the evaluation of this corporation's Board of Directors, their Annual Reports, other online public documents (Corporate Governance, Inclusion Reports, etc.), and their corporate website, have been used, so as to apply a content analysis.

Regarding the list of tourism-high technological organisations, the NASDAQ-100 represents the largest, based on market capitalization, non-financial companies listed on the NASDAQ Stock Market. In our study, the including criteria were: organisations directly related to tourism and those that had some tourism-related business among their main activities (labelled as miscellaneous in the study). The final list of companies included was:

- *Tourism*: American Airlines Group Inc.; Ctrip.Com International Ltd; Expedia Group Inc.; Marriott International Inc.; Norwegian Cruise Line Holdings Ltd; Booking Holdings Inc.; Wynn Resorts Ltd.
- *Miscellaneous*: Apple; Baidu; eBay; Facebook; Alphabet; JD.COM; Microsoft.

The information sources are Annual Reports, Corporate Public Documentation and Corporate Websites. Globally, narrative communication in annual reports is viewed as the crucial element in achieving quality of corporate reporting and regulators are focusing attention on the management discussion and analysis statement in the annual report [32]. Meanwhile, accounting researchers have increasingly focused their efforts on investigating disclosure, in particular the determinants of disclosure and the capital market consequences. Furthermore, early studies suggest that the collection of process or management data is usually easier both for the company to gather and for stakeholders to understand, while outcome data collection is complex and more open to interpretation [33].

Finally, regarding methodology, Content Analysis provides a meaningful method to evaluate these Annual Reports. Qualitative content analysis is one of the numerous

research methods using text data analysis [34:128]. Following these authors, qualitative content analysis is defined as a research method for the subjective interpretation of the content of text data through the systematic classification process of coding and identifying themes or patterns. Consequently, a basic element in the methodology is the identification of codes and the variables to be analysed.

Regarding the variables used, two variables were used in order to measure gender diversity on the Board [35]. First, identification of whether there is, at least, one woman on board (=1) or not (=0). Second, the percentage of women on the board, calculated as the number of female directors divided by the total number of directors. The next analysis, i.e., actions towards the improvement of women's participation in decision-making positions, has considered the actions communicated through annual reports, other corporate reports and website, with the main objective of offering transparency in this issue and increasing women's participation internally. Finally, through a statistical analysis, using R software, the relation between implementing programs to support women's participation in decision-making positions and the number of women on Board of Directors is evaluated.

4 Results

4.1 Women's Presence on Board of Directors

Among the 15 NASDAQ-100 organisations included in this study, there are important disparities, though they share a common result: in all of them women are under-represented in their Board of Directors (Table 1).

The company with the highest percentage of women on their Board is Wynn Resorts Ltd, with 3 out of 7 women in their board of directors (42.9%), a US organisation that operates luxury hotels and destination casino resorts. In the opposite situation, two Chinese organisations are found with no female participation at all: Baidu Inc. and JD.com, provider of Internet search services in China and internationally, and e-commerce and retail infrastructure services in China, respectively.

It is also important to highlight the relatively important participation of women (33.3%) on the Boards of eBay, Microsoft Corp, Norwegian Cruise Line Holdings Ltd and Marriot International Corp (27.3%). Finally, Fig. 1 shows an important difference between tourism and miscellaneous corporations. In tourism organisations, on average 25.9% of board members are women, while in the other technological organisations this percentage is reduced to a 16.2%; the main reason could be the higher standard deviation in miscellaneous corporations (13.7 versus 10.2) because the non-women data in two important organisations is included in this group (Baidu and JD.com).

4.2 The Implementation of a Gender Perspective in Corporate Management

According to the Content Analysis applied to the specified documentation, all evaluated organisations mention the relevance of the variable gender in their documents related to Code of Business Conduct and Ethics. Specifically, these organisations

Table 1. List of companies included in the study

	Sector	Snapshot (Bloomberg.com)	% Women Board Directors (Num. women/Num. members)	Chairman of the Board is a woman?
American Airlines Group Inc (USA)	Tourism. Passenger Transportation	American Airlines Group Inc. operates as a network air carrier. It provides scheduled air transportation services for passengers and cargo.	16.7% (2/12)	No
Apple Inc (USA)	Miscellaneous	Apple Inc. designs, manufactures, and markets mobile communication and media devices, personal computers, related software, services, accessories, networking solutions, and third-party digital content and applications.	14.3% (1/7)	Yes
Baidu Inc. (China)	Miscellaneous	Baidu, Inc. provides Internet search services in China and internationally.	0.0% (0/3)	No
Ctrip.Com International Ltd (China)	Tourism. Distribution	Ctrip.com International, Ltd. operates as a travel service provider for accommodation reservation, transportation ticketing, packaged tours, and corporate travel management in China.	14.3% (1/7)	No
EBay Inc. (USA)	Miscellaneous	EBay Inc. operates commerce platforms that connect various buyers and sellers worldwide.	33.3% (4/12)	Yes
Expedia Group Inc. (USA)	Tourism. Distribution	Expedia Group, Inc. operates as an online travel company in the United States and internationally. It operates through Core OTA, Trivago, HomeAway, and Egencia segments.	28.6% (4/14)	No
Facebook (USA)	Miscellaneous	Facebook, Inc. provides various products to connect and share through mobile devices, personal computers, and other surfaces.	14.3% (1/7)	No

(continued)

Table 1. (continued)

	Sector	Snapshot (Bloomberg.com)	% Women Board Directors (Num. women/Num. members)	Chairman of the Board is a woman?
Alphabet (USA)	Miscellaneous	Alphabet Inc. operates as a holding company that provides web-based search, advertisements, maps, software applications, mobile operating systems, consumer content, enterprise solutions, commerce, and hardware product	18.2% (2/11)	No
JD.com Inc. (China)	Miscellaneous	JD.com, Inc. operates as an e-commerce company and retail infrastructure service provider.	0.0% (3/3)	No
Marriott International Inc. (USA)	Tourism. Hospitality	Marriott International, Inc. operates, franchises, and licenses hotel, residential, and timeshare properties worldwide.	27.3% (3/11)	No
Microsoft Corp (USA)	Miscellaneous	Microsoft Corporation develops, licenses, and supports software products, services, and devices worldwide.	33.3% (4/12)	
Norwegian Cruise Line Holdings Ltd (USA)	Tourism. Passenger Transportation	Norwegian Cruise Line Holdings Ltd. operates as a cruise company. The company operates the Norwegian Cruise Line, Oceania Cruises, and Regent Seven Seas Cruises brands.	33.3% (3/9)	Yes
Booking Holdings Inc. (USA)	Tourism. Distribution	Booking Holdings Inc. provides online travel and related services internationally.	18.2% (2/11)	No
Wynn Resorts Ltd (USA)	Tourism. Hospitality	Wynn Resorts Limited owns and operates luxury hotels and destination casino resorts.	42.9% (3/7)	No

highlight the importance given to diversity of race, ethnicity, gender, age, education, cultural background, and professional experiences in evaluating candidates for all kinds of positions, especially Board of Directors. But this commitment is not always backed up by gender or diversity programs that convert intentions into realities.

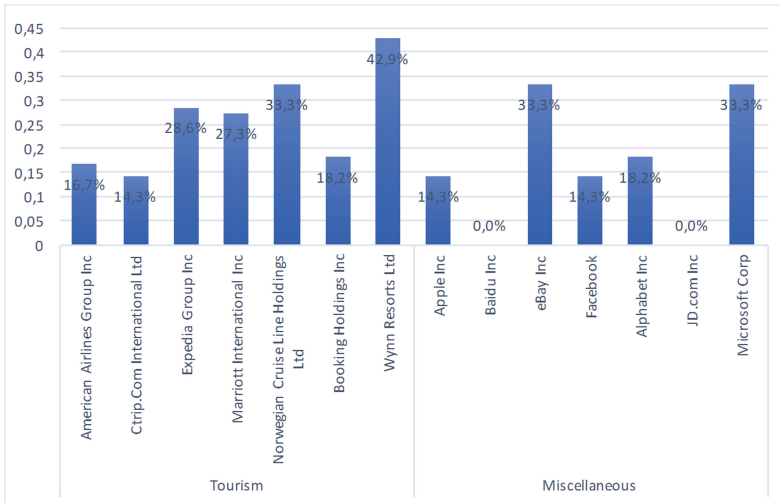


Fig. 1. Percentage of women on the Board of different companies (tourism and miscellaneous)

The information shared by these organisations in their Annual Reports, public documents and website varies importantly among these tourism versus high-tech companies. Table 2 shows how there are important differences between companies, whereas these differences are not so important between the two economic sectors evaluated (tourism and high-tech organisations): 75% of miscellaneous organisations provide information about the percentage of women appointed in each position (Transparency), as well developing specific programs to promote the increasing participation of women in all kinds of positions, including decision making positions; for Tourism organisations this percentage is 57%.

The companies’ comparison show how Chinese organisations do not provide information about their actions in this matter, as this study only evaluates the communication made. Also, two tourism organisations are not providing this information (Norwegian Cruise Line Holdings Ltd and Booking Holdings Inc.).

Finally, regarding the specific programs a few actions could be highlight. An important number (53%) of this corporations have specific diversity websites or reports (American Airlines, Expedia, Marriot, Wynn Resorts, Apple, eBay, Facebook and Alphabet). Also, transparency in the communication of Gender Pay Gap and specific recruitment processes, seem relevant.

According to the performed statistical analysis these specific programs seem to have a positive impact on the number of women on the boards of directors (see Fig. 2 and Table 3). Furthermore, when tested the model

$$Logit(prog) = \beta_0 + \beta_1 \cdot NumWomen \tag{1}$$

where *prog* is the probability of having a program that promotes the participation of women and *NumWomen* is the number of women on the Board, it has been found that the odds of having such program increases 2.7 times [with CI (1.03, 11.3)] with the

Table 2. Transparency and reporting gender perspective in management

	Gender information available in	Transparency and specific gender programs	Main programs to promote gender equality
AmericaAirlines Group	Corporate Responsibility Report 2017	Yes	International Female Development program to mentor 11 high-performing candidates in their journey toward roles in management.
Ctrip Internet	Annual report	No	No programs or actions identified in online public documentation.
Expedia Group	https://www.expediagroup.com/gender-balance/	Yes	Unconscious Bias training/Sponsorship and Mentorship Programs/Enhanced Parental Leave/Affinity and Diversity Groups/Women in the Workplace Study/Recruiting at Expedia/Flexible Work Scheduling.
Marriott International	https://www.marriott.com/diversity/diversity-and-inclusion.mi	Yes	Programs to promote Women's hotels ownership and relations with diverse suppliers including women.
Norweg.Cruise Line		No	No programs or actions identified in online public documentation
Booking		No	No programs or actions identified in online public documentation
Wynn Resorts Lt	2017 Sustainability Report	Yes	Culture and Community Department: supports diversity and inclusion, gender equality, fair treatment in the workplace; Women's Leadership Forum: close gender gap in management, provide career growth.
Apple	https://www.apple.com/diversity/	Yes	Pay Equity Actions & Suppliers expansion to include more businesses owned by women, minorities, Veterans, people with disabilities, and LGBTQ individual.
Baidu		No	No programs or actions identified in online public documentation
eBay	Diversity and Inclusion (D&I) Report. Website	Yes	University Recruiting: Recruiting Team under D&I Team. As a result, they experienced increasing racial, ethnic and gender diversity within summer intern class by 12% year; Board of Directors supports D&I strategy and two underrepresented minority women, were also appointed to the Board; External Partnerships.
Facebook	https://fb.com/diversityreport	Yes	Recruiting processes follow a gender inclusion perspective
Alphabet	https://diversity.google/annual-report/	Yes	Recruiting processes diverse sensitive & Supporting Supplier Diversity and creating inclusive products
JD.COM		No	No programs or actions identified in online public documentation
Microsoft	https://www.microsoft.com/en-us/diversity/	Yes	Group of Women at Microsoft volunteer in different actions related to education and mentoring

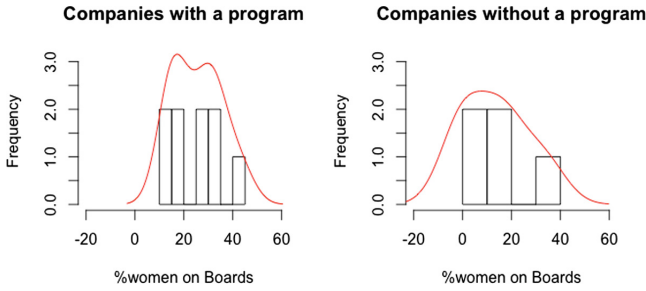


Fig. 2. Histograms companies versus gender programs

Table 3. Statistical results for companies with or without program

Companies without a program				Companies with a program			
	NumWomen	NumBoard	propBoard		NumWomen	NumBoard	propBoard
Min,	0.0	3.0	0.0	Min,	1.0	7.0	0.1429
Median	1.0	7.0	0.1429	Median	3.0	11.0	0.2727
Mean	1.2	6.6	0.1316	Mean	2.7	10.3	0.2542
Max.	3.0	11.0	0.3333	Max.	4.0	14.0	0.4286

Source: own source

number of women on the Board as compared to companies that do not include women. Similarly, when estimated the linear regression

$$NumWomen = \beta_0 + \beta_1 \cdot prog \tag{2}$$

Coefficients	Estimate	Std. Error	t value	Pr(> t)
β_0	1.2000	0.5598	2.144	0.0532
β_1	1.4667	0.6981	2.101	0.0575,

it can be concluded (p-value: 0.05746) that the program has had a positive impact on the number of women on the Boards.

5 Conclusions

Results show, as expected, a low participation of women in NASDAQ tourism-technology corporations. Nevertheless, there is an important disparity among organisations that show that a better future is possible. Also, the double gender gap in tourism-technological organisations does not seem to be more important than in other type of organisations. Finally, the most common actions taken to support women’s participation in the decision-making positions are specific diversity websites or reports, transparency in the communication of Gender Pay Gap and specific recruitment processes.

Future research could be aligned with in-depth analysis, through qualitative methodologies, regarding the operationalization of the gender gap. The inclusion of other indicators and sources of information could provide meaningful information in management decision making in the hospitality and tourism industry, in particular, in the IT related companies.

Acknowledgements. This project has received funding from the European Union's Horizon 2020 research and innovation program under grant agreement No WomENT DLV-792738.

References

1. Movono A, Dahles H (2017) Female empowerment and tourism: a focus on businesses in a Fijian village. *Asia Pac J Tour Res* 22(6):681–692. <https://doi.org/10.1080/10941665.2017.1308397>
2. Costa C, Bakas FE, Breda Z, Durao M, Carvalho I, Cacador S (2017) Gender, flexibility and the 'ideal tourism worker'. *Ann Tour Res* 64:64–75. <https://doi.org/10.1016/j.annals.2017.03.002>
3. Figueroa-Domecq C, Pritchard A, Segovia-Pérez M, Morgan N, Villacé-Molinero T (2015) Tourism gender research: a critical accounting. *Ann Tour Res* 52:87–103. <https://doi.org/10.1016/j.annals.2015.02.001>
4. Ashcraft C, McLain B, Eger E (2016) Women in tech: the facts. National Centre for Women & Technology (NCWIT). https://www.ncwit.org/sites/default/files/resources/ncwit_women-in-it_2016-full-report_final-web06012016.pdf
5. Segovia-Pérez M, Figueroa-Domecq C, Mercado-Idoeta, C (2012) Presente y futuro de la mujer directiva en puestos tecnológicos del sector turístico In A Guevara Plaza A Aguayo Maldonado, J L Caro Herrero A Cerezo Medina (eds) *Turitec 2012: IX Congreso Nacional Turismo y Tecnologías de la Información y las Comunicaciones*. Málaga: Universidad de Málaga 287–303
6. Segovia-Pérez M, Figueroa-Domecq C, Fuentes-Moraleda L, Muñoz-Mazón A (2018) Incorporating a gender approach in the hospitality industry: Female executives' perceptions. *Int J Hosp Manag* 76A:184–193. <https://doi.org/10.1016/j.ijhm.2018.05.008>
7. Wang MT, Degol JL (2017) Gender gap in science, technology, engineering, and mathematics (STEM): current knowledge, implications for practice, policy, and future directions. *Educ Psychol Rev* 29(1):119–140
8. Teigen M (2012) Gender quotas on corporate boards: on the diffusion of a distinct national policy reform. In: Engelstad F, Teigen M (eds) *Firms, boards and gender quotas: Comparative perspectives*. Comparative Social Research, vol 29. Emerald, Bingley, UK, pp 115–146
9. Robnik S (2015) Gender equality in decision-making positions—significance of transparent staffing. The Ministry of Labour Family Social Affairs and Equal Opportunities Ljubljana. http://www.mddsz.gov.si/fileadmin/mddsz.gov.si/pageuploads/dokumenti__pdf/enake_moznosti/VkljucivseRaziskavaTransparentnoKadrovanjeANG.pdf
10. Díaz-Fernández MC, González-Rodríguez MR, Simonetti B (2015) Top management team's intellectual capital and firm performance. *Eur Manag J* 33(5):322–331. <https://doi.org/10.1016/j.emj.2015.03.004>
11. Shields M (2015) Women's participation in Seattle's high-tech economy. https://smartech.gatech.edu/bitstream/handle/1853/53790/madelyn_shields_womens_participation_in_seattles_hightech_economy.pdf

12. Hewlett SA, Luce CB, Servon LJ, Sherbin L, Shiller P, Sosnovich E, Sumberg K (2008) The Athena factor: Reversing the brain drain in science, engineering, and technology. *Harv Bus Rev Res Rep* 10094:1–100
13. Doherty L, Guerrier Y, Jamieson S, Lashley C, Lockwood A (2001) Getting ahead: graduate careers in hospitality management. CHME/HEFCE, London
14. García-Pozo A, Campos-Soria JA, Sánchez-Ollero JL, Marchante-Lara M (2012) The regional wage gap in the Spanish hospitality sector based on a gender perspective. *Int J Hosp Manag* 31(1):266–275. <https://doi.org/10.1016/j.ijhm.2011.06.007>
15. Muñoz-Bullón F (2009) The gap between male and female pay in the Spanish tourism industry. *Tour Manag* 30(5):638–649. <https://doi.org/10.1016/j.tourman.2008.11.007>
16. Kinnaird V, Hall D (1996) Understanding tourism processes: a gender-aware framework. *Tour Manag* 17(2):95–102
17. Ramos V, Rey-Maqueira J, Tugores M (2002) Analisis empírico de discriminación por razón de género en una economía especializada en turismo. *Annals of Tourism Research en Español* 4(1):239–258
18. Sinclair MT (edit) (1997) *Gender, work and tourism*, Routledge, Nueva York
19. Kelan EK (2007) Tools and toys: communicating gendered positions towards technology. *Inf Commun Soc* 10(3): 358–383. <https://doi.org/10.1080/13691180701409960>, [https://doi.org/10.1016/0261-5177\(95\)00112-3](https://doi.org/10.1016/0261-5177(95)00112-3)
20. Soleymani S, Mosavi SY, Parirokh M (2012) The relationship between usage rate of information and communication technology by faculty members of Ferdowsi University of Mashhad, and motivation rate, updating of lesson content and attractiveness of classroom in academic year of 2008–2009. *Iran J Inf Process Manag* 27(3):737–758
21. Koppi T, Sheard J, Naghdy F, Edwards SL, Brookes W (2010) Towards a gender inclusive information and communications technology curriculum: a perspective from graduates in the workforce. *Comput Sci Educ* 20(4):265–282. <https://doi.org/10.1080/08993408.2010.527686>
22. Wickramasinghe V (2009) Predictors of job satisfaction among IT graduates in offshore outsourced IT firms. *Pers Rev* 38(4):413–431
23. Faulkner W (2001) The technology question in feminism: a view from feminist technology studies. *Women's Stud Int Forum* 24(1):79–95. [https://doi.org/10.1016/S0277-5395\(00\)00166-7](https://doi.org/10.1016/S0277-5395(00)00166-7)
24. Turkle S (2004) Computational reticence: Why women fear the intimate machine. In: *Technology and women's voices*. Routledge, pp 44–60
25. Fundación Telefónica (2017) *La sociedad de la información en España 2017*. https://www.fundaciontelefonica.com/artes_cultura/sociedad-de-la-informacion/sdie-2017/
26. Tajeddini K, Walle AH, Denisa M (2017) Enterprising women, tourism, and development: the case of Bali. *Int J Hosp Tour Adm* 18(2):195–218. <https://doi.org/10.1080/15256480.2016.1264906>
27. Cook A Glass, C (2014) Women and top leadership positions: towards an institutional analysis. *Gend Work Organ* 21(1):91–103. <https://doi.org/10.1111/gwao.12018>
28. González-Rodríguez MR, Díaz-Fernández MC, Simonetti B (2015) The social economic and environmental dimensions of corporate social responsibility: The role played by consumers and potential entrepreneurs. *Int Bus Rev* 24(5):836–848. <https://doi.org/10.1016/j.ibusrev.2015.03.002>
29. Adams RB (2016) Women on boards: the superheroes of tomorrow? *Leadersh Q* 27(3):371–386. <https://doi.org/10.1016/j.leaqua.2015.11.001>
30. Jourová V (2016) Gender balance on corporate boards: Europe is cracking the glass ceiling. Fact sheets European Commission. file:///Users/cfigueroa/Downloads/WomenonBoards.pdf
31. European Commission (2016) *Database on women and men in decision-making*

32. Beattie V, McInnes W, Fearnley S (2004) A methodology for analysing and evaluating narratives in annual reports: a comprehensive descriptive profile and metrics for disclosure quality attributes. *Account Forum* 28(3):205–236. <https://doi.org/10.1016/j.accfor.2004.07.001>
33. Bonilla-Priego MJ, Font X, Del Rosario Pacheco-Olivares M (2014) Corporate sustainability reporting index and baseline data for the cruise industry. *Tour Manag* 44:149–160. <https://doi.org/10.1016/j.tourman.2014.03.004>
34. Hsieh HF, Shannon SE (2005) Three approaches to qualitative content analysis. *Qual Health Res* 15(9):1277–1288. <https://doi.org/10.1177/1049732305276687>
35. Wallgren FM, Andersson P (2018) Board gender diversity and firm financial performance: a study of 100 companies listed on Nasdaq Stockholm. Master Thesis. <http://www.diva-portal.org/smash/get/diva2:1206669/FULLTEXT01.pdf>



Citizen Engagement and Entrepreneurship: Implications for Sustainable Tourism Development

Marianna Sigala¹ and Dandison Ukpabi²(✉)

¹ University of South Australia, Adelaide, SA, Australia
marianna.Sigala@unisa.edu.au

² University of Jyväskylä, Jyväskylä, Finland
dandison.c.ukpabi@jyu.fi

Abstract. Research has not investigated the use of competitions-hackathons as a citizen engagement tool to motivate and activate citizen's engagement in entrepreneurship driving sustainable tourism development. This paper fills in this gap by using the SHARE Challenge as a case study. SHARE is a competition-based crowdsourcing project launched by the Government of South Australia aiming to engage citizens in sharing economy entrepreneurial ventures. The competition received 88 eligible ideas from different stakeholders, and the study conducted a content analyses of these ideas for investigating the profile of the citizens and the type of the sharing economy ideas that were inspired by the SHARE. Tourism was found to be the sector attracting most of the submitted ideas for starting-up a sharing economy entrepreneurial venture aiming to make sustainable use of tourism resources. The findings provide evidence on how SHARE has 'educated', inspired, and activated the citizens to engage in sustainable entrepreneurship.

Keywords: Hackathons · Citizen engagement · Entrepreneurship
Sharing economy · Sustainable tourism development

1 Introduction

Citizen engagement has continued to gain traction in political and corporate circles. Government policies bothering on education, unemployment, marriage equality and structural projects have all properly been shaped through citizen engagement [1, 2]. Again, [2] report that citizen engagement has contributed significantly to the United States Environmental Protection Agency's robust framework in water management programmes in different neighbourhoods. Still within the United States, [3] report that citizens have developed a sense of ownership and the protection of natural resources (forest, land and water) around them through citizen engagement. Realising the importance of renewable energy to environmental sustainability, [4] argues that community collaborative movements focused on renewable energy have increased community-wide participation thus boosted cohesion and bonding within the community.

While the dominance of the traditional channels of citizen engagement limited citizen participation, emerging technologies have redefined citizen engagement with the availability of multi-faceted channels through which authorities can engage citizens. As a matter of fact, citizen engagement through hackathons have become commonplace in recent times. Hackathons are coding competitions involving programmers who develop mobile applications within specific time periods [5]. Open data are usually employed during hackathon events. Open data are information freely available for access [6]. Similarly, sharing economy, that is, “the peer-to-peer-based activity of obtaining, giving, or sharing the access to goods and services, coordinated through community-based online services” has successfully provided entrepreneurial opportunities to many people [7, p. 47]. Thus, the need to use hackathon events to develop programs that promote entrepreneurship and sustainable tourism development has become necessary. Though critics have highlighted that no effective, durable and impactful technology could be built within the limited time that hackathons are allocated [8], practitioners and academics have however continuously highlighted the need for hackathons as an opportunity for corporate bodies and governments to engage with the citizens to proffer social, economic and technological solutions [5, 9]. Interestingly, while numerous studies have investigated citizen engagement as a tool for fostering government-citizen relationships [10], academic literature is scarce that have examined the role of hackathons as a citizen engagement tool. Accordingly, this study has two objectives, that is, to examine the role of citizen engagement on instilling entrepreneurship and evaluate the influence of hackathon contexts as a citizen engagement tool in promoting sustainable tourism development.

To achieve the above objectives, a crowdsourcing competition project called SHARE Challenge was used as a case study. SHARE is a citizen engagement hackathon competition organised and managed by the Department of the Premier and Cabinet (DPC) of the State of South Australia (SA) in 2017 (<https://share.yoursay.sa.gov.au/>). The SHARE challenge invited citizens to submit entrepreneurial venture ideas for supporting sustainable tourism and economic development in South Australia. A promotion of the SHARE Challenge (through online and offline media and workshops) took place from April to May 2017, the submission deadline was on the 13 June 2018 and 88 eligible ideas were entered and evaluated for the citizen engagement competition. The top 10 ideas were offered the opportunity to participate in an incubation mentorship programme lasting for 3 months, at the end of which they had to pitch their final ideas. Finally, the top three best evaluated ideas at the pitch event were provided with prizes (cash rewards and participation in a mentorship educational program) for enabling and preparing the citizens to implement their ideas. The study analysed the 88 submitted ideas in relation to the profile of the citizens and the type of the entrepreneurial ideas with the aim to examine whether the competition managed to inspire and activate the citizen to engage in entrepreneurship contributing to sustainable development. Findings provide useful implications on policy makers and professionals on how to best design hackathons to instil citizen engagement and promote sustainable tourism development.

2 Literature Review on Citizen Engagement

Radtko [4] opine that citizen engagement presents the opportunity to those outside the precincts of power to give a voice in the management of the social system. Thus, [11, p. 494] define citizen engagement “as the active participation of citizens, in partnership with government, in decision and policy making processes”. To this end, citizen participation imbues a sense of community identification which leads to collaborative action to influence positive outcomes. Interestingly, the diffusion of information and communication technology (ICT) has opened up multiple channels of citizen engagement leading to the emergence of e-democracy. Lee et al. [12] posit that e-democracy entails citizens’ access to ICT to enhance their participation in the decision-making process. To this end, some scholars have pointed out that e-democracy enhances citizen engagement, for instance more integration and collaboration particularly to those who by time and circumstances were unable to participate in government programmes [13–15].

2.1 Citizen Engagement and Sustainable Tourism Development

While destinations compete to attract tourists, there is usually a pressure exerted on both the host destination and natural resources when aggregate number of visitors increase. These usually results to social and environmental challenges [16]. Accordingly, there has been growing practitioner and academic attention in sustainable tourism [17]. Defined as tourism that enhances “the quality of life of the host community, provides a high quality of experience for the visitors and maintains the quality of the environment on which both the host community and the visitor depend” [18, p. 11], sustainable tourism is hinged on a tripod: preservation of the natural environment; high quality of experience for the tourist and a positive impact on the host community [19]. Okazaki [20] advocated the theory of citizen participation and power redistribution as a form of advancing sustainable tourism. Building on the work of [21], the study contends that citizen participation evolves from three main levels: non-participation (manipulation and therapy); degrees of tokenism (informing, consulting and placating), and degrees of citizen power (partnership, delegated power and citizen control). This theory has many implications for sustainable tourism planning and development. For instance, in the first level, while ‘manipulation’ represents policy makers’ lack of understanding of citizen engagement, ‘therapy’ entails the use of power to adjust local citizen’s views and opinions through the use of force. In the second level, while ‘informing’ encompass a gradual shifting from the use of brute force to a civilized practice of informing citizens of their rights and responsibilities, ‘consulting’ represents efforts to convince residents to express their opinions and ‘placating’ embodies a gradual increase in public influence. Finally, in the third level, first element ‘partnership’ represents negotiation between citizens and power holders, an evolving form of power redistribution. In ‘delegated power’, the citizens achieve dominant power in decision making while citizens assume the power of decision and policy making in ‘citizen control’. These steps show that citizen engagement for sustainable tourism development evolves through a well-planned and sustained process. To this

end, policy makers should put in place measures aimed at getting and harnessing citizens' inputs for critical decisions relating to sustainable tourism development.

2.2 The Use of Hackathons for Sustainable Tourism Development

Recently, a stream of literature has emerged seeking to align citizen engagement with the dynamism in the information technology [10, 22, 23] whereby citizens develop technological solutions to destination challenges. Consistent with the argument that governments do not have all the solutions to city challenges [23] and that inputs of citizens are fundamental to solving those problems, there is therefore a growing movement of using open data to provide technology solutions through innovation competitions [2]. Open data are information that governments and municipalities freely make available for access to the public [23]. Everyday use of technological devices generates a huge quantity of urban open data available at government's disposal. Official statistics, sensor-based data, and user- or company-generated content constitutes the three main sources of open government data [23]. In their raw form, this information cannot be used to solve any problem. Open innovation contests usually take the form of hackathons where governments involve citizens to develop mobile applications that create economic and social value for the city dwellers. Hackathons are 'marathon coding competitions' involving teams of computer programmers brought together to develop prototypes of mobile applications under certain conditions [5]. Hackathons take between 24 and 48 h and sometimes, even more and ends with a pitch where prizes are awarded by the selection panel to the team adjudged to have performed better [22]. Hackathons have been predominantly adopted by corporate institutions for product and service innovation. According to [5], big and leading technology giants like Apple, Android, Nokia, AT&T, Microsoft and Unilever have all benefitted from the knowledge-pull created through hackathons. Interestingly, advances in programming has demystified the coding process, thus, hackathons are no longer exclusively for tech-savvy individuals [5]. It is therefore imperative that destination managers and local authorities must continuously find ways to implement sustainable tourism development policies through the use of existing data on the platform of hackathons.

3 Methodology

The study aimed to examine the impact of SHARE in instilling citizen engagement in sustainable tourism development. To that end, the study analysed the ideas submitted to the SHARE Challenge by doing a content analysis of the submitted projects. The SHARE Challenge attracted 88 entrepreneurial ideas adopting the principles of the sharing economy, and the study analysed all of them. The Department of the Premier and Cabinet (DPC) provided access to the submission files, and the submitted ideas were analysed in relation to the profile of the citizens submitting their idea and the type of the sharing economy project that they were proposing in terms of: the resources to be 'shared'; the sector being affected; the type of social problem being addressed and the value being created. The ideas were also analysed in relation to the economic

empowerment (compensation/fee) that they could provide to two types of stakeholders: (a) the peer-to-peer platform being used for enabling the sharing of resources; and (b) the actors using the platform for sharing resources. The purpose of the content analyses of the submitted ideas was to investigate how the ideas crowdsourced through the SHARE Challenge inspired and activated citizens to get engaged with tourism entrepreneurship contributing to sustainable tourism. The findings from these 88 ideas and their implications are discussed in the following sections.

4 Presentation and Discussion of the Findings

The results of the submitted ideas for the SHARE challenge are presented below. Ideas were submitted by private individuals and corporate organisations. Similarly, ideas covered a wide range of areas including spaces, assets and various types of resources that could be utilised to generate revenue.

4.1 Finding Related to the Profile and Type of Stakeholders Submitting Ideas

As concerns the type and location of the actors submitting ideas to the SHARE Challenge, results confirm the reach and impact on a diversified type of actors. Ideas were submitted by a somewhat balanced percentage between individuals (48.9%) and organisations (51.1%), although the number of ideas coming from for-profit organisations was almost double the number of ideas submitted from non-for-profit organisations (34.1% and 17.0%) (Table 1). These findings confirm research and anecdotal evidence that the collaborative economy is applicable and it does provide an entrepreneurial opportunity to any type of stakeholder. Thus, it is very positive and important that the SHARE Challenge was attractive and provided an economic empowerment opportunity to a wide citizenry base, and specifically to individuals in SA who are increasingly facing problems of under- or un-employment.

Table 1. Actors submitting ideas

Participant	No. of ideas	% of ideas
Non-for-profit organisation	15	17.0%
For profit organisation	30	34.1%
Individual	43	48.9%
Total	88	100%

Findings also show that the greatest percentage of ideas (83%) were submitted by actors located in SA, with the remaining of the ideas (17%) submitted across all states of Australia apart North Territory and Tasmania. NSW and Victoria were the states from where a significant greater number of ideas were submitted from, but this is not surprising given the greater population living in these states but also the greater economic and entrepreneurial activity taking place in these states [24]. These findings are

important because they show that the SHARE Challenge has managed to achieve its objectives in terms of using the competition challenge and the affordances of the collaborative economy to boost entrepreneurial activity in SA and make the SA a test bed for new entrepreneurial ventures by primarily empowering its local citizenry but also by attracting ideas from other states. In addition, the fact that 42% of the submitted ideas were also found to be able to have an impact not only in SA but also in other states and countries, further reinforces the conclusion that SHARE has achieved its goal to make SA the test bed of new entrepreneurial ventures and sustainable tourism development practices.

4.2 Findings Related to the Sharing Economy Entrepreneurial Ideas

As concerns the resource being affected by the entrepreneurial ideas, the findings revealed that there was an almost balanced interest in (re)-using tangible and intangible resources, since 41% of the ideas (36 ideas) represented tangible resources and the remaining 59% (52 ideas) represented intangible resources. However, a more detailed analysis investigating the specific nature of the resources that the ideas proposed to affect (Table 2) revealed that the greatest percentage of ideas focused on (re)-using physical assets (29.5%), space (27.3%) and human resources (12.5% intellectual human resources and 10.2% physical human resources). A substantial lower percentage of ideas focused on (re)-using waste (6.8%), data (5.7%), natural resources (4.5%) and cultural/heritage resources (3.4%).

Table 2. Type of resource to be (re)-used

Type of resource	No of ideas	% of ideas
Cultural/heritage resources	3	3.4%
Physical/natural resources	4	4.5%
Data/information	5	5.7%
Waste	6	6.8%
Physical human resources (e.g. physical human activity)	9	10.2%
Intellectual human resources (e.g. know how)	11	12.5%
Space	24	27.3%
Physical assets (e.g. tools, equipment, cars)	26	29.5%
Total	88	100%

These findings may not be surprising when considering that the under-utilised space is one of the major ‘waste’ and issues frequently identified by several stakeholders in SA. In addition, the increased interest on space, cars and human resources can also be attributed to the great controversial public debates as well as international but also Australian presence and appeal of the marketplaces of ‘Airbnb’, ‘Uber’ and ‘Airtasker’. These powerful brands of peer-to-peer marketplace have definitely created an increased citizenship awareness and understanding on how to utilise and monetise ‘unused’ space, cars and human resources for generating economic, social and

environmental values. Finally, the fact that the majority of the submitted ideas to SHARE showed a great interest and focus to apply the principles of the collaborative economy in order to utilise and monetize the potential of space and human resources in SA is another ‘success’ for the SHARE Challenge. Subsequently, the economic empowerment and job opportunities provided to under-employed and/or un-employed to provide their physical and intellectual resources through peer-to-peer platforms is critically important to the SA economy and its drive towards sustainable tourism development.

On the other hand, the findings also revealed a myopia of citizenry and a ‘lost’ opportunity for SHARE Challenge to attract ideas and boost entrepreneurship by utilising other important resources such as, data/information. The use of data/information in the collaborative economy has become very important specifically due to the availability of numerous open public data, the resources invested by public bodies to provide it, and the need to use them for increasing transparency, supporting democracy and decision-making. Trends in big data (the huge amount of available data online) also shows a lost opportunity but also lack of awareness of citizenry about the potential to use data/information for developing entrepreneurial ventures and generating value. In addition, the use of the principles of the collaborative economy for (re)-utilising natural and cultural resources can ensure the sustainable utilisation and development of these resources by: generating economic value for maintaining and protecting these resources; and avoiding the over-commercialisation of the resources by finding a good balance between the achievement of economic, socio-cultural and environmental value.

Findings related to the impact of the ideas submitted provide further evidence about the accomplishment of the objectives of the SHARE Challenge. The ideas were found to solve a great variety of social problems (Table 3), but with a great emphasis on underutilised assets/wastage and unemployment. This is not surprising given the fact that the greatest majority of ideas were also found to focus on (re)-utilising space, assets and human resources. The great interest generated by SHARE on addressing issues of unemployment and wastage/underutilised resources is very positive to SA, as these currently represent to current but also increasing worries in the state. Crime is not a major concern in SA, so, it is not surprising as well as worrying that only a small number of ideas were attracted to solve this issue.

Table 3. Type of social problem being addressed

Social problem	Number	Percentage
Crime	2	2.3%
Old-age related	7	8.0%
Unemployment	19	21.6%
Underutilized assets/wastage	55	62.5%
Total	88	100%

However, ideas aiming to solve the social issues relating to ageing are really too few, and this actually represents a lost opportunity for the SHARE Challenge since ageing and its subsequent social issues and problems that can create are a major concern for the state. Thus, there are plenty of opportunities in this space to further exploit the affordances of the collaborative economy to address such issues by developing a more customised and dedicated project in this context in the near future. Another interesting and supportive finding (in relation to the impact of the SHARE Challenge to raise and instil entrepreneurial activity within industries being important and appropriate to SA) is the fact that a substantial percentage of ideas (but maybe not enough) relate to two critically important but also inter-related industries, i.e. tourism and agriculture (Table 4).

Table 4. Type of industry

Industry	Number	Percentage
Sports/recreation	1	1.1%
Power and energy	1	1.1%
Banking/finance	2	2.3%
Communication/telecommunication	3	3.4%
Health	6	6.8%
Transportation	8	9.1%
Education	8	9.1%
Real estate	9	10.2%
Tourism	10	11.4%
Agriculture	14	15.9%
Homecare/households	26	29.5%
Total	88	100%

Tourism represents an important and competitive industry for SA attracting foreign visitors and income that in turn generate numerous jobs; SA is also known for its sustainable and high quality agricultural products, which are heavily related and contributed to the development of world-wide famous tourism products in SA (i.e. (luxury) wine tourism, (organic/sustainable) food tourism and cuisine, agro-tourism, nature-based tourism). Because of these but also coupled with the high affordances and appropriateness of the collaborative economy to boost sustainable tourism development (i.e. the Airbnb and Uber phenomenon), it is highly recommended that future citizen engagement projects should aim to instil and boost entrepreneurial activity and opportunities within these two important but also interrelated industries. The synergies and multiplier development effects by combining tourism and agriculture can only be too important and beneficial to SA economy and communities, e.g. allow locals to remain in rural areas with an economic activity instead of immigrating to city centre to get a job.

Findings show that 43.2% of the ideas provide a compensation/fee to the owner of the marketplace, and more than half of the ideas (55.7%) allow for a compensation/fee

for the stakeholder using the marketplace to share its resource. In other words, either way, all ideas economically empower at least one or frequently both stakeholders. Findings also show that the entrepreneurial ideas empower and provide a solution to a great variety of ‘disadvantaged citizens’ like students, retired, parents, young, unemployed, homeless, communities/groups. These are referred to as ‘disadvantaged citizens’ based on the fact that they cannot easily start up an entrepreneurial venture due to lack of time, expertise, capital and know how. The purpose of the SHARE Challenge was to give the opportunity and resources to such citizen to engage in entrepreneurship. These findings also provide additional support about the socio-economic impact that the SHARE Challenge has managed to generate in specific groups of citizens requiring special attention and support.

5 Conclusions and Implications

The objective of this study was to examine the role of competitions in motivating citizen engagement in sustainable (tourism) development and entrepreneurship. The case of the SHARE Challenge (a sharing economy competition initiated by the government of South Australia) was used as a case study. Findings about the ownership and control of the resources being affected by the ideas also revealed some interesting findings, but also confirmed some of the above conclusions. A substantial higher percentage of ideas aimed to (re)-utilise privately owned resources than publicly owned resources. In addition, findings revealed that the greatest percentage of ideas focused on (re)-utilising resources controlled by citizens. This is not surprising given the previously identified emphasis on human resources and very low focus on public resources (e.g. natural, cultural and open public data). However, findings also show that there is a good balance of ideas releasing resources controlled by both citizens’ and non-citizens with the latter actors representing a great and balanced diversity of various public, community/social and non-for-profit enterprises.

Indeed, the findings reveal that the submitted ideas propose to release resources controlled by an almost balanced proportion of three different stakeholders namely for-profit enterprises, social/community enterprises and government agents. Thus, although the ideas show a substantial over-emphasis on privately owned over publicly owned resources, on the other hand, the ideas represent a balanced capacity to release resources (for generating socio-economic value) that are controlled by a great variety of social actors coming from both the private and public economic sphere. More detailed findings providing the percentages of ideas based on the type of resources and the social actors controlling the resources also reflect that the SHARE competition attracted a great diversity of ideas spread across various types of resources controlled by various social actors. In this vein, the SHARE Challenge has been successful in inspiring entrepreneurial interest in line with the principles of the collaborative economy in order to release a great type of resources from the control of a diversified pool of social actors.

Though this study is descriptive, it however opens up the following critical insights, which can be leveraged by destination marketing organisations and local authorities to incorporate citizen engagement in their strategic efforts to implement sustainable tourism development policies. Accordingly, three key lessons are derived on how citizen engagement motivates entrepreneurship and sustainable tourism development. First, locals need to be carried along in designing and delivering social services. As posited by [23], government does not have all the solutions to city challenges, thus the contributions of citizens are very fundamental as they have more information at their disposal that can provide solutions to social problems. The engagement of citizens in competitive contests like the SHARE Challenge can unlock ideas which can trigger various entrepreneurial ventures. Second, while governments at all levels including international organisations are drafting different policies and channelling resources to mitigate the effects of human activities on the environment with incommensurate results [25], it is important for governments to begin to focus more on citizen engagement as a veritable means of developing sustainable use of resources. As evidenced from the results, the management of underutilized assets/wastage accounted for the highest percentage of the social problems the identified ideas seek to solve. To this end, utilizing citizen engagement could engender bottom-up approaches to sustainable tourism development [26, 27]. Finally, local authorities and destination management organisations should, as a matter of policy, incorporate citizen participation in driving sustainable tourism development. As argued by [20] when policy planners incorporate locals as critical stakeholders in driving policies, the benefits are often more than when policies are only top-down.

One major limitation of the study is that it did not examine the consequences of the ideas in terms of triggering practical entrepreneurial ventures. Thus, it is proposed that from a developing country perspective, how can the government through citizen engagement motivate citizens to provide solutions to critical social ills such as insecurity, hunger and crime? Furthermore, countries in Europe and the United States have been battling refugee crises for about a decade now. These refugees mainly migrate from Africa and Asia to seek for a better life elsewhere. However, some studies have pointed out that these countries have sufficient natural and human resources to economically transform these countries [28]. From a leadership point of view, further studies can explore how citizen engagement can enhance sustainable tourism development within the developing country context and how such can mitigate migration to developed economies.

References

1. Kraft ME, Clary BB (1991) Citizen participation and the NIMBY syndrome: public response to radioactive waste disposal. *West Polit Q* 44(2):299–328
2. Wagenet LP, Pfeffer MJ (2007) Organizing citizen engagement for democratic environmental planning. *Soc Nat Resour* 20(9):801–813
3. Carr DS, Halvorsen K (2001) An evaluation of three democratic, community-based approaches to citizen participation: surveys, conversations with community groups, and community dinners. *Soc Nat Resour* 14(2):107–126

4. Radtke J (2014) A closer look inside collaborative action: civic engagement and participation in community energy initiatives. *People Place Policy Online* 8(3)
5. Leckart C (2012) The hackathon is on: pitching and programming the next killer app. https://www.wired.com/2012/02/ff_hackathons/. Accessed 29 Oct 2017
6. Hartmann S, Mainka A, Stock WG (2016) Opportunities and challenges for civic engagement: a global investigation of innovation competitions. *Int J Knowl Soc Res (IJKSR)* 7(3):1–15
7. Hamari J, Sjöklint M, Ukkonen A (2016) The sharing economy: why people participate in collaborative consumption. *J Assoc Inf Sci Technol* 67(9):2047–2059
8. Wishnie J (2014) Why hackathons suck (and don't have to). <https://www.thoughtworks.com/insights/blog/why-hackathons-suck>. Accessed 31 Oct 2014
9. Briscoe G (2014) Digital innovation: the hackathon phenomenon
10. Desouza KC, Bhagwatwar A (2012) Citizen apps to solve complex urban problems. *J Urban Technol* 19(3):107–136
11. Olphert W, Damodaran L (2007) Citizen participation and engagement in the design of e-government services: the missing link in effective ICT design and delivery. *J Assoc Inf Syst* 8(9):27
12. Lee CP, Chang K, Berry FS (2011) Testing the development and diffusion of e-government and e-democracy: a global perspective. *Public Adm. Rev.* 71(3):444–454
13. Macintosh A (2008) E-democracy and e-participation research in Europe. In: *Digital government*. Springer, Boston, MA, pp 85–102
14. Chun S, Shulman S, Sandoval R, Hovy E (2010) Government 2.0: making connections between citizens, data and government. *Inf Polity* 15(1, 2): 1–9
15. Linders D (2012) From e-government to we-government: defining a typology for citizen coproduction in the age of social media. *Government Inf Q* 29(4):446–454
16. Alexis P (2017) Over-tourism and anti-tourist sentiment: an exploratory analysis and discussion. *Ovidius Univ Ann Econ Sci Ser* 17(2):288–293
17. Lee TH (2013) Influence analysis of community resident support for sustainable tourism development. *Tour. Manag.* 34:37–46
18. McIntyre G (1993) *Sustainable tourism development: guide for local planners*. World Tourism Organization, Madrid
19. Liu Z (2003) Sustainable tourism development: a critique. *J Sustain Tour* 11(6):459–475
20. Okazaki E (2008) A community-based tourism model: Its conception and use. *J Sustain Tour* 16(5):511–529
21. Arnstein SR (1969) A ladder of citizen participation. *J Am Inst Planners* 35(4):216–224
22. Richard GT, Kafai YB, Adleberg B, Telhan O (2015) StitchFest: diversifying a college hackathon to broaden participation and perceptions in computing. In: *Proceedings of the 46th ACM technical symposium on computer science education*. ACM, pp 114–119
23. Hartmann S, Mainka A, Stock WG (2016) Opportunities and challenges for civic engagement: a global investigation of innovation competitions. *Int J Knowl Soc Res (IJKSR)* 7(3):1–15
24. Stimson R, Baum S, Mullins P, O'Connor K (2001) Australia's regional cities and towns: modelling community opportunity and vulnerability. *Australas J Regional Stud* 7(1):23.s
25. Burby R, Dixon J, Ericksen N, Handmer J, May P, Michaels S, Smith DI (2013) *Environmental management and governance: intergovernmental approaches to hazards and sustainability*. Routledge

26. Byrd ET (2007) Stakeholders in sustainable tourism development and their roles: applying stakeholder theory to sustainable tourism development. *Tour Rev* 62(2):6–13
27. Koontz TM, Newig J (2014) From planning to implementation: top-down and bottom-up approaches for collaborative watershed management. *Policy Stud J* 42(3):416–442
28. Chok S, Macbeth J, Warren C (2007) Tourism as a tool for poverty alleviation: a critical analysis of ‘pro-poor tourism’ and implications for sustainability. *Curr Issues Tour* 10(2–3):144–165

Smartphone Usage and Tourism Applications



Understanding Key Motivations for Using a Hotel Gamified Application

Demos Parapanos^(✉) and Elina (Eleni) Michopoulou

Centre for Contemporary Hospitality and Tourism, University of Derby, Derby, UK

D.parapanosl@unimail.derby.ac.uk,
E.michopoulou@derby.ac.uk

Abstract. While hospitality has been one of the industries that have been keen to adopt and use various technologies, the proliferation of gamification application is still to materialise. It is therefore very interesting to investigate the potential benefits of gamified applications for both demand and supply in the area of the hospitality industry by identifying the motives of individuals' when they use a hotel-gamified application. Since fun has become the requirement to ensure continuous demands for many products or services, companies and organizations feel the need to involve fun in their offerings to secure continuity in consumption and use. Hence, this study aims to understand the meaning of fun for individuals when they will use a hotel-gamified application. Visual material was prepared so the interviewees would have an idea of how a hotel-gamified application would look if it were in existence today based on the current definitions of gamification.

Keywords: Gamification · Fun · Gamified mobile applications
Consumer behaviour

1 Introduction

Gamification is a major trend for the coming years in tourism, which will appeal to consumers across all ages and demographics [1]. Daisyme, [2] suggests that gamification is the next big thing in marketing; by combining the increasing adoption of video games across society and the influence they have in shaping everyday life and interactions, it's recognition that they can produce a desirable experience and motivate users to remain engaged in an activity. In order to highlight the importance of games and pleasure as a new marketing strategy, Zicherman and Linder [3], argued that games are about pleasure and pleasure is the new marketing (an extreme dimension of marketing). Hence, because digital games are fun, engaging, and popular, many organizations, including schools, military, units, companies and health-care organizations, are using games to train individuals, engage online customers and connect a global workforce [4, 5]. Whilst games can be considered unproductive, with no valuable outcomes, gamification can engage users in solving real-world problems, entail value-adding activities and outcomes, and be more than just a waste of time [6].

Researchers in the tourism industry argue that the tourism industry is becoming more and more competitive and surviving as well as marketing a destination has become a challenge, so in order to gain a competitive advantage, the use of modern technology is crucial for many destination-marketing organizations [7]. Gamification can be applied in technology-mediated and non-technology-mediated contexts [8]. Within technology-mediated contexts, gamification is more applicable due to the favourable environment that such context offers [9]. Recent evolutions indicate that mobile devices are becoming travel buddies and their use is profoundly influencing the different phases of a travellers' journey [10]. Hence, it could be assumed, that a mobile hotel gamified application is now easier than ever to develop and succeed.

The phenomenon of gamification has been applied with several objectives, ranging from increasing brand awareness to encouraging consumer engagement [11]. Even though, tourism industry has already used game element [11], limited research has been focused on the individuals' motives to use them. Hence, this study aims to identify individuals' motives when they use a gamified application with significant attention to the element of fun as a major motive to do so. As a relatively new phenomenon in the industry, factors affecting its usage behaviour remain to be studied. Fun as a perception of experience from the users and consumers' point of view may be particularly instrumental in the consumption of products or services [12]. These outcomes could offer several advantages to hotels by providing relationship marketing that hopefully will increase revenue and strengthen customer loyalty.

2 Theoretical Background

The actual term of gamification first appeared in 2008 [13, 14] and has gain popularity since 2010 [14, 15]. The most popular definition of gamification is the use of game design elements in a non-game context [14, 16, 17]. Gamification has been described as the use of game-based mechanics aesthetics and game thinking to engage people, promote learning, motivate action and solve problem [14]. Also as the use of game design mechanics to influence people out of a game context [18]. Even though, gamification has been applied in several contexts [11], this study focuses on consumers' behaviour to use a gamified application, in hospitality industry.

To explain factors that influence intention to use a particular technology within tourism and hospitality, many studies have used Technology Acceptance Model (TAM) relevant models (i.e. for use of websites [19, 20], user generated content (UGC) [21], hotel self-service kiosks [22] and mobile applications (m-apps) [23]). Hence, a TAM based approach would be appropriate to examine factors that would influence the acceptance of hotel-gamified application as a new technology. However, while TAM based models have been used in tourism and hospitality contexts in order to predict behaviour towards technology, they have yet to be applied on gamified applications context.

Effective gamification is dependent on internal or external motivation [24]. Gamification is the application of gaming metaphors to real life tasks to influence behaviour, improve motivation and enhance engagement [25]. Similarly, modern video games are using sophisticated psychology and neurochemistry to determine what motivates

players and keeps them coming back for more [24]. In a recent blog post, Michael Wu, Ph.D., Principal Scientist of Analytics at Lithium, discusses the science and psychology behind gamification. The goal of game dynamics, according to Dr. Wu, is to drive a user-desired behaviour predictably [26]. Hence, necessary is to understand how humans behave in order to understand game dynamics [26]. To highlight the importance of individuals, Killian [27], argues that even though it is within human nature to like games, not everyone likes the same kind or style of games. Indeed, according to Marczewski [25] even though it is possible to design games, serious games or gamified systems without knowing who the target players and users are, it is more likely to create a more engaging experience when the target players are identified first.

In the literature of games, Bartle [28] first conducted research in the areas of game design and game development, as well as explored players' personality types for massively multiplayer online games and he is best known for his theory on game participant psychology, which classifies players based on their gaming preference (achievers, explorers, socialisers and killers) [29]. Even though Bartle's four types of players seems to have often described and explained in the game industry [3, 25, 29–31], it appears that not all research about digital games can be applied directly to the gamification of other applications [30]. It is suggested that games are just for fun and entertaining, whereas gamification has a certain purpose, without any gameplay [6]. These differences possibly lead to the different player profiles between gamers and gamification users.

Marczewski [25] looked at a more gamification specific taxonomy for types of users within systems, therefore starting from the perspective of intrinsic motivation, he chose to use ideas from Edward Deci and Richard Ryan's Self Determination Theory and Daniel Pink's Drive. Marczewski [25], by combining these, he settled on four motivations: Relatedness, Autonomy, Master and Purpose in order to describe four types of intrinsically motivated user types. However, a fifth type was suggested; an extrinsically motivated type: The Player who is actually motivated by the reward. Finally, and much later on a sixth type was included, the Disruptor. Even though this model is trying to explain the motives of individuals as gamified users, it seems to be generic for any gamified system, therefore individuals' motives may differ based on the context of the gamified application.

One of the common denominators between game and gamified application use, is the importance of perceived 'fun' when using the system [25, 28]. Indeed, one of the most important factors that the designer should identify when starting to work on a game is what will be the fun element for the player during the game [32] and since fun is subjective there are so many different features that must go into a game to make it fun [33]. Prior studies, incorporated perceived enjoyment in the TAM to achieve a more accurate prediction of customers' acceptance of a specific product or service [34]. Perceived enjoyment refers to the extent to which the user perceives the activity of using a technology as being enjoyable [34–36] and the degree to which the use of the computer is perceived as pleasant, regardless of all consequences of execution which may be envisaged [37–39]. For example, studies by Lee et al. [36], Rouibah, Lowry and Hwang [39], Agrebi and Jallais [37] have all examined the relationship between perceived enjoyment and intention to use an information system, showing the positive effect of the variable towards usage. The importance of fun has also been

acknowledged within tourism by Xu, Buhalis, and Weber [40], who claim that gamification can enhance tourists' experiences by getting tourists immersed into a simulated travel world, which is fantasy and fun in nature. Taking this into consideration and since a gamified application is an application that uses game design elements in a non-game context, it is important to identify what are these elements that make a game and fun and what they mean by it.

3 Research Methodology

Although, previous studies show motives of individuals to either play games or use gamified applications [25, 28], and highlight the fact that tourists have diverse profiles [41], more research is required to better understand individuals' behaviour when they use a gamified application specifically in the context of hospitality industry. Hence, this research aims to understand users' attitudes towards hotel gamified applications. In particular, the study looks to identify the key motives that contribute towards intention to use a hotels' gamified application and to investigate individuals' perception of fun when using a hotel gamified application.

To do so, this research used TAM relevant constructs (such as perceived enjoyment and perceived ease of use), as a guideline to inform the interview questions and investigate whether these variables actually have an effect on the intention to use a hotel's gamified application or whether other variables are relevant to the specific context. The element of fun was also included, as it seemed to be one of the most important motivators for individuals to play games. Emphasis on the element of fun is given, due to the previous literature which recognises the importance of that element for the success of games. This research did not take the theory into testing, as it appears that not all research about digital games can be applied directly to the gamification of other applications [30]. Thus, the element of fun and Bartle's taxonomy of players have only been taken into consideration as a guideline when developing the interview questions to identify whether these categories do apply in the context of hotel gamified systems.

For this study, an inductive, qualitative approach was most appropriate to enable an in-depth analysis of the phenomenon of gamification and individuals' motives when they would use a hotel-gamified application. A total of 31 semi-structured interviews have been carried out, recorded and transcribed, lasting between 25-50 min. Data saturation was achieved after 25 interviews, however six more interviews were conducted for confirmation. For the purposes of this research, visual material has been prepared for the interviewees to have a look and gain an idea of how a hotel's gamified application would look like if it were in existence today. These visual materials (see Fig. 1), are prototype pictures based on the definitions of gamification. The pictures have been developed in order to include elements that make a game fun (socialising, achieving, exploring and imposing upon others) as Bartley [28] identifies them. Furthermore, Marczewski's [25], five motivations (Relatedness, Autonomy, Master, Purpose and Reward) have been taken into consideration when developing the pictures in order to help the conversation start. As the visual material is focused on the hospitality context, results are relevant to a hotel's gamified application and not gamified applications in general.



Fig. 1. Example of visual material

This study used a purposive and convenience sampling technique, and part of the selection criteria focused on having prior experience with gaming. Most participants were college students because it was important to have knowledge around games, as these visual materials have been developed to look a lot like games. Indeed, a study from Pew Internet Research finds that 81% of college students play video games at least “once in a while” [42]. With regards to whether students are the target market of hotel chain that would be determined by a number of other sociocultural, lifestyle and financial characteristics, more than their status as students.

4 Findings and Discussion

One of the most common ways of approaching qualitative data analysis is through conducting a thematic analysis [43]. The essential purpose of this approach is to search for themes, or patterns that occur across a data set (semi-structure interviews in this case) and it involves a researcher to code data to identify themes or patterns for further analysis, related to the research question [44]. After reading and reviewing the respondents’ comments, seven key themes emerged with regards to motives and eight regarding the meaning of fun, which are discussed below.

4.1 Motives to Use a Hotel Gamified Application

Perceived Enjoyment – The vast majority of participants mentioned enjoyment as the primary factor of why they would use the hotel gamified application. When individuals asked what do they like the most from the application shown they seem to like the element of fun. [*‘I find it fun. I mean it looks like it pushes me to actually bother to use it [...] Hotel apps tend to be dry but I like that it is different from everything I used to know and it makes this procedure more fun’ (Interview: R)*]. Participants explained that enjoyment mainly comes from the gameplay experience it is promoting. [*‘...but out of the steps I see I find it very interesting even fun, because it reminds me of games’ (Interview: I)*].

Perceived Ease of Use – In the current study perceived ease of use refers to the degree to which a mobile gamified application is perceived as easy to understand and operate when a user is partaking in a hotel gamified application system. Most participants made an explicit reference to ease of use as a motivator to use the system. [*‘... I mean it gives me the chance to set up my requests –if it wasn’t straightforward I wouldn’t use it.’ (Interview: S)*]. Findings also confirm that the less effort a technology requires, the more tendency and intention consumers will feel to use it [*‘It looks very simple and easy to use. For example, I can see the nearby hotels of the brand very easily and choose one of them’ (Interview: C)*]. Participants also stated that they would not be deterred by hotels’ attempts to upsell or cross-sell, as long as the gamified process was easy to use.

Perceived Usefulness – All participants suggested that unless a gamified application is useful, they would not use it. They suggested that, because of mobile device storage space limitations, they would only keep an app if it brought some value. [*‘It is giving me the opportunity to get discounts and offers so I feel it is useful to me to use it and stay with the company’ (Interview: E)*]. Some participants also suggested that usefulness was very important otherwise [*‘...it would not worth the trade-off with battery life’ (Interview: B)*]. Most participants also claimed that for a gamified hotel app to be useful it would have to find a balance between the gaming/fun elements, usability of features and personalised content suggestions. [*‘It looks very useful for me right to be honest because as I said it makes my life easier as it talks to me directly and it guidelines towards how to do certain things and what it is close and so on’ (Interview: R)*].

Reward/Extrinsic Motives – For some of our participants rewards were appreciated not just for their objective value, but also for their perceived value resulting from accomplishment and achievement. [*‘I would follow it because I know that my money spending will be rewarded in some point in the future so it is actually a contribution towards my decision making [...] I want the reward to be equal to my challenge and the more I progress the highest the challenge has to be otherwise it gets boring’ (Interview: F)*]. Some of our participants were drawn to economic rewards, demonstrating that the behaviour was no longer performed because it was interesting or fun; instead, it was carried out in pursuit of external rewards. [*‘I personally like the fact that it takes you from the booking to the finish and you can get reward and stuff out of it [...] gamification or gameplay is not a big issue with me I am not a massive gamer personally, but I would use it because of the rewards’ (Interview: B)*]. These findings demonstrate that external rewards including monetary rewards are considerable motivators to use a hotel gamified application. It seems that within a hotel context, rewards are a standard expectation; what participants wanted to see is the level of reward as compared to the challenge involved in getting it.

Direct Feedback-Interactivity – Interactive media, allows users to classify, control, revise, establish and ignore information, and the interactions that that occur on the network can affect users’ attitude towards using it [45]. This sentiment was also expressed by our participants: [*‘I like this one, because in this application it makes you want to use it. I mean it tells you about offers all the time I guess. I have direct contact with them and direct feedback because it tracks whatever I do any time and it tells me*

what I can earn from the activities' (Interview: E). Our participants also indicated that the hotel gamified application should provide instant confirmation of the status of activities and processes, as well as highlight the effort required to complete a task as 'any action needs a reaction' (Interview: B).

Perceived Innovativeness – Innovative individuals are the ones who could handle uncertainty and also have a better intention to adopt new innovations in IT [23]. Many of our participants showed positive intention to use a hotel gamified system because of the perceived innovation. Our participants' intention to use hotel gamified app was linked to both the allure of using a new (innovative) technology in itself, but also to self-image (i.e. they are innovative because they use the tech). [*'..well I like it because it is new and because it combines two different things the gaming activity and the booking activity' (Interview: H)].*

Social Influence – Our participants emphasised that their travel decisions are very much influenced by people close to them. The use of a gamified application was seen as an excellent way to facilitate those interactions as long as there were enough users (both from personal circle as well as in general) to interact with. [*'Well I am a person who always looks on others comments as it has to do with booking a hotel room so if this application could give me the chance to speak with others or read comments regarding with my future destination I am really fond of it' (Interview: A)].*

4.2 Meaning of FUN for Hotel Gamified Applications Users

Andrzej Marczewski suggests that it would be more rational to step back and initially view the situation with two players' types in mind; those who are "willing" to play and those "not willing" to play [25, 29]. Key consideration of those willing and unwilling to play is the element of 'fun'. Hence, this research tried to understand the element of fun for individuals when using a hotel gamified application with eight contexts arising.

Socialising - Socialising has appeared as a meaning of fun for individuals when they would use the hotel gamified application because it gives them the opportunity to communicate with others [*'I would say it is fun, because I can see what others do and I can see that it looks a lot like Sims, but in the same time whatever I do or earn is actual real' (Interview: E)]* but also as an element to find out information about a hotel throughout people who have already experienced it [*'I find it interesting that I can ask others about the services of the hotel and their opinion about them. I mean it is good to know about a service from someone who has already used how so not too long ago' (Interview: R)].*

Achieving - Achieving as an element of fun has been highly connected with the reward as participant T mentioned: [*'I like the fact that I can collect points from achievements because in this case the more points I collect and the more experiences I achieve, the better the reward will be' (Interview: T).*

Competitiveness – It appears that people find fun in competitiveness in using a hotel gamified application [*'I like it because I am a competitive person. I mean I like the fact that I can see how many points I have and how many points the leader has in order to*

have an idea about how much more effort I have to put through in order to reach the top. As I said before I like to get better and compete with others [...] the highest I will get to the ranking the most I would stick with the company' (Interview: Q)].

Challenge – Similarly to competitiveness individuals would like the idea of a hotel gamified application could promote challenges [Well I like the fact that it is challenging. It would push me to do things in order to win. For example, if I was a usual traveller and there was a challenging task to fulfil I would use it even more (Interview: F)] and that would increase engagement and interest [But overall I say that I like the fact that I have to fulfil a challenge take points or badges in order to be rewarded. Is less boring (Interview G)].

Explore – The element of exploring appeared as a meaning of fun when using a hotel gamified application, but interestingly they do not want to explore the application itself, but they want the application to motivate them to be more active and explore the hotel or the environment around it [I mostly like the exploring part because that way I get the chance to see the hotel as well. So I would use it more if it was sending me to several places of the hotel because that would make me more active and also I could explore the hotel or even artefacts close to the hotel [...]. The exploring thing would get me to know more about the location, but also you are doing something not online, but you are physically doing something and go somewhere' (Interview: I)]. Another interesting suggestion was that the element of exploring could be more important than the reward itself as it has to do with using the application [The reward is very important, but also my lifestyle as well. I am a person with limited plans especially as it has to do with holidays. For example, I like to visit new places and try new things so if this application is pushing me to go out and explore new places or tastes and give me an offer on top of it then I am more than happy to follow it' (Interview: Q)].

Imposing upon others – Fun appeared in the form of showing off that an individual is better than others mostly through the mechanic of leader board [I like a lot the fact that you can get points and level up so you can progress and differentiate yourself from others. For the same reason I also like the fact that I can be on the leader board so I can compare myself with others and my progression with theirs. And of course I want to battle to be the best because that means the best reward as well' (Interview: H)][I like the fact that I can get badges as I see here bronze, silver, and gold and so on; so it covers my competitiveness as I can beat others'(Interview: Q)]. Interestingly it was mentioned that being number 1 in a leader board has to be something achievable. In this sense the individual would rather compete with others in the same environment (hotel) rather than a global ranking. [The fact that I am first in the leader board would be enough for me to push me over. I mean of course if you are first in the internal leader board you could have a free drink or if you held on the number 1 for more than 10 min for example you could get something more, but I would do it even without a reward [...] if you are willing to push further, I mean you could get people use a facility, push them for the extra level harder, but stay within range. I mean if you look at a global board and you are 7000 out of 200000 is not great it is just showing that I have used it' (Interview: D)].

Interactivity - Individuals like the element of interactivity as fun when they use a hotel gamified application [*'I like it because it is more interactive and I like that' (Interview: C)*][*'Yes I would definitely become loyal to this brand, because it is an easy platform and even though I am sure that this kind of big chain hotels have already some reward schemes or other reward systems I find this more interactive, it gets more interesting' (Interview: T)*].

Personalisation - Individuals seems to like the idea of creating their own avatar as it gives them the opportunity to make the application more personal to them [*'I like the fact that I can build my own avatar. I see it as a personal fact and I would enjoy it' (Interview: F)*]. For another member it would be more interesting if the avatar could actually look exactly like the individual. [*'If you could actually take a photo and personalise your avatar instead of just creating it, it would work brilliantly' (Interview: B)*]. Very important also seem to be the element of the application speaking directly to the audience as they have a greater connection [*'I find exciting that it is personalise. I am not just booking a hotel room, but the hotel talks to me now and it tells me that if I book with them they will give me tasks back to do so they are interested about my living there. They are giving me some tasks so I know what is around the hotel as well as in the hotel' (Interview: P)*].

5 Conclusion

This research tried to explain which motives are important for individuals when they would use a gamified application in the context of hospitality industry. Special attention is given to the element of fun as the literature shows that it is a key motive in the context of gaming. It appears that seven motives (perceived enjoyment (or fun), ease of use, usefulness, innovativeness, interactivity, social influence and reward), should be taken into consideration when designing a gamified application in the context of hospitality. Participants of this study mentioned that these elements would make a hotel gamified application more attractive to them, therefore they would be more interested in using it and engaging with it. It is understood that, the technological support could encourage tourist engagement, enhance tourist experience, improve loyalty and increase brand awareness [27, 46]; but organisations should also consider the above elements in the application mechanics in order to make it engaging and attractive.

It appears that the element of fun is a key motive for individuals to use hotel gamified applications. A tourist is a person who typically has "little or no knowledge of the environment" [47], so using game mechanics and game metaphors will give the benefit to the tourist to learn more about the current visit while having fun. Participants in this research expressed eight elements (socialising, achieving, competitiveness, challenge, explore, imposing upon others, interactivity and personalisation) that they consider as fun. Hotels should consider the nearby unique attractions and the history of the location as well as the eight elements of fun as emerged from the participants to create a unique and fun gamified application. Gamification is not only the use of badges, rewards and points; rather, the engaging elements of why people play games (where it is not just for

the points): for the sense of engagement, immediate feedback, feeling of accomplishment and success of striving against a challenge and overcoming [14].

This study comes with inherent limitations. Firstly, the qualitative findings of the study provide an insight into motivations for using a hotel gamified app, should be further elaborated to explore whether additional motivations exist. To provide generalizability, future studies should consider quantitative methodologies. Also, our sample primarily entailed college students and future research should explore the concepts within alternative populations. In conclusion, gamification is a complex phenomenon, which it has only just begun to be understood. Further research is required to further conceptualise and comprehend the intricacies inherent in the definitions and meanings currently ascribed to it. In particular, user profiling needs further investigation to uncover the core constructs that affect the intention to use gamified applications.

References

1. Xu F, Tian F, Buhalis D, Weber J, Zhang H (2015) Tourists as mobile gamers: Gamification for tourism marketing. *J Travel Tour Market* 33:1124–1142. <https://doi.org/10.1080/105448408.2015.1093999>
2. Daisyme P. <https://www.forbes.com/sites/theyec/2017/06/22/how-to-add-gamification-to-your-marketing-strategy/#322288b05b3b>. Accessed 5 June 2018
3. Zicherman G, Linder J (2010) *Game based marketing*. Wiley, New Jersey, USA
4. Dickey M (2005) Engaging by design: how engagement strategies in popular computer and video games can inform instructional design. *Educ Technol Res Dev* 53:67–83. <https://doi.org/10.1007/BF02504866>
5. Stapleton AJ (2004) “Serious games: serious opportunities”, Australian game developers’ conference. Australia, Melbourne
6. Lombriser P, van der Valk R (2011) *Improving the quality of the software development lifecycle with gamification*. Springer, Berlin
7. Han DI, Jung T, Gibson A (2014) Dublin AR: implementing augmented reality in tourism. In: Xiang Z, Tussyadiah I (eds) *Information and communication technologies in tourism 2014*. Springer International Publishing, Wien, New York, pp 511–523. https://doi.org/10.1007/978-3-319-03973-2_37
8. Egger R, Bulencea P (2015) https://books.google.co.uk/books?hl=en&lr=&id=r3UCgAAQBAJ&oi=fnd&pg=PA9&dq=Gamification+in+Tourism:+Designing+memorable+experiences.+&ots=JPEgiv-ann&sig=afOQYv4yJ_3YBBu1_Zok5QaDiz4#v=onepage&q=Gamification%20in%20Tourism%3A%20Designing%20memorable%20experiences.&f=false. Accessed 11 June 2018
9. Burke B. <https://www.forbes.com/sites/gartnergroup/2014/04/10/how-gamification-motivates-the-masses/#14e815bf5c04>. Accessed 9 June 2018
10. Inversini A (2017) Managing passengers’ experience through mobile moments. *J Air Transp Manag* 62:78–81. <https://doi.org/10.1016/j.jairtraman.2017.03.009>
11. Garcia A, Linaza MT, Gutierrez A, Garcia E, Ornes I (2016) Generation of Gamified mobile experiences by DMOs. In: Inversini A, Schegg R (eds) *Information and communication technologies in tourism 2016*. Springer International Publishing Spain, pp 45–57. <https://doi.org/10.1007/978-3-319-28231-2-4>

12. Tasci ADA, Ko YJ (2016) A Fun-Scale for understanding the hedonic value of a product: The destination context. *J Travel Tour Market* 33:162–183. <https://doi.org/10.1080/10548408.2015.1038421>
13. Huotari K, Hamari J (2012) Defining Gamification - a service marketing perspective. *MindTrek* 3:17–22. <https://doi.org/10.1145/2393132.2393137>
14. Kirsh BA (2014) *Game in libraries: essays on using play to connect and instruct*. McFarland & Company Inc., Publishers, North Carolina, USA
15. Girard J, Klein D, Berg K (2015) *Strategic Data-Based wisdom in the big data era*. Information Science Reference, Hersey, USA
16. Kinver M. <http://www.bbc.com/news/science-environment-25104468>. Accessed 2 May 2018
17. Treiblmaier H, Putz LM, Lowry PB (2018) Research commentary: setting a definition, context, and theory-based research agenda for the Gamification of non-gaming applications. *Trans Hum Comput Interact* 10:131–162. <https://doi.org/10.17705/1thci.00107>
18. Al-Zaidi Z. <http://www.theguardian.com/media-network/media-network-blog/2012/apr/26/gamification-ubiquity>. Accessed 11 June 2018
19. Herrero A, San Martin H (2012) Developing and testing a global model to explain the adoption of websites by users in rural tourism accommodations. *Int J Hosp Manag* 31:1178–1186. <https://doi.org/10.1016/j.ijhm.2012.02.005>
20. Munoz-Leiva F, Hernandez-Mendez J, Sanchez-Fernandez J (2012) Generalising user behaviour in online travel sites through the Travel 2.0 website acceptance model. *Online Inf Rev* 36:879–902. <https://doi.org/10.1108/14684521211287945>
21. Mendes-Filho L, Mills AM, Tan FB, Milne S (2018) Empowering the traveller: an examination of the impact of user-generated content on travel planning. *J Travel Tour Market* 35:425–436. <https://doi.org/10.1080/10548408.2017.1358237>
22. Kim M, Qu H (2013) Travellers' behavioural intention toward hotel self-service kiosks usage. *Int J Contemp Hosp Manag* 26:225–245. <https://doi.org/10.1108/IJCHM-09-2012-0165>
23. Tan GWH, Ooi KB, Leong LY, Lin B (2014) Predicting the drivers of behavioural intention to use mobile learning: a hybrid SEM-Neural networks approach. *Comput Hum Behav* 36:198–213. <https://doi.org/10.1016/j.chb.2014.03.052>
24. Post R. <http://www.theguardian.com/sustainable-business/game-on-gamification-business-change-behavior>. Accessed 5 June 2018
25. Marczewski A <http://www.worldcat.org/title/gamification-a-simple-introduction-a-bit-more/oclc/853508828>. Accessed 3 June 2018
26. Wu M <https://lithosphere.lithium.com/t5/Science-of-Social-Blog/Gamification-from-a-Company-of-Pro-Gamers/ba-p/19258>. Accessed 5 June 2018
27. Killian E <http://www.eamonkillian.com/saasify/>. Accessed 2 June 2018
28. Bartle R. <http://mud.co.uk/richard/hcdis.htm>. Accessed 11 June 2018
29. Choo YK http://www.yukaichou.com/gamification-examples/what-is-gamification/#.Uwyrnvl_u6M. Accessed 6 May 2018
30. Dixon D <http://gamification-research.org/wp-content/uploads/2011/04/11-Dixon.pdf>. Accessed 9 Feb 2016
31. Kim AJ <https://www.youtube.com/watch?v=F4YP-hGZTuA>. Accessed 2 May 2018
32. Moore ME (2011) *Basics of game design*. Taylor and Francis Group, London, UK
33. Dunningway T, Novak J (2008) *Game development essentials: Gameplay mechanics*. Delmar Cengage Learning, New York, USA
34. Rodrigues LF, Oliveira A, Costa CJ (2016) Playing seriously – How gamification and social cues influence bank customers to use gamified e-business applications. *Comput Hum Behav* 63:392–407. <https://doi.org/10.1016/j.chb.2016.05.063>

35. Hamari J, Koivisto J (2015) Why do people use gamification services? *Int J Inf Manag* 35:419–431. <https://doi.org/10.1016/j.ijinfomgt.2015.04.006>
36. Lee S, Park EA, Cho M, Jin B (2018) Factors affecting tablet computer users' intention to purchase mobile applications. *Soc Behav Personal* 46:25–38. <https://doi.org/10.2224/sbp.6525>
37. Agrebi S, Jallais J (2015) Explain the intention to use smartphones for mobile shopping. *J Retailing Consum Serv* 22:16–23. <https://doi.org/10.1016/j.jretconser.2014.09.003>
38. Natarajan T, Balasubramanian SA, Kasilngam DL (2017) Understanding the intention to use mobile shopping applications and its influence in price sensitivity. *J Retailing Consum Serv* 37:8–22. <https://doi.org/10.1016/j.jretconser.2017.02.010>
39. Rouibah K, Lowry PB, Hwang Y (2016) The effects of perceived enjoyment and perceived risks on trust formation and intentions to use online payment systems: new perspectives from an Arab country. *Electron Commer Res Appl* 19:33–43. <https://doi.org/10.1016/j.elerap.2016.07.001>
40. Xu F, Buhalis D, Weber J (2017) Serious games and the gamification of tourism. *Tour Manag* 60:244–256. <https://doi.org/10.1016/j.tourman.2016.11.020>
41. Kellner L, Egger R (2016) Tracking tourist spatial-temporal behaviour in urban places, a methodological overview and gps case study. In: Inversini A, Schegg R (eds) *Information and communication technologies in tourism 2016*. Springer International Publishing, Switzerland, pp 481–494. https://doi.org/10.1007/978-3-319-28231-2_35
42. Pew Research Centre. <http://www.pewinternet.org/2008/12/07/adults-and-video-games/>. Accessed 16 Feb 2018
43. Bryman A, Burgess P (2015) *Business research methods*. Oxford University Press, Oxford, UK
44. Saunders M, Lewis P, Thornhill A (2016) *research methods for business students*. Pearson Education Limited, Harlow, UK
45. Pai FY, Yeh TM (2014) The effects of information sharing and interactivity on the intention to use social networking websites. *Qual Quant* 48:2191–2207. <https://doi.org/10.1007/s11135-013-9886-5>
46. Xu F, Weber J, Buhalis D (2014) Gamification in Tourism. In: Xiang Z, Tussyadiah I (eds.) *Information and communication technologies in tourism 2014*. Springer International Publishing, Switzerland, pp 525–537. https://doi.org/10.1007/978-3-319-03973-2_38
47. McKercher B, du Cros H (2003) Testing a cultural tourism typology. *Int J Tour Res* 5:45–58. <https://doi.org/10.1002/jtr.417>



Antecedents and Outcomes of Smartphone Usage Among Indian Millennial Travellers

Shashank Gore, Sreejith Balasubramanian, and Cody Morris Paris^(✉)

Middlesex University Dubai, Dubai, United Arab Emirates
shashankgore7@gmail.com,
{s.balasubramanian, c.paris}@mdx.ac.ae

Abstract. This study explored the extent to which the antecedents (psychological anxiety, behavioural anxiety, need for virtual comfort and security, and need for disconnectedness) impact smartphone usage while traveling, and the extent to which smartphone usage impacts travel efficacy and experience. Structural equation modelling was employed to analyse the data collected through a structured questionnaire from 227 Indian Millennials. The findings suggest that the need for virtual comfort & security and behavioural anxiety positive influence smartphone use while traveling, while psychological anxiety, and need for disconnectedness were found to have no significant impact. Further, smartphone use while traveling was found to have a strong impact on the travel efficacy and experience of users.

Keywords: Disconnection · Technology addiction · Travel behaviour
Smartphones · Millennials · South Asia

1 Introduction

As smartphones continue to play a central role in the enhancement of individuals' daily lives, it is important to understand the antecedents of smartphone use within the travel context (enablers and barriers). Some research suggests that 'mobile addiction' and psychological and/or behavioural anxiety caused by the potential of being 'disconnected' influence smartphone use and behaviour during travel [1–3]. For many, the constant need to connect and maintain a level of intimacy across distance with friends, family and colleagues influence the use of smartphones during travel [4]. Smartphones, along with related technological innovations, enable users to virtually connect at a distance with their 'daily lives' and thus have blurred the traditional 'home vs away' [5, 6]. Reflecting on 'hyperconnective' lives of individuals today, some have argued that the need for smartphone disconnectedness [20] could reduce the usage of smartphone during travel, particularly as people start to embrace recent 'digital detox/diet' movements. So far, the evidence on the influence of these antecedents on smartphone usage during travel has been mostly qualitative in nature with most participants coming from 'Western' countries [7–9].

India is currently third in the world in smartphone users, and is poised to overtake the US as the 2nd largest smartphone and internet market [10, 11]. India has a median age of 26, and more than 60% of the Indian population between 15–29 years of age visit social networks every day [12]. Moreover, a recent Global Travel Intention (GTI) report by Visa on international travel trends and behaviour in more than 27 countries and territories highlight that Indians travel more, an average of 5.6 trips annually, than the both the global average of 4.2 trips and the Asia Pacific (APAC) average of 4.7 trips. Moreover, Indian travelers annual spending (USD 2,334) also outpaces the APAC's average of USD 1,677.

In India, millennials are already the chief earners and make up about half of the working population [13]. Millennials in India are considered to be tech savvy with consumer tastes that are shaping and redefining make consumer industries [13]. Moreover, generally, Millennials are increasingly confident in planning travel on their smartphones. Google's study found 2/3rd of Millennials confessed to being comfortable with planning an entire trip on a smartphone [14].

There is a growing body of research that has explored how smartphones and other mobile and social technologies can greatly enhance the travel experience [15, 16]. Smartphones can greatly enhance the travel experience, and in many cases, make traveling 'easier'. However, recent studies have highlighted potential ill-effects of smartphone (over-) usage on travel experience [8, 9]. The interplay and balance between the potential of the smartphone to disrupt the travel experience due to being 'over connected' or anxieties related to being disconnected and the benefits and enhancement of the travel experience that the smartphone affords has prompted this study. The purpose of this study is to assess the impact of antecedents on smartphone usage while traveling and the impact of smartphone usage on travel efficacy and experience among Indian millennials.

2 Literature Review and Hypotheses Development

There has been an increasing interest in the antecedents and outcomes of smartphone usage during travel in the literature [17, 18]. For instance, through the theoretical lens of adaptive structuration theory, Wang et al. [16] framed smartphone usage during travel as spillover effects of smartphone use in everyday life. Wozniak et al. [17] looked at four psychological antecedents namely, self-efficacy, mobile-specific innovativeness, mobile users' information privacy concerns, and personal attachment, and found all of them to positively impact smartphone usage during travel. The Extended Self Theory [19] has been employed to explain anxieties caused by being separated from smartphones [4, 20] and the impact on smartphone usage during travel. Meanwhile, authors such as Dickinson et al. [21] and Silas et al. [22] highlighted the desire for digital disconnection will reduce smartphone usage during travel. Despite significant developments in the literature, there is much to be known with regards to antecedents and outcomes to smartphone usage during travel.

2.1 Antecedents to Smartphone Usage During Travel - Psychological Anxiety

Lopez et al. [1] in their study of British adolescents, found withdrawal to be the most relevant addiction symptom, with participants reported experiencing unpleasant emotions when they were unable to use their mobile phone as usual. Concurrent with the withdrawal symptom of addiction, is the fear of not being able to access one's cell phone or Nomophobia [23]. Sharma et al. [24] discovered 75% of the Indian Medical Students in their study facing Nomophobia, while 83% of them reported panic attacks. Yildirim et al. [25] concluded 42.5% of Turkish college students to be nomophobic, with high stress being reported for 'not being able to communicate', 'not being able to access information' and a 'dying battery'. Literature suggests many pathways for a possible dependency. We expect people with psychological anxiety to prefer the use of smartphones during travel. This leads to our first hypothesis:

H1: Psychological anxiety will positively influence smartphone usage while travel

2.2 Antecedents to Smartphone Usage During Travel - Behavioural Anxiety

It is the anxiety that leads to overuse of smartphones. For instance, smartphone features like notifications/alerts usually act as cues for periodic checking of a mobile phone, over time a mere proximity with the instrument serves as a gateway to problematic use [26]. Habitual checking also enables reassurance-seeking from peers for individuals with psychosocial behaviours like low self-esteem, anxiety, depression and loneliness which further triggers intensive use [27]. Another behavioural tendency is the 'Fear of Missing Out (FOMO)', which compels people to stay connected and fuel overuse [4]. Impulsivity (lack of self-control) and Extraversion (excessive need to socialise) are also found to be triggers of overuse [27]. Resultantly, smartphone addiction has been associated with somatic complaints, anxiety and insomnia [28, 29]. Therefore, it could be argued that the behavioural anxiety related to smartphone usage in everyday life could spill over to smartphone usage during travel. This leads to our next hypotheses:

H2: Behavioural anxiety will positively influence smartphone usage while travel

2.3 Antecedents to Smartphone Usage During Travel - Need for Virtual Comfort and Security

Studies have shown that the need to be constantly connected through internet during travel is increasing [8]. For instance, staying connected helps travelers with a sense of belongingness in an unfamiliar atmosphere [8]. A study by Tanti and Buhalis [9] found respondents highlighting the importance of constantly sharing their travel experiences digitally (for instance, via social media) with their friends back home. The study also highlighted that the constant connectivity helps them to be 'stay at home while away' which in turn provides a sense of security. Neuhofer [8] found that travellers are increasingly feeling socially obligated to click and upload pictures on social media.

Overall, it could be argued that this need for virtual comfort and security during travel is increasing the usage of smartphones during travel. This leads to our next hypotheses:

H3: The need for virtual comfort and security will positively influence smartphone usage while travel

2.4 Antecedents to Smartphone Usage During Travel - Need for Disconnectedness

Several authors have highlighted the need for disconnectedness during travel. For instance, Neuhofer [8] highlighted that travellers are focused on ‘taking pictures for later’ rather than enjoying the experience in the ‘now’. The study also highlighted that it limits the experience to online feedbacks and google searches, rather than interacting with the locals and understand their culture. Similarly, Tanti and Buhalis [9] highlighted the risk of not spending enough time with your travel companion because of staying digitally connected with others. Moreover, the study found that constant connectivity leads to information overload which adds to traveller’s psychological stress. In addition, the excessive time spending on online social media has been associated with more online friends than offline friends [30], which in turn increases shyness in face to face interactions [31] thereby reducing the chances of making new friends during travel. This has led to many groups like Digital Detox (digitaldetox.org) operates on the philosophy ‘disconnect to reconnect’, offering events, retreats and summer camps with off the grid accommodation, meditation, yoga, hiking, art and writing workshops for individuals and corporates alike. Therefore, it could be argued that the need to disconnect will reduce smartphone usage during travel. This leads to our next hypotheses:

H4: The need for disconnectedness will negatively influence smartphone usage while travel

2.5 Impact of Smartphone Usage During Travel on Travel Efficacy and Experience

Several authors have argued that the smartphone preference/usage during travel has enabled travelers to become more efficient as it helps them make informed decisions such as finding cheaper deals, easier routes, etc. [8]. Similarly, several studies argue that a traveller’s experience to be incomplete without a smartphone [15, 16]. On the contrary, researchers argue that adverse impact of smartphone usage on the travel experience [8, 9]. Constant connectivity limits an individual’s ability to enjoy leisure time [32] and leads to impaired psychological and physical health [33]. Neuhofer [8] claims that increased technology use dominates activities and devalues a traveller’s experience. Given the contrasting views, it important to test the following hypothesis:

H5: Smartphone usage while travel will have a positive impact on travel efficacy and experience

Figure 1 captures the proposed hypothesis in a framework.

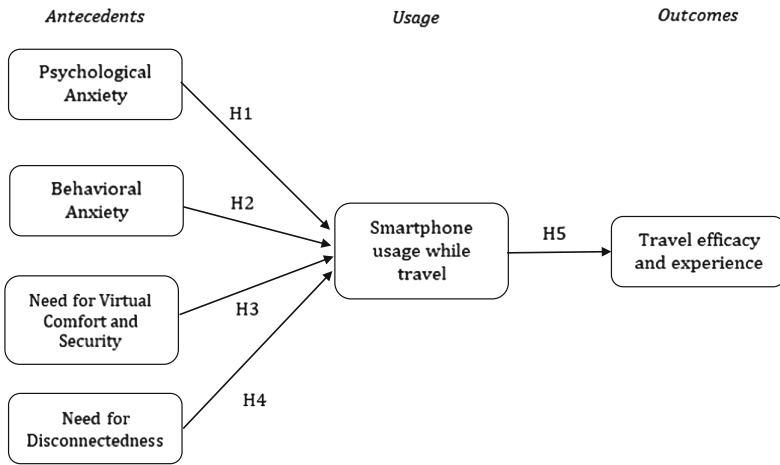


Fig. 1. Hypothesized framework.

3 Research Methodology

A quantitative survey approach was adopted in this study. As seen in Table 2, the 29 measurement items for the survey to capture the six constructs were influenced and/or adopted from the literature. A 5-point Likert scale ranging from Strongly Disagree (1) to Strongly Agree (5) was utilized to capture the respondents' opinion/attitude on the measurement items. Since the developed survey instrument was not tested and validated collectively previously, the instrument was pre-tested with five participants. The feedback from the pre-test participants on content, structure and grammar proved useful in improving the survey questionnaire.

The main survey was conducted online over a period of 3 weeks during fall 2017 using Google forms. The participants of this study were recruited using a non-probability purposive sampling technique, mainly through social media platforms such as Facebook and Whatsapp. The target sample population were Indian Millennials in the age group of 18–35 years. In addition, three pre-requisites were also adopted in the study to ensure only eligible respondents participated in the survey. This includes the participant must be a) Owners of smartphone for at least over a year, b) Avid travelers, should have travelled in the past 6 months or planning to do so in the upcoming 6 months to ensure recollection/assumption of their past/upcoming experiences and c) Smartphone users during travel. After removing incomplete responses, a total of 227 usable responses were obtained for data analysis. The demographic profile of the respondents is given in Table 1.

Table 1. Demographic profile of respondents

Attribute	Responses	Percentage (%)
<i>Age</i>		
18–22	23	10.1
23–28	168	74
29–35	36	15.8
<i>Gender</i>		
Male	100	44.1
Female	127	55.9
<i>Education</i>		
Student	14	6.2
Graduate	86	37.9
Post Graduate	127	55.9
<i>Occupation</i>		
Employed	179	78.9
Unemployed	48	21.1
<i>Marital Status</i>		
Married	63	27.8
Unmarried	164	72.2

4 Data Analysis and Results

Before proceeding with the analysis to test the hypothesized relationships, it is important first to ensure the data collected and constructs considered in the study meet the underlying assumptions required for conducting statistical analysis [34]. First, common method bias (CMB) was conducted using Harman one-factor exploratory factor analysis [35]. The one-factor solution only explained 25.4% of the total variance, which is well below the 50% cut-off [35], clearly indicating that CMB is not an issue in this study. Next, the unidimensionality of the constructs (convergent validity) were assessed using the confirmatory factor analysis (CFA). Maximum Likelihood Estimation using AMOS 23.0 software was used to perform CFA. Convergent validity assessment is important to ensure that the measurement items that are supposed to be measuring the same construct are indeed related. The standardized factor loading (SFL) obtained from the CFA is given in Table 2. As seen in the table, all items except “You prefer the convenience of your smartphone camera as opposed to a DSLR while travelling” have factor loadings >0.5 , indicating strong convergent validity of the constructs [36]. The item that failed to load was subsequently removed from further analysis. This is also in line with previous studies in tourism context such as Chen and Tsai [37], who have retained factor loadings greater than 0.5, while removing any variables with factor loading less than 0.5.

Next, discriminant validity was assessed to ensure that the measurement items from different constructs are indeed unrelated. As seen in Table 3, the inter-construct correlation between any pair of constructs was less than the suggested threshold of 0.85, indicating discriminant validity. Further, the square root of the average variance

Table 2. Measurement items and standardized factor loadings

Constructs and items	SFL
<i>Psychological Anxiety</i>	
You find it difficult to switch off your smartphone [20]	0.85
You feel anxious if you have not checked for messages or switched on your smartphone for some time [20]	0.81
When out of range for some time, you become preoccupied with the thought of missing a call [20]	0.67
<i>Behavioral Anxiety</i>	
You find yourself occupied on your smartphone when you should be doing other things instead [20]	0.79
You find yourself engaged on smartphone for longer periods of time than intended [20]	0.69
You can never spend enough time on your smartphone and often lose sleep over it [20]	0.78
<i>Need for Virtual Comfort and Security</i>	
You prefer constant connectivity as it helps you to 'stay at home while away' which provides a sense of security [7, 9, 16]	0.82
The fear of missing out on important moments back home compels you not to disconnect while travelling [4]	0.83
Sharing your travel experiences digitally (for instance, via social media) with your friends back home while being 'in the moment' is important to you [8]	0.69
While travelling, you would rather be talking to your friend back home than to the stranger beside you [22]	0.58
The perceived expectation of being 'constantly available' online is a key driver to stay connected during travel [7, 8]	0.67
Staying digitally connected helps you with a sense of belongingness in an unfamiliar atmosphere [22]	0.66
<i>Need for Disconnectedness</i>	
Constant connectivity might also inhibit your companion's travel experience due to your non-involvement at the moment [8, 16]	0.76
Excessive use of digital devices while travelling limits the opportunity of interacting with the locals and understanding their culture [7, 8]	0.79
Constant connectivity with your friends back home reduces your chances of making new ones on the journey [2]	0.62
Constant connectedness limits a traveler's experience by stealing away their attention from their surroundings [7]	0.69
Constant connectivity leads to information overload which adds to your psychological stress which you thought of relieving while travelling [7]	0.72
<i>Smartphone Usage</i>	
Among other digital devices, you prefer using your smartphone to manage your micro-moments (searching for a restaurant, booking a cab etc.) while traveling [16, 38]	0.66
Among other digital devices, you prefer using your smartphone for navigation (for e.g. Google Maps) while traveling [9, 16, 38]	0.51
Among other digital devices, you prefer using your smartphone to translate different languages while traveling [39]	0.58
Among other digital devices, you prefer using your smartphone to update your travel experiences on social media while traveling [16]	0.60
Among other digital devices, you prefer using your smartphone for internet browsing while travelling [16, 38]	0.61
Among other digital devices, you prefer using your smartphone for online travel bookings (flight or hotel booking) [16, 38]	0.61
Among other digital devices, you prefer using your smartphone to post customer reviews on various online platforms [9]	0.61
You prefer the convenience of your smartphone camera as opposed to a DSLR while travelling [39]	0.44*
<i>Travel Efficacy and Experience (Outcomes)</i>	
Smartphone usage brings efficiency during travel and helps you make informed decisions (helping you find cheaper deals, easier routes, etc.) [16, 38]	0.71
Smartphone gives you the confidence to travel to a new destination [16, 38]	0.57
Using a smartphone gives you better control over your itinerary and travel decisions [14, 16, 40]	0.69
Digital connectivity via smartphones is pivotal for a complete and immersive travel experience [16]	0.59

Note: SFLs - standardized factor loadings from CFA; *SFL less than 0.5, and therefore removed from subsequent analysis

extracted (AVE) exceed the pair-wise correlation between the constructs except for the correlation between smartphone usage while travel and travel efficacy and experience, indicating provisional discriminant validity [41]. As this is a new 'first test' of the

model, further refinement of measurement model is needed in future studies. Finally, the reliability test for the constructs using Cronbach’s alpha value shows good reliability of the constructs (refer to Table 3), as the values were significantly above the suggested recommended threshold of 0.7 [42].

Table 3. Descriptive statistics, reliability, and validity

	Mean	S.D.	CR	AVE	1	2	3	4	5	6
1. Psychological anxiety (3)	3.00	1.04	.820	.610	.781					
2. Behavioral anxiety (3)	3.53	.926	.794	.571	.511	.756				
3. Need for virtual comfort and security (6)	3.09	.886	.860	.512	.319	.600	.716			
4. Need for disconnectedness (5)	4.02	.685	.837	.516	.352	.004	-.071	.718		
5. Smartphone usage while travel (7)	4.05	.613	.800	.361	.243	-.001	.500	-.009	.601	
6. Travel efficacy and experience (4)	3.95	.673	.724	.416	.095	.075	.420	-.028	.813	.645

The structural equation modelling (SEM) analysis using AMOS 23.0, which employs maximum likelihood estimation procedure was used to test the framework and hypotheses. The overall model fit (χ^2) and other model fit indices of structural model obtained was well within the acceptable range; $\chi^2 = 615.471$, $\chi^2/df = 1.848$, < 2 ; RMSEA = $0.06 < 0.08$; CFI = $.902 > .90$; with the exception of TLI = 0.887 , which fell slightly below the recommended threshold cut-off of $.90$ – $.95$ but still above the conservative cut-off of 0.80 [43]. Also, but not surprisingly, the overall model fit χ^2/df obtained is significant ($p < .05$) since it is sensitive to sample size, though ideally it should have been insignificant ($p > .05$) [43].

The results of the structural model are shown in Table 4. As seen in the Table 4, 3 out of the 5 hypotheses are supported. Two hypotheses, namely psychological anxiety and smartphone usage (H1), and need for disconnectedness and smartphone usage (H4) were not supported. In support of H2, the results show that the behavioural anxiety is positively and significantly related to the smartphone usage while travel ($\beta = .203$, $t = 2.722$). Similarly, significant positive relationships were observed between virtual comfort and security and smartphone usage ($\beta = .490$, $t = 5.676$), and between smartphone usage while travel and travel efficacy and experience ($\beta = .908$, $t = 8.201$) in support of hypotheses H3 and H5 respectively.

Table 4. Structural model

Hypothesized relationships			β	S.E.	t-value	Result
H1	Psychological anxiety	→ Smartphone usage	.022	.041	.320	Not supported
H2	Behavioral anxiety	→ Smartphone usage	.203	.042	2.722**	Supported
H3	Need for virtual comfort and security	→ Smartphone usage	.490	.050	5.676***	Supported
H4	Need for disconnectedness	→ Smartphone usage	-.014	.046	-.201	Not supported
H5	Smartphone usage while travel	→ Travel efficacy and experience	.908	.135	8.201***	Supported

***Significant at $p < .001$ (2-tailed test); **Significant at $p < .01$; β –standardized coefficients; S.E. – standard error

5 Discussion and Conclusion

The findings show that psychological anxiety, although reported to be moderate (Mean = 3.00), was found to have no impact on the preference for smartphone usage for travel purpose. On the other hand, behavioural anxiety, not only was found to have a relatively higher mean of 3.53, but also was found to have a low but significant ($\beta = .203$) impact on the preference for smartphone usage for travel purpose. This could be because the ‘over use’ of smartphones due to behavioural anxiety may have enriched the users with the necessary skills and knowledge on how to use the various features of smartphones, which in turn may have translated into use during travel. This to some extent can be related to the “spillover” effects of the habits established in their daily lives into travel such as the use of smartphones [16]. The need for virtual comfort and security was found to have even greater impact on the preference for smartphone usage for travel purpose ($\beta = .490$). This is not surprising given that all of the virtual comfort and security needs of travelers (M = 3.01) such as instant messaging (face messenger, Whatsapp etc.), video chat (Skype, Whatsapp), and seamless internet browsing, along with other features such as high quality camera, media players, location and maps, and Wi-Fi and mobile hotspot capabilities can be achieved through smartphones [44]. The other contributing factor for this relationship is the increase in mobile broadband subscription, which has witnessed an enormous growth of 680% (from 270 million to 2.1 billion) between 2007 and 2013 [40] and 71% browsed the web only on their smartphones [40].

Surprisingly, the strong urge for disconnectedness (M = 4.02) has not translated to reduced use of smartphones during travel. The findings point to the addictive nature of smartphones or technology in general [1, 27]. Previous studies have reported a similar inability to control one’s online activity along with feelings of guilt about the lack of control [45]. Finally, the preference for smartphone usage for travel purpose was found to have a strong and significant impact on the travel efficacy and experience ($\beta = .908$). The finding is in line with previous studies that reported the smartphone’s ability to manage travel was found to influence and modify travel choices which in turn was found to increase unplanned travel [16]. Google’s [38] study reported 85% of the travellers decided the activities they do upon arriving at the destination. The study also shows that 85% of non-branded hotel searches with regards to ‘Today’ and ‘Tonight’ happen on smartphones. A similar study by Mintel [46] shows that half of the mobile reservations are booked with 48 h upon arrival. Moreover, 96% of users agreed smartphones was their most reliable device to get things done [47]. This shows the efficacy and experience (efficiency, control, confidence and experience) that smartphones bring for travelers, and therefore strongly rejects the notion that smartphones have adverse impact on travel [8, 9].

Regarding practical implications, the findings highlight the urgent need for change for travel companies, tour operators and hotels, especially those who are still using the traditional way of operations, to technology and systems that are smartphone friendly. The findings also show that the destination marketing organizations (DMO) need to focus on digital marketing to leverage the addictive nature of smartphone users. Also, the positive association between smartphones and travel efficacy and experience should

provide the impetus for travelers, especially the non-users to use smartphones. Finally, given that the 70% of the projected 10 billion cell phones to be smartphones by 2030 [48], and with international tourists alone forecasted to increase from 1.1 billion in 2015 to 1.8 billion by 2030 [49] this study is timely, and joins the first wave of quantitative investigation on smartphone usage during travel.

This study presents the first initial test of the model and provides the basis for further refinement of the model. However, the study has limitations with regards to generalizability given the focus is only on Indian millennials. Future studies could also work to enhance the framework by considering additional antecedents, as well as attempt to enhance the practical usefulness by testing the framework in different cultural contexts.

References

1. Lopez-Fernandez O, Honrubia-Serrano L, Freixa-Blanxart M, Gibson W (2014) Prevalence of problematic mobile phone use in British adolescents. *Cyberpsychol Behav Soc Netw* 17 (2):91–98
2. Park EA, Lee S (2015) Multidimensionality: redefining the digital divide in the smartphone era. *info* 17(2):80–96
3. Pearce P, Gretzel U (2012) Tourism in technology dead zones: documenting experiential dimensions. *Int J Tour Sci* 12(2):1–20
4. Clayton RB, Leshner G, Almond A (2015) The extended iSelf: the impact of iPhone separation on cognition, emotion, and physiology. *J Comput Mediat Commun* 20(2):119–135
5. Hannam K, Butler G, Paris C (2014) Developments and key issues in tourism mobilities. *Ann Tour Res* 44:171–185
6. Germann Molz J, Paris C (2015) Social affordances of flashpacking: exploring the mobility nexus of travel and communication. *Mobilities* 10(2):173–192
7. Paris CM, Berger EA, Rubin S, Casson M (2015) Disconnected and unplugged: experiences of technology induced anxieties and tensions while traveling. In: Tussyadiah I, Inversini A (eds) *Information and communication technologies in tourism 2015*. Springer, Cham, pp 803–816. https://doi.org/10.1007/978-3-319-14343-9_58
8. Neuhofer B (2016) Value Co-creation and Co-destruction in connected tourist experiences. In: Inversini A, Schegg R (eds) *Information and communication technologies in tourism 2016*. Springer, Cham, pp 779–792. https://doi.org/10.1007/978-3-319-28231-2_56
9. Tanti A, Buhalis D (2016) connectivity and the consequences of being (Dis)connected. In: Inversini A, Schegg R (eds) *information and communication technologies in tourism 2016*. Springer, Cham, pp 31–44. https://doi.org/10.1007/978-3-319-28231-2_3
10. Tansel U (2016) Smartphones is the biggest beneficiary of shifting consumer priorities in Asia Pacific. London – Euromonitor International
11. Marceux P (2015) India to become world's second largest internet market. London – Euromonitor International
12. Euromonitor International (2014) India in 2030: the future demographic. London – Euromonitor International
13. Deloitte (2018) Trend-setting millennials: redefining the consumer story'. http://rls.net.in/wp-content/uploads/2018/02/Trendsetting-Millennials_RAI-Deloitte.pdf. Accessed 20 Aug 2018

14. Google (2016a) Millennial travellers: mobile shopping and booking behaviour. <https://www.thinkwithgoogle.com/advertising-channels/mobile/millennial-travelers-mobile-shopping-booking-behavior/>. Accessed 18 July 2017
15. Neuhofer B, Buhalis D, Ladkin A (2014) A typology of technology-enhanced tourism experiences. *Int J Tour Res* 16:340–350
16. Wang D, Xiang Z, Fesenmaier DR (2016) Smartphone use in everyday life and travel. *J Travel Res* 55(1):52–63
17. Wozniak T, Schaffner D, Stanoevska-Slabeva K, Lenz-Kesekamp V (2018) Psychological antecedents of mobile consumer behaviour and implications for customer journeys in tourism. *Inf Technol Tour* 18(1–4):85–112
18. Douglas A, Lubbe B, Van Rooyen A (2018) Business travellers' use of mobile travel applications: a generational analysis. *Inf Technol Tour* 18(1–4):113–132
19. Belk RW (2013) Extended self in a digital world. *J Consum Res* 40(3):477–500
20. Bianchi A, Phillips J (2005) Psychological predictors of problem mobile phone use. *CyberPsychol Behav* 8(1):39–51
21. Dickinson JE, Hibbert JF, Filimonau V (2016) Mobile technology and the tourist experience: (Dis) connection at the campsite. *Tour Manag* 57:193–201
22. Silas E, Løvlie AS, Ling R (2016) The smartphone's role in the contemporary backpacking experience. *Netw Knowl J MeCCSA Postgrad Netw* 9(6):40–55
23. King ALS, Valença AM, Nardi AE (2010) Nomophobia: the mobile phone in panic disorder with agoraphobia reducing phobias or worsening of dependence? *Cogn Behav Neurol* 23(1):52–54
24. Sharma N, Sharma P, Sharma N, Wavare RR (2015) Rising concern of nomophobia amongst Indian medical students. *Int J Res Med Sci* 3(3):705–707
25. Yildirim C, Sumuer E, Adnan M, Yildirim S (2015) A growing fear: prevalence of nomophobia among turkish college students. *Inf Dev* 32(5):1322–1331
26. Oulasvirta A, Rattenbury T, Ma L, Raita E (2012) Habits make smartphone use more pervasive. *Pers Ubiquit Comput* 16(1):105–114
27. Billieux J, Maurage P, Lopez-Fernandez O, Kuss DJ, Griffiths MD (2015) Can disordered mobile phone use be considered a behavioral addiction? An update on current evidence and a comprehensive model for future research. *Curr Addict Rep* 2(2):156–162
28. Jenaro C, Flores N, Gómez-Vela M, González-Gil F, Caballo C (2007) Problematic internet and cell-phone use: psychological, behavioral, and health correlates
29. Thomee S, Harenstam A, Hagberg M (2011) Mobile phone use and stress, sleep disturbances, and symptoms of depression among young adults – a prospective cohort study. *BMC Public Health* 11(1):1–12
30. Pollet TV, Roberts SGB, Dunbar RIM (2011) Use of social network sites and instant messaging does not lead to increased offline social network size, or to emotionally closer relationships with offline network members. *Cyberpsychol Behav Soc Netw* 14(4):253–258
31. Ward CC, Tracey TJG (2004) Relation of shyness with aspects of online relationship involvement. *J Soc Pers Relationsh* 21:611–623
32. Smit BW (2016) Successfully leaving work at work: the self-regulatory underpinnings of psychological detachment. *J Occup Organ Psychol* 89:493–514
33. Lundberg U, Lindfors P (2002) Psychophysiological reactions to telework in female and male white-collar workers. *J Occup Health Psychol* 7:354–364
34. Hair JF Jr, Black WC, Babin BJ, Anderson RE (2010) *Multivariate data analysis – a global perspective*, 7th edn. Upper Saddle River, New Jersey, Pearson
35. Podsakoff PM, MacKenzie SB, Lee JY, Podsakoff NP (2003) Common method biases in behavioral research: a critical review of the literature and recommended remedies. *J Appl Psychol* 88(5):879–903

36. Kline P (1994) *An easy guide to factor analysis*. Routledge, London
37. Chen CF, Tsai D (2007) How destination image and evaluative factors affect behavioral intentions? *Tour Manag* 28(4):1115–1122
38. Google (2016c) How micro-moments are reshaping the travel customer journey. <https://www.thinkwithgoogle.com/marketing-resources/micro-moments/micro-moments-travel-customer-journey/>. Accessed 18 July 2017
39. Mang CF, Piper LA, Brown NR (2016) The incidence of smartphone usage among tourists. *Int J Tour Res* 18(6):591–601
40. Google (2016b) How people use their devices: what marketers need to know. <https://www.thinkwithgoogle.com/advertising-channels/mobile/device-use-marketer-tips/>. Accessed 18 July 2017
41. Fornell C, Larcker DF (1981) Structural equation models with unobservable variables and measurement error: Algebra and statistics. *J Mark Res*, 382–388
42. Nunnally JC, Bernstein IH (1994) The assessment of reliability. *Psychom Theory* 3(1):248–292
43. Hooper D, Coughlan J, Mullen M (2008) Structural equation modelling: Guidelines for determining model fit. *Articles*, 2
44. Jung Y (2014) What a smartphone is to me: understanding user values in using smartphones. *Inf Syst J* 24(4):299–321
45. Caplan SE (2003) Preference for online social interaction: a theory of problematic internet use and psychosocial well-being. *Commun Res* 30(6):625–648
46. Mintel (2016) Trends in travel and tourism distribution – November 2016. London – Mintel Group Ltd
47. Gevelber L (2016) Mobile has changed search intent and how people get things done: new consumer behavior data. <https://www.thinkwithgoogle.com/consumer-insights/mobile-search-consumer-behavior-data/>. Accessed 18 July 2017
48. Bremner C (2016) Future of travel 2030: adventure travel world summit presentation. London – Euromonitor International
49. Predosanu MD, Zervou S, Young-Hee K, Fahad N, Alonso F, Julian M, Kester J (2011). *Tourism towards 2030 global overview*

Digital Community



Motivations, Mobility and Work Practices; The Conceptual Realities of Digital Nomads

Grant Hall^(✉), Marianna Sigala, Ruth Rentschler, and Stephen Boyle

School of Management, University of South Australia, Adelaide, Australia
{grant.hall, marianna.sigala, ruth.rentschler,
stephen.boyle}@unisa.edu.au

Abstract. In an increasingly digitised and globalised world, a new type of business tourism has emerged, undertaken by the digital nomad (DN). Tourism operators and government agencies are increasingly seeking to attract DNs. Yet, knowledge about DNs is often based on reports that focus on glamorous aspects of the DN lifestyle whilst glossing over the negative realities of DN lifestyles. This study addresses this gap by adopting a retrospective autoethnographical approach that provides a more holistic understanding of DN life. The study collects and critically reflects on a vast amount of data related to various events and observations associated with the lead researcher's experience of living as a DN. Sans gloss, the study's findings reveal the characteristic motivations, mobility and work practices of DNs, discusses the implications of DNs for tourism practitioners that seek to attract DNs, and recommends future areas of research.

Keywords: Digital nomad · Reality · Theory · Mobility · Work practices
Challenges · Ethics · Legal

1 Introduction

To live in one land is captivity

John Donne, poet (1572-1631)
From *Elegy III 'Change'* (poem) [1]

The purpose of this study is three-fold: 1) to reveal the characteristic motivations, mobility and work practices of DNs so that conceptual understandings about them can be advanced; 2) to discuss the implications of DNs for tourism operators (e.g. hotels, tour organisers) and government agencies (e.g. tourism and investment attraction agencies), and 3) to identify directions and ideas for future research.

A digital nomad (DN) is an individual who achieves location independence by conducting their work in an online environment; DNs transfer work independence to mobility by not consistently working in one designated personal office space, and by using the possibility to simultaneously work and travel [2]. This academic conceptualisation of DNs is consistent with its definition by popular media highlighting that DNs are those working in digital environments and display nomadic characteristics [3, 4].

Despite the continuous growth in the numbers of people becoming DNs and their impacts in shaping international business, social and tourism environments [5], the literature has failed so far to better understand this phenomenon [2]. Knowledge about DNs relies on a biased and selective origin of information sources (e.g. newspaper and online articles, interviews) [2]. The latter tend to gloss over the realities of DN lifestyles to focus on the more glamorous aspects, often presenting an image of DNs which has become stereotypical: young, freedom-loving people who have embarked on a utopic international highlife, armed only with a laptop. On the contrary, the reality of a DNs life may not always represent a life as glamorous as the media may depict.

Existing academic research explains how understanding tourist segments is useful for tourism practitioners [6, 7], yet whilst DNs are increasingly treated as a unique segment of tourists within the academic literature [8–10], the ‘fragmented and non-scientific’ [2] nature of the existing information about DNs, particularly within the popular media, renders much of it to be of limited use for practitioners. By advancing the conceptual knowledge about DNs, this study presents findings that are useful for practitioners and researchers alike who seek to better understand the DNs for attracting them and penetrating this emerging tourist segment.

2 Digital Nomads

Because travel is an important part of the DN lifestyle (evidenced by the *nomad* part of ‘digital nomad’), tourism studies represent a natural starting point for the examination of DNs. As such, most of the existing academic research into DNs has been performed by those from the tourism field [9]. Whilst DNs also represent an emerging segment of workers, the examination of DNs as a labour segment is outside of the scope of this study. From the observations of the researcher (who lived as a DN from 2014 to 2018), DNs differ from conventional tourists. Whereas conventional tourists tend to visit a pre-arranged destination and enjoy their time there before returning home [10], DNs incorporate their work lives into longer term travel. Whilst DNs are both travellers and workers, they are also different to conventional business travellers. For example, whilst business travellers typically have their travel expenses covered by their employer [11, 12], DNs are more likely to have to pay their own way (unless a client is paying for them to travel somewhere). Whereas business travellers are more likely to stay for short periods and perhaps enjoy a small amount of tourism orientated activities [13], DN’s are more likely to do the opposite. Furthermore, whilst business travellers are typically men of high incomes [14–16], women and low-income workers appear to be noticeably more represented with the DN population.

DNs have been studied as a separate segment of tourists and consumers in the experience economy [8–10]. In a study of ‘global nomads’ (and not just DNs), Kanisto (2014) applied a range of disciplines (e.g. tourism studies, lifestyle migration studies and mobility paradigms) to study ‘global nomads’ (which could include DNs) [9, 10]. Whilst DNs may resemble other tourist segments, from backpackers to business travellers, they are also different from those segments, and as such, it is correct to treat DNs as a unique segment. Furthermore, because DNs are typically both tourists and entrepreneurial minded individuals who are making money whilst they are abroad [2],

governments have become interested in attracting them as a means of advancing economic development agendas. This is evidenced by the increasing availability of so called ‘Digital Nomad visas’, such as those available in Thailand and Estonia.

DNs have been mentioned in the literature since as early as 1997, when in their touchstone book titled ‘Digital Nomad’, Tsugio Makimoto and David Manners ‘*predicted that the rise of digital technology would herald a new ‘nomadic age’ in which people would be free to roam the globe virtually*’ [5, 17]. The growing influence of DNs is reflected in an increasing amount of media produced by self-identified DNs, such as blogs, videos and books [18–20], articles in major business and news publications, such as *Forbes* [21] and *The New York Times* [22] and academic articles, such as those mentioned throughout this study. However, practical, gloss-free, real-life information about DN motivations, work and mobility practices, which would be useful to practitioners who seek to attract DNs, is seldom observable within the existing popular media, such as the articles just listed.

Academic research reflects some of the prevailing motivations of DNs. The first of these themes surrounds notions of freedom. Digital nomadism is a new human lifestyle which has been made possible by the emergence of new information and communication technologies [5]. These technologies enable DNs to work in places and at times of their own choosing [5, 23]. When DNs discuss their motivations, their expressed desires frequently allude to escaping the ‘*nine-to-five prison*’ of conventional work, whilst enjoying the benefits of working from anywhere and on their own terms [3]. The second prevailing theme is about ‘*blurring of the boundaries of work and leisure*’ [5], and how DNs perceive the work and leisure aspects of their lives as being equally enjoyable, often perceiving work not as an imposed obligation, but rather as being ‘*intrinsically motivated and fulfilling*’ [2]. The third key theme is about the independent nature of the work they perform, which allows them to pursue their work, travel and leisure interests. As DNs are typically freelancers, entrepreneurs, remote workers or a combination thereof [2], they often work independently, and as such, belong ‘*to an innovative type of culture*’, which is ‘*based on the principles of individualization*’ [24].

Spending time with DNs in popular DN hotspots, Altringer (2015) observed some of their work and mobility practices [3]. Her findings detail how the number of co-working spaces around the world have ‘*exploded*’ to cater to the needs of DN’s. She explained that whilst most of the DNs she met worked independently, others formed location-independent teams, or worked for larger companies that gave them the freedom to work wherever they chose. Her research confirms the importance of online DN communities (e.g. social media sites which can provide access to information, partners, networks, advice, training); and physical ‘*work spaces*’ (e.g. DN dedicated coworking spaces, conferences and events).

DNs ‘*find inventive ways to support themselves*’ [5], and whilst the technologies that enable DNs are new, people of all working ages live as DNs [2, 3]. Altringer (2015) explained how many DNs are more ‘*mid-career than millennial*’, before pointing out that the most successful DNs ‘*have in-demand skills, have proven themselves already, and are arriving at their own definitions of a high quality of life*’ [3].

There is no a widely agreed number of DN’s, but indicators suggest that DNs represent a sizable group. The MBO Partners 2018 State of Independence in America research report found that 4.8 million independent workers in the US currently describe

themselves as digital nomads [25]. There are DN Facebook Groups (e.g. *Digital Nomads Around The World*) with tens of thousands of members, promoting popular DN conferences, camps, books, tools, shared workspaces, destinations and advice. Global DN hotspots have emerged, such as Chang Mai in Thailand, which hosts thousands of DNs who currently work there [26].

3 Methodology

This study has adopted a retrospective autoethnographical approach for providing a more holistic understanding of DNs. Autoethnographers incorporate aspects of both autobiography and ethnography into their research [27]. To that end, events, personal experiences and observations associated with the researcher's experience of living as a DN from 2014 to 2018 were analysed and critically reflected upon to inform this study (Table 1). Autoethnography is a research and writing approach which is used to describe and analyse (graphy) personal experience (auto) to understand a cultural experience (ethno) [27]. Ethnography is traditionally associated with social anthropological research, whereby the researcher would visit a foreign land, access a group, such as a tribe or village, and spend time with that group (sometimes years), with the intention of learning more about its culture [28]. In this study, the autoethnographer visited Asia, where he observed the DN "tribe" for three years and learned about their culture. Through the addition of personal experiences and the critical reflection of those experiences, Ellis et al. (2011) argued that autoethnography '*expands and opens up a wider lens on the world*' [27].

This study has adopted a retrospective approach to the autoethnographical, since the analysed events and observations occurred in the past and when the researcher had no intention of recounting the experience in research and writing [28]. 'Observing behaviour', 'listening to what is said' and 'participant observation' are key aspects of ethnography [28]. Reflecting this, thirty-one research observations are embedded within the autoethnographical account which were derived from three sources: the researcher's recounted experience of being a DN; through discussions with fellow DN's; and the researcher's observations of other DNs' behaviours. DNs' behaviours were observed by monitoring: the discussions within DN focussed social media groups; the online activities of DN's who were sharing details of their working practices on social media; and the content about, or produced by DNs (such as articles, blogs, webpages, books and YouTube videos). To reduce the autoethnographers possible self-bias, his data interpretation was triangulated by using the other authors to check his personal comments and their given interpretation, and subsequently check that interpretation with theory. Nonetheless, the authors accept Hayano's (1979) assertion that an 'insider's position... is not necessarily an unchallengeable "true" picture', but rather 'represents one possible perspective' [29].

4 Retrospective Autoethnography: Key Observations

In July 2014 the researcher left his job in the Australian Government's Department of Prime Minister and Cabinet to become a DN. He was not aware of the term 'digital nomad' at the time, but would eventually come familiar with the term and self-identify as a DN. 'Digital nomad' is not a term that everyone is familiar with, even among people who could be accurately categorised as DNs (Observation.1). The job the researcher had left was in Perth, Western Australia, and the first port of call on his DN journey was his home city of Adelaide, in South Australia. Largely, the visit home, in which he was accompanied by his wife and two children, was to prepare for their move abroad, by doing things such as selling the family car, storing belongings, obtaining passports for the children, getting visas and spending some time with family and friends before departing (Ob's.2&3). The preparations the researcher made in advance of departing are typical of the preparations that many DNs make before they head abroad. Such preparations can be very time-consuming and include layers of bureaucracy which need to be navigated (Ob.3).

The researcher was to establish an international event management and consulting business. Like many others, the researcher was not content to work a conventional 9-5 life in an office job, and he craved the freedom to work when, where and how he wanted, on projects that were fun, interesting, and important to him (Ob.4). At thirty-nine years of age, he was more mid-career than millennial, with an established professional network, experience in event management, post-graduate university qualifications and the skills that he believed would be sought after within the market. The researcher and his family based themselves in Phan Thiet, Vietnam, and through attending networking meetings in Ho Chi Minh City, some two-hundred kilometres east of Phan Thiet, he met and became aware that there are many DNs of his own age and older, who were similarly educated, qualified and experienced (Ob.5). Many of the conversations that the researcher had with other DNs centred around shared desires for freedom from conventional work situations, desires which appear to be characteristically held amongst of DNs. The researcher's business took an agency model, which meant that was the sole employee, and all work was performed by himself, or by independent contractors whom he would engage on a need-by-need basis (Ob.6). This business model was selected, because by using independent contractors, work could be performed in any location, so long as a willing contractor could be found to work in a given location. Through his observations and conversations with other DNs, it became apparent to the researcher that many DNs structure their businesses in a similar way so that they can operate internationally (Ob.7).

Phan Thiet was chosen as the family base for many reasons, the main one being that it is researcher's wife's home town and she has family there. DNs will often be attracted to places where they have existing connections, such as friends or family (Ob.8). Phan Thiet also offered an 'attractive leisure lifestyle' with great weather and many beautiful beaches and resorts for the researcher and his family to visit, and furthermore, it was in Asia, the target market area for the researcher's new business venture. Whilst the researcher observed that many DNs choose to base themselves in idyllic locales (such as beachside spots or mountain hideaways), there are also many

DNs in places that appear more idyllic in terms of business opportunities and nightlife, than in natural beauty, such as Bangkok and Ho Chi Minh City (Ob.9). DNs also are often attracted to live in DN hotspots, such as Chang Mai in Thailand and Tallinn in Estonia, locations where a sizeable DN population already exists, because it means that they can be assured that they will be able to access many of the resources they need in that location, such as coworking spaces and established networks (Ob.10). Phan Thiet is not a DN hotspot, and whilst the researcher met DNs who passed through Phan Thiet, he only met one DN there who was actually based there, an American consultant to the health industry. As Vietnam is a developing nation, the cost of living is much lower than many places, such as Australia, and as such, the researcher calculated that this low-cost of living would allow him about three times longer in which to establish his business before his savings ran out than he would have had he remained in Australia. Through his observations and conversations with other DNs, the researcher learned that much like himself, DNs are often attracted to low-cost locations, such as those in developing nations, in which they can make their available funds last for longer time (Ob.11).

The researcher worked alone at his computer for many months, creating a website, developing a business plan and building the desired networks. Working on a computer, as per the ‘digital’ in ‘digital nomad’, is a work life situation that DNs are accurately characterised by (Ob.12). The researcher found this to be a very lonely process, as it required little interaction with anybody else (Ob.13). Once the researcher began meeting other people, who, like him, could work whenever and wherever they wanted, he became aware of the term ‘digital nomad’. He became increasingly engaged with online DN social networking groups (some of which have tens of thousands of members), as he could access a great deal of valuable resources within these groups (such as tips, information and contacts) (Ob.14). It was also during this time that the researcher observed the importance of personal branding to DNs, who use personal branding efforts to demonstrate their work professionalism and ethical values (which the researcher observed were also very important to many DNs) (Ob’s.15&16). Because DNs often lack the funds to undertake mass-marketing efforts, they often turn to social media because it represents a low-cost form of advertising when compared to more conventional approaches, such as purchasing media advertising. As such, many DNs, including the researcher, invest their time to develop their own personal brand, through content production that may include videos, blogs, or social media posts.

The researcher’s awareness grew of what is referred to as the ‘DN community’, and how people within the DN community spoke of ‘the DN experience’ and ‘the DN journey’. He learned that the international DN community is gigantic and expanding, and how there are large DN related conferences, multi-day DN boat cruises on ocean liners, a myriad of DN “meet-up” events in many cities, DN focused co-working and co-living spaces, and other resources of which DNs can access to aid them in achieving their DN aims (Ob.17). The researcher noticed how DNs would talk of both the international DN community, and of location specific DN communities, such as the DN ‘hotspot’ communities of Ubud in Indonesia and Medellin in Colombia (Ob.18). Whilst many DNs self-promoted themselves as DNs, the researcher chose not to, largely because he didn’t want prospective clients to think that he was more interested in travel or sitting by the beach than the work they might engage him to do (Ob.19).

The researcher began to observe the inventive ways in which DNs make money, and whilst most DNs he met were ‘freelancers, entrepreneurs or remote workers or a combination thereof’ [2], he also met DNs doing some highly unique work. One DN the researcher met made money via an online pyramid scheme which taught card tricks that travellers could use in bars to make money by winning bets (Ob.20).

Whilst the researcher was permitted to work legally in Vietnam, largely on account of being married to a Vietnamese national, the legality of working as a DN is a topic of concern for DNs. Commonly, tourists and expatriate workers in Phan Thiet would obtain their visa advice from tourist operators, such as local hotels and tour companies, who would often help them to make visa arrangements. DNs will often enter a country on a tourism visa, but because they then subsequently work following entry, they are, in many cases, arguably, and at least technically, breaking the law. In most countries, the law is yet to come to grips with the concept that people may come to a country and work, but yet earn their money from another country. Because DNs are not working in a conventional job role within the host country, directly for an employer within that country, it can be argued that by earning money from a third country, that DNs are not contravening the spirit of the law of their host country any more than someone sending a work email whilst on holiday is. As such, when a DN arrives in a new country and are asked by a customs official at the border or airport as to the purposes of their visit, DNs will often respond that they are visiting as a tourist (even if they intend to work). This approach is not about deception, but rather a practical approach to avoiding problems that may occur when operating within a grey legal area. Working within such a legal grey area poses many challenges to DNs, and particularly those who prefer to work within a more solid legal environment (Ob.21). Working legally is not only a legal consideration for many DNs but also an ethical one for many who doubt the legality of their actions. Ethical questions about the ways in which DNs operate, and the effects of their operations on the people and places around them, are frequent topics of conversations among DNs, and particularly those working in developing countries. For example, when a location becomes a DN hotspot, what are the implications for local people regarding important factors like the cost of living? DNs are often concerned that the actions of people within the DN community can amount to exploitation of people in developing and third-world nations (Ob.22). Whilst visual imagery frequently portray laptop carrying DNs as being successful, freedom-loving and often exceedingly good-looking people, who thrive in an environment of adventure, swimming pools and spectacular locations, the reality is that many DNs struggle financially, often living a much more difficult and frustrating life than their Instagram accounts may indicate (Ob.23). When DNs are struggling financially, they are often motivated to obtain work within the informal economy, sometimes in breach of their visa conditions (Ob.24).

The researcher slowly began to obtain clients from a range of countries, some of whom were engaging him to work on projects on a third country, such as an Australian project in Indonesia, and a British one in Thailand. Among the projects the researcher worked on, a handful were collaborative projects with other DNs (who were often in other locations), and through doing this he learned how DNs often collaborate in order to reduce costs and maximise potential outputs (Ob.25). He mostly worked from his laptop in Phan Thiet, but often travelled for work as well, frequently to other cities in

Table 1. Summary of observations

Observations relating to DN conceptualisation	Observations relating to DN motivations	Observations relating to DN mobility and work practices
<ul style="list-style-type: none"> • Ob.1. People who could be accurately categorised as DNs are not always aware of the term ‘digital nomad’ • Ob.2. DNs are not always single people, and can often be accompanied partners and families • Ob.5. The DN community consists of people of all working ages • Ob.13. DNs can suffer from loneliness due to the nature of undertaking computer based work • Ob.16. Maintaining ethical values is of importance to many DNs • Ob.18. There is an international DN community, and location specific DN communities, which includes noted DN hotspots • Ob.22. There are numerous ethical issues relating to the DN community, including the potential negative effects that their operations may have on the people and places they travel to • Ob.23. Many DNs struggle financially whilst abroad • Ob.27. Some DNs are more geographically mobile than others • Ob.28. Some DNs establish a permanent or semi-permanent base, and some live and work in an almost perpetual state of travel • Ob.30. DNs often return home from their travels due to family considerations 	<ul style="list-style-type: none"> • Ob.4. People are motivated to become DNs as they crave the freedom to work when, where and how they want, on projects they consider to be fun, interesting and important • Ob.8. DNs will often be attracted to locations where they have existing personal connections, such as family or friends • Ob.9. Whilst many DNs base themselves in locations that offer attractive leisure lifestyles, many will also base themselves in locations that provide good business opportunities • Ob.10. DNs are often motivated to base themselves in locations where there is already a sizeable DN population, thus giving them access to desirable resources such as coworking spaces and established networks • Ob.11. Many DNs seek to live in low-cost destinations as a way to make their funds last longer • Ob.29. Maintaining and prolonging one’s DN lifestyle is of high concern to DNs and ideas on how to do so are a frequent topic of conversation (Ob.28) 	<ul style="list-style-type: none"> • Ob.3. The preparations required to embark on a DN lifestyle can be extensive and time-consuming, often including a large range of legal and bureaucratic processes to navigate • Ob.6. DNs may work alone and engage independent contractors on a need-by-need basis • Ob.7. DNs often structure their businesses in a way that enables to them to operate internationally • Ob.12. DNs characteristically spend a great deal of time working alone using computers • Ob.14. DNs can access a range of resources through DN related groups on social media platforms • Ob.15. Many DNs invest time and resources in personal branding efforts • Ob.17. There are many events and resources that allow DNs to meet each other face-to-face • Ob.19. Not all DNs want it widely known that they are DNs as it may be inconsistent with the image they wish to project of themselves or their business • Ob.20. DNs often find inventive ways to make money • Ob.21. DNs often operate within a legal grey area in relation to their visa conditions, and this is a source of anxiety for many DNs

(continued)

Table 1. (continued)

Observations relating to DN conceptualisation	Observations relating to DN motivations	Observations relating to DN mobility and work practices
<ul style="list-style-type: none"> • Ob.31. DNs can maintain the capacity to be DNs after they have returned from abroad 		<ul style="list-style-type: none"> • Ob.24. When DNs are struggling financially, they may be motivated to work within the informal economy, potentially in violation of their visa conditions • Ob.25. DNs often seek to collaborate with others to achieve their aims • Ob.26. DNs often have to pay their own travel expenses (as opposed to business travellers whose employers typically pay for travel expenses)

Ob. = Observation number

Vietnam, but occasionally to other countries too, including Singapore, India, Thailand and Australia. Usually, such trips were self-funded, but sometimes a client covered the expenses (Ob.26). Whilst he was travelling frequently, he was not as mobile as many other DNs whom he met during this time, who existed in a seemingly perpetual state of travel, and rather than having a base, constantly moved from one location to another (Ob's.27&28).

In December 2017, the researcher and his family moved back to the researcher's home city of Adelaide in South Australia. This decision was taken as their children had reached primary school age and both the researcher and his wife felt that the children would receive a better education in Australia. Furthermore, as Adelaide is the researcher's home city, his aging parents there hadn't had the opportunity to spend much time with their grandchildren in the previous years. Among DNs, ideas about how to maintain one's DN lifestyle and prolong it are a frequent topic of conversation (Ob.29). Conversely, 'going home' is also a frequent topic of discussion. Through his observations, the researcher realised that considerations such as children's education options and family matters are important and often deciding factors for DNs when deciding whether and when to return home (Ob.30). Whilst the researcher is now based in his home town, he still self-identifies as a DN, because he maintains the capacity to use digital technologies to work wherever and whenever he likes, and he intends to use this capacity to continue to work digitally, and to travel widely (Ob.31).

5 Key Findings and Implications

With practitioners in mind, this study aimed to provide a more holistic, gloss-free (and therefore more useful) representation of DNs. By reflecting on the autoethnographic observations, five key findings emerged in relation to DN motivations, mobility and work practices:

Finding 1. DNs are motivated to become DNs due to the freedom it brings (see Observation 4). Practitioners need to be cognisant that the desire for freedom is a characteristic motivation for people becoming DNs. Such knowledge will allow for a greater alignment of the design of initiatives and infrastructure to attract DNs with the motivations of DNs, thus contributing to the effectiveness of such investments.

Finding 2. Whilst DN's are motivated to base themselves in locations with attractive leisure features, DNs are also motivated to locate themselves in places where they can access desired connections, such as with people they already know, existing DN communities, or with markets or industries they wish to engage with (Ob's.8, 9, 10 and 18). Practitioners need to identify their value proposition and develop the appropriate infrastructure, services and amenities for DNs who may be considering their region as a base or a place to visit, in order to attract the desired amount of DNs. Equally important is the development of the social capital (networks and collaborations) amongst the local communities, DNs and other entities which may provide professional and emotional support to DNs, thus enabling them to integrate, perform and thrive in their new environment.

Finding 3. As a result of characteristic DN work and mobility practices (such as undertaking solo computer work and having nomadic characteristics), DNs may face issues such as loneliness and financial pressures, which may be amplified when they are unable to access health or financial safety nets that may be available in their home nations, such as health care or welfare services (Ob's.12, 13, 21, 23 and 24). DNs are an increasing demographic, who, whilst living away from home, may be unable to access the wellbeing and financial support services they require. Understanding these challenges will enable practitioners who design products, services, initiatives and infrastructure to attract DNs, to include functions within their design that may help to negate these issues, thus making their destination more attractive to DNs.

Finding 4. DN work and mobility practices, which typically involve 'nomadic' practices incorporating international travel, mean that DNs often need to negotiate cumbersome bureaucratic and legal processes. These challenges may be amplified when there is a need to negotiate such protocols whilst abroad (sometimes in multiple countries), and lack clear legal frameworks for DNs to legally work within (Ob.3). Further research into the bureaucratic and legal hurdles that DNs face can help practitioners. By having the required knowledge, tourism operators can provide more informed assistance to their DN clientele (such as visa advice), whilst for governments, the awareness of such hurdles can serve as a starting point for reducing them (and thus making their region more attractive to DNs).

Finding 5. Within their work practice, DN's often consider complex ethical questions, which may be amplified by a lack of knowledge about the impacts that DN's have on the places they visit, and the people who already live there (Ob's.16, 21). Typically, DN's want to live an ethical life that benefits people around them and the planet generally, and as such, they want to know more about how their actions and those of their community impact on the world around them. As the number of DN's increase, unethical behaviours by DN's (such as undertaking illegal work practices) are likely to also proportionally increase, which may bring about negative outcomes to a region, with potentially long-term and irreversible effects. Tourism operators will benefit from knowing more about the activities and risks their DN clientele may engage themselves in, and also about DN desires in regard to working ethically. Governments seeking to attract DN's need to be informed of the risks of unethical behaviour in order to initiate preventative actions, and also to encourage (and help facilitate) DN involvement in ethical activities.

6 Conclusions and Recommendations for Future Research

The DN lifestyle offers benefits for those who decide to become DN's. Similarly, as an emerging segment of workers and tourists, DN's can benefit the places in which they travel, not only economically, but also by enriching and diversifying the social and cultural life of the place. To ensure these benefits are obtainable, we need to continue learning more about DN's by unravelling both the positive as well as the negative side (i.e. obstacles, difficulties) of their lives and aspirations. This study has presented the observations of one DN, and as such is susceptible to the biases of the autoethnographer. Hence, future research is needed to confirm, refine, expand and enrich the findings of this study by conducting a larger scale study (incorporating many cultures, DN destinations and professions/specialisations). Given the still limited knowledge in the field, further qualitative research focusing on DN's is required to better understand the inner perceptions and experiences of those living, working and traveling as DN's.

References

1. Donne J (nd) Elegy 3 'Change', poem. <https://www.poemhunter.com/poem/elegy-iii-change/>. Accessed 9 Sep 2018
2. Reichenberger I (2017) Digital nomads – a quest for holistic freedom in work and leisure. *Ann Leis Res* 21(3):1–17. <https://doi.org/10.1080/11745398.2017.1358098>
3. Altringer B (2015) Globetrotting digital nomads: the future of work or too good to be true?. *Forbes*, 22 Dec 2015. <https://www.forbes.com/sites/forbesleadershipforum/2015/12/22/globetrotting-digital-nomads-the-future-of-work-or-too-good-to-be-true/#e6e2627594e3>. Accessed 3 Nov 2017
4. Boydell F (nd) What is a digital nomad? Knomo London. <https://www.knomobags.com/row/blog/what-is-a-digital-nomad>. Accessed 3 Nov 2017
5. Richards G (2015) The new global nomads: youth travel in a globalizing world. *Tour Recreat Res* 40(3):340–352. <https://doi.org/10.1080/02508281.2015.1075724>

6. Frochot I, Morrison A (2000) Benefit segmentation: a review of its applications to travel and tourism research. *J Travel Tour Mark* 9(4):21–45. https://doi.org/10.1300/J073v09n04_02
7. Kastenholz E, Davis D, Paul G (1999) Segmenting tourism in rural areas: the case of north and central Portugal. *J Travel Res* 37(4):353–363. <https://doi.org/10.1177/004728759903700405>
8. Franks K (2016) Digital Nomads: the drivers and effects of becoming location independent. Thesis, Breda University of Applied Science, Netherlands
9. Mouratidis, G (2018) Digital nomadism: travel, remote work and alternative lifestyles. Masters Thesis, Lund University, Lund, Sweden
10. Kannisto E (2014) Global Nomads: challenges of mobility in the sedentary world. Ridderprint, Ridderkerk, Netherlands
11. de Jager J, Fourie L (2004), Tourist satisfaction: airline service performance as a satisfaction determinant. In: Pineda F, Brebbia C, Mugica, M (eds) Sustainable tourism, pp 275–284
12. Noone M, McGuire K (2015) Impact of attitudinal loyalty on the frequent unmanaged business traveler's use of price and consumer reviews in hotel choice. *J Revenue Pricing Manag* 15(1):20–36. <https://doi.org/10.1057/rpm.2015.48>
13. Martínez-García E, Ferrer-Rosell B, Coenders G (2012) Profile of business and leisure travelers on low cost carriers in Europe. *J Air Transp Manag* 20:12–14. <https://doi.org/10.1016/j.jairtraman.2011.09.002>
14. Aguilera A (2008) Business travel and mobile workers. *Transp Res* 42(8):1109–1116. <https://doi.org/10.1016/j.tra.2008.03.005>
15. Harvey G (1987) Airport choice in a multiple airport region. *Transp Res* 21(6):439–449. [https://doi.org/10.1016/0191-2607\(87\)90033-1](https://doi.org/10.1016/0191-2607(87)90033-1)
16. Newth F (2009) The new strategic imperative: understanding the female business traveler. *Int Bus Econ Res J* 8(11):51–64. <https://doi.org/10.19030/iber.v8i11.3185>
17. Makimoto T, Manners D (1997) Digital nomad. Wiley & Sons, Hoboken, New Jersey
18. Adalid A (2015) The ultimate guide on how to become a digital nomad. Blog post, I am Aileen, 24 Dec 2015. <https://iamaileen.com/how-to-become-a-digital-nomad-guide/>. Accessed 18 Apr 2018
19. Cornell C (2016) 7 ways to get anything anywhere. Blog post, Spartan Traveller, 13 Nov 2013, viewed 18 Apr 2018. <http://spartantraveler.com/get-anything-anywhere/>. Accessed 18 Apr 2018
20. Gussekloo A, Jacobs E (2016) Digital nomads: how to live, work and play around the world. Location-Independent Publishers, New York
21. Pofeldt E (2018) Digital nomadism goes mainstream. *Forbes*, 30 Au 2018. <https://www.forbes.com/sites/elainepofeldt/2018/08/30/digital-nomadism-goes-mainstream/#646833e54553>. Accessed 18 Oct 2018
22. Chayka K (2018) When You're a 'Digital Nomad,' the world is your office. *New York Times*, 8 Feb 2018. <https://www.nytimes.com/2018/02/08/magazine/when-youre-a-digital-nomad-the-world-is-your-office.html>. Accessed 19 Oct 2018
23. Moravec JW (2013) Knowmad society: the “new” work and education. *On the Horizon* 21(2):79–83. <https://doi.org/10.1108/10748121311322978>
24. Dobrinskaya D (2016) Nomadic lifestyle in the network society: sociological aspect. In: Third international transdisciplinary research and practice online conference, pp 116–120
25. MBO Partners (2018) State of Independence in America'. Research report, at <https://www.mbopartners.com/uploads/files/stateofindependencereports/StateofIndependence-ResearchBrief-DigitalNomads.pdf>. Accessed 19 Oct 2018
26. Dodgshun J (2017) Waylaid in nomad heaven. *Otago Daily Times*, 23 May 2017. <https://www.odt.co.nz/lifestyle/travel/waylaid-nomad-heaven>. Accessed 28 Oct 2018

27. Ellis C, Adams T, Bochner A (2011) Autoethnography: an overview. *Hist Soc Res* 36 (4):273–290
28. Bryman A (2001) *Social research methods*. Oxford University Press, Oxford
29. Hayano D (1979) Auto-ethnography: paradigms, problems, and prospects. *Hum Organ J Soc Appl Anthropol* 38(1):99–104. <https://doi.org/10.17730/humo.38.1.u761n5601t4g318v>



Influence of Offline Activities and Customer Value Creation on Online Travel Community Continuance Usage Intention

Dandison Ukpabi¹(✉), Heikki Karjaluoto¹, Sunday Olaleye²,
and Emmanuel Mogaji³

¹ University of Jyväskylä, Jyväskylä, Finland
{dandison.c.ukpabi, heikki.karjaluoto}@jyu.fi

² University of Oulu, Oulu, Finland
sunday.olaleye@oulu.fi

³ University of Greenwich, Greenwich, UK
e.o.mogaji@greenwich.ac.uk

Abstract. The purpose of this study is to empirically test a model that examines the roles of offline activities and customer value creation on tourists' continuance use of online travel communities (OTCs). Hypotheses were tested through a sample of 251 respondents on Amazon Mechanical Turk (MTurk). SmartPLS structural equation modelling was used to test the structural model. Results indicated that offline activities significantly influence hedonic and social values, while this support was not found with functional value. Similarly, while offline activities positively influence continuance usage intention, no positive relationship was established between offline activities and recommendation intention. Additionally, the three dimensions of customer value creation positively influenced continuance usage intention. This study suggests that in planning offline activities, managers of OTCs must understand the dynamics of customer value creation in order to enhance social bonds among members and continuous usage of the OTC.

Keywords: Offline activities · Social presence · Customer value creation
Continuous usage intention

1 Introduction

Online travel communities (OTCs) are important for both consumers and tourism firms. OTCs provide consumers with the opportunity to make informed travel decisions through reading about and learning from the experiences of others, who share their stories on such platforms [1], while tourism firms use them as strategic platforms to foster customer engagement and deepen consumer ties to their brands [2]. As organisations increasingly host OTCs, consumer interest in these platforms also steadily increases. For instance, recent reports indicate that while TripAdvisor currently welcomes an average of 455 million unique monthly visitors, Facebook is home to 2.13 billion active users [3, 4]. For Facebook, this is an approximate 73% increase from its 2013 records, which calculated 1.23 billion active users [5]. This promising trend has spurred both firms and private individuals to set up their own online communities.

In spite of this positive trajectory for online communities, the recent experiences of such notable firms as British Airways, AirFrance, Sony, Dell, and the British Broadcasting Corporation—all of which shut down their online communities shortly after launch [6]—create serious concerns that raise critical questions about the sustainability of OTCs. Critics have highlighted that so long as online deviant behaviours remain unchecked, users will continue to lose interest in participating in such communities [7]. In order to improve the confidence of participants, tourism and travel sites are organising offline activities as part of their strategy to reinforce and consolidate established online relationships and maintain a loyal customer base [8]. To this end, offline fan clubs that host informal meetings and gatherings are common in recent times. In most cases, these forums provide a company with an opportunity to propagate its brand and generate positive word-of-mouth reviews [9].

However, evidence from the relationship marketing body of knowledge reveals that consumers are wary of relationships or purchase experiences that accrue little or no value [10, 11]. Customer value is a cardinal determinant of relationship continuance, because consumers often perpetuate the relationship from which they derive the maximum value [10]. Accordingly, firms will settle into advantageous positions if they exploit how offline activities impact customer value. Interestingly, despite numerous investigations on customer value, literature is scarce regarding critical questions relating to offline activities and customer value and how they influence continuance intention in OTCs. Additionally, the studies that examine the post-adoption behaviour of consumers in OTCs are few [12]. This paper aims to fill this gap by developing a model to test the role of offline activities in perceived customer value and their effects on continuance intention in OTCs. This paper seeks to contribute to OTC customer post-adoption behaviour literature by examining the importance of offline activities and how they affect different components of customer value in continuance participation. In so doing, it examines the theoretical issues and managerial practices that foster OTCs.

2 Literature Review and Theoretical Framework

2.1 OTCs

OTCs offer a communication and networking platform for users and a forum where people can interact, share thoughts on places of interest, and provide reviews on areas they have visited [12, 13]. It also offers the opportunity for travellers to discover what other people think about destinations and facilities [2]. OTCs are changing travellers' consuming behaviour, as travellers rely on the opinions and recommendations of other travellers. These communities rely on members to create content relevant for others. Developing and sustaining communities has become a critical issue for community managers, as active participation is crucial for their long-term survival [12, 14]. To make communities more cohesive, they often organise events and offline activities to offer an opportunity for community members to engage and interact. Previous studies on OTCs have focused on the antecedents of community involvement and contribution [15, 16] and consumer intentions to participate [2]. Additionally, [2] found that the perceived usefulness of provided information positively influences attitudes toward participation, just

as [15] earlier found that participants are motivated to contribute to online communities by social and hedonic benefits. However, the members' sense of belonging increases when offline activities are organised that maintain previously formed social ties [8].

2.2 Conceptual Model and Hypotheses

2.2.1 Social Presence and Customer Value Creation in OTCs

According to Short et al. [17], social presence theory describes the “degree of salience of the other person in the interaction and the consequent salience of the interpersonal relationships”. The theory is related to two social psychology concepts: “intimacy”—referring to physical distance between communicators and barriers to communication; television offers greater intimacy than radio—and “immediacy,” a measure of the psychological distance that a communicator puts between himself or herself and the object of his/her communication. With the advancement of communication technology and the related increasing usage of the internet for communication and interaction, [18] noted that the social presence theory can contribute to a better understanding of social behaviour in mediated environments. Thus, a stream of research has identified social media as platforms with a high social presence, as they afford communicators the opportunity to present themselves to others as “real people” [19–21]. This implies that social media afford users the opportunity to better understand those they are in contact with through their profiles and real time chat. However, critics contend that with the abundance of deceitful profiles in social media, offline activities such as phone calls and physical meetings are necessary to increase social presence among friends on online platforms [22]. Accordingly, members of OTCs can be encouraged to strengthen their online social ties through offline phone calls. Managers of OTCs can increase the customer value of their sites when offline activities, such as phone calls and face-to-face meetings and gatherings, are regularly organised for members.

Zhang, Guo, Hu, and Liu [23, p. 231] define customer value creation as “the process by which producers and consumers, as peer subjects, co-create value for themselves and each other.” This involves dialogue and interaction between the firm and the customer for mutual benefits. Early scholars viewed customer value as a trade-off between quality and price [24]. This perspective measures customer value as a function of the quality of the product and the price paid. Several years later, customer value was conceptualized into five dimensions: functional, conditional, social, emotional, and epistemic values [25]. Subsequently, scholars have measured value as both a unidimensional and multidimensional construct [11, 26–28]. From an online social network perspective, [23] presented customer value creation as a three-dimensional construct, having functional, hedonic, and social values.

Functional value is based on the assumption that individuals are rational problem-solvers [23]. From the perspective of OTCs, functional value encompasses their members' need for information that leads to financial savings and a high quality of service. Firms can send offline messages to members concerning information on new offerings. Additionally, offline activities can be organised to promote the firm's offerings.

Hedonic values have been conceptualized as the feelings and emotive aspects of community involvement [29]. Lee and Hyun [30] report that enjoyable features are critical in influencing participation levels in OTCs. Thus, this argues that incorporating

enjoyable features leading to fun and pleasure in offline activities will increase customer value.

Social value is considered an independent dimension in total customer value that is used to enhance user status and self-esteem [31]. These values are derived as evidence of a long-term engagement within the community; they represent a symbolic status used to emphasise unique traits [31]. Previous research has only focused on online engagement for co-creating consumer values, but little is known about the influence of offline activities. Matei [32] posits that offline activities can foster and enhance connections within the OTC. A strong sense of social presence is expected to lead to a strong intention to engage with the offline activities of the OTC, as the presence of other members can complement online activities and strengthen the ties within communities [8, 17].

Accordingly, the following hypotheses are proposed

H1: The offline activities of OTCs positively influence their functional value.

H2: The offline activities of OTCs positively influence their hedonic value.

H3: The offline activities of OTCs positively influence their social value.

2.2.2 Continuance Intention

Members' continued interest and willingness to engage in a community will have an impact on the long-term survival of an OTC [33]. It is important that members stick together; this is essential in attracting and retaining members [34] and encouraging the continuous use of the platform. Liang, Ho, Li, and Turban [35, p. 78] described the continuance intention to use OTCs as "an indicator that shows the degree to which a user intends to continue using the social networking site." This study examines continuance intention because social media has significantly changed consumers' decision making process and greatly influenced their patronage of hospitality and tourism services. Accordingly, this study will reveal strategies critical for managers of destinations, airlines and hospitality services to enhance consumers' continuous participation in their OTCs. Thus, it is argued that members will continue to use OTCs that promote activities and information sharing that are likely to satisfy functional, hedonic, and social values. Thus, the following hypotheses are proposed:

H4: The functional value of OTCs positively relates to continuance intention.

H5: The hedonic value of OTCs positively relates to continuance intention.

H6: The social value OTCs positively relates to continuance intention.

H7: The offline activities of OTCs positively relate to continuance intention.

H8: The offline activities of OTCs positively relate to recommendation intention.

2.2.3 Recommendation Intention

When members are satisfied with their experience on a platform, they are more likely to invite others [12, 36]. Members' desire to continue using the platform is underpinned by their satisfaction and motivates them to share their positive experiences with others [37, 38].

Accordingly, the hypothesis below is proposed:

H9: Continuous intention of OTC use positively relates to recommendation intention.

3 Research Method

3.1 Sample, Data Collection and Survey Development

The data for this study was collected from Amazon Mechanical Turk (MTurk; <https://requester.mturk.com>) in August 2018, as specified by [30]. To ensure that participants were members of OTCs and maintained accounts therein, the study requested that they indicate the OTC to which they belonged. In total, 251 usable questionnaires were received and analysed with SmartPLS 3.27. The operational definitions of the six constructs examined (Fig. 1) are based on previous studies (Table 1). All six constructs were measured with seven-point multiple items adapted from existing studies.

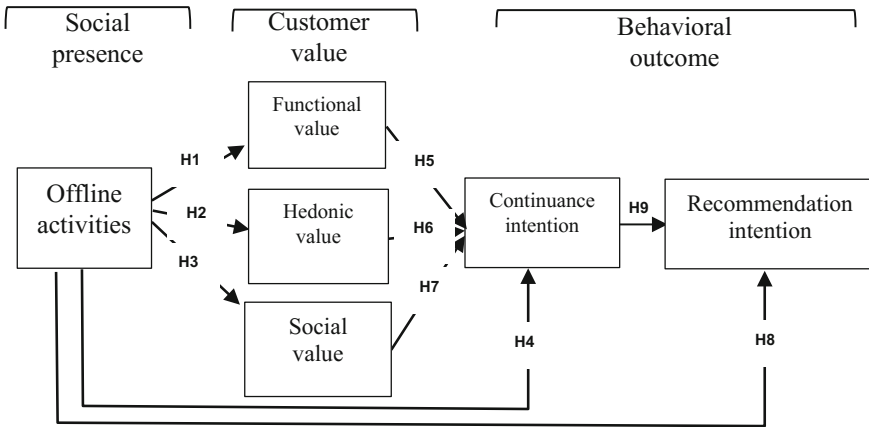


Fig. 1. Conceptual model

Table 1. Operational definitions of constructs

Construct	Extant operational definition	Reference
Offline activities (OA)	Offline interactions aimed at strengthening the bonds of online community members	[8]
Functional value (FV)	Consumer evaluation of information based on its usefulness and accessibility	[23]
Hedonic value (HV)	Consumer evaluation of information based on its ability to offer comfort, pleasure and fun	[23]
Social value (SV)	Consumer evaluation of social media based its ability to satisfy their need for social interaction	[23]
Continuance intention (CI)	Consumer intention to continue using the social network site	[35]
Recommendation intention (RI)	Consumer willingness to share their positive experiences with others and convince them to also use the social network site	[23]

4 Analysis and Results

4.1 Demographic Variables

The sample was male-dominated (65.7%). Marital statuses included single (51.8%), married (40.2%), co-habiting (5.2%), and divorced (2.8%). In terms of education level, bachelor’s degree holders were most prominent (68.1%), followed by high school or diploma (19.1%), master’s degree (11.2%), and Ph.D. (1.6%) holders. Most respondents were professionals (64.1%), followed by technicians (17.5%), students (10.4%), homemakers (5.6%), and civil servants (2.4%). The monthly income levels (in USD) of the respondents were in the order of \$3,100–\$4,000 (15.5%), \$4,100–\$5,000 (11.6%) and \$5,100 or more (12.4%). The respondents that visited travel sites twice a week accounted for approximately one third of the sample (34.7%), three visits per week accounted for one fifth (19.9%), respondents with less than one visit per week comprised 19.1% of the sample, those more than five visits 15.5%, and those with four visits 10.8%. The average time spent by the respondents on each visit ranged from thirty minutes to one hour (53%), less than thirty minutes (22.7%), one to two hours (17.5%), and more than two hours (6.8%).

4.2 Measurements, Structural Model, and Hypotheses Testing

The adequacy of the measurement model was assessed based on the criteria of convergent validity, discriminant validity, and reliability. All factor loadings were above the recommended boundary of 0.7 [39]. Likewise, composite reliability conformed to the required values and ranged from 0.882 to 0.93 [40]. The average variance extracted (AVE) values were all greater than the stipulated value of 0.5 [41]. Further, discriminant validity was achieved (Table 3) as the square roots of the AVE values were higher than were the correlations between each construct [42]. Figure 2 illustrates the

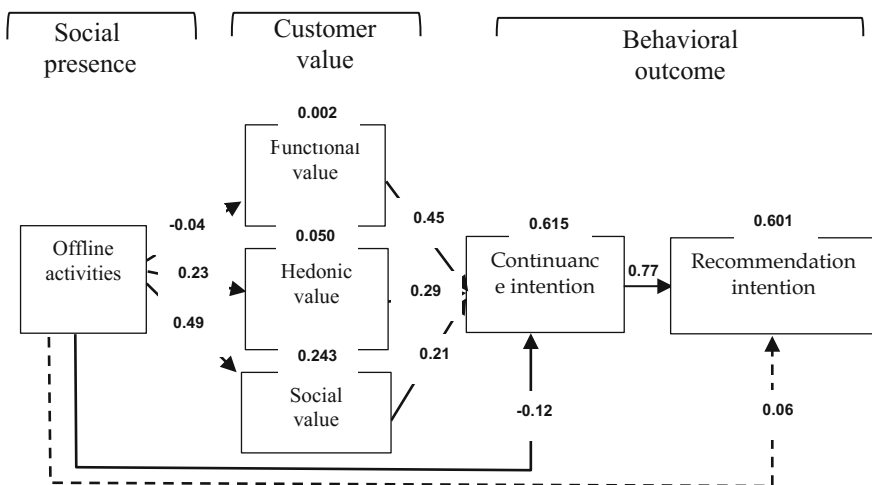


Fig. 2. Structural model results

Table 2. OTC reliability and convergent validity

Variables		Items	Factor loading	Cronbach's alpha	Composite reliability	AVE
Social presence	Offline activities	OA 1	0.92	0.84	0.93	0.86
		OA 2	0.94			
Customer value	Functional value	FV 1	0.88	0.80	0.88	0.72
		FV 3	0.86			
		FV 4	0.79			
	Hedonic value	HV 2	0.89	0.72	0.88	0.78
		HV 3	0.88			
	Social value	SV 1	0.90	0.89	0.93	0.82
		SV 2	0.90			
		SV 3	0.91			
	Behavioural outcome	Continuance intention	CI 1	0.87	0.87	0.91
CI 2			0.83			
CI 3			0.87			
CI 4			0.83			
Recommendation intention		RI_1	0.86	0.81	0.89	0.72
		RI_3	0.89			
		RI_4	0.80			

Note the items that loaded below the set criteria were deleted.

result of the structural model analysis for this study, including the coefficient of determination (R^2) and standardized path coefficients for all hypothesized relationships. Below, Table 2 shows the factor loading, Cronbach alpha, composite reliability, and AVE of the data.

Table 3 shows the discriminant validity and the diagonal values with the AVE.

The relationship between offline activities and functional value was not significant ($\beta = -0.04$ ns). However, the relationship between hedonic value ($\beta = 0.225^{***}$), and social value ($\beta = 0.49^{***}$) was significant. Furthermore, offline activities were found to have a slight influence on continuance intention ($\beta = -0.117^*$) but no direct effect on

Table 3. OTC discriminant validity

	(1)	(2)	(3)	(4)	(5)	(6)
(1) CI	0.852					
(2) FV	0.719	0.845				
(3) HV	0.683	0.663	0.884			
(4) OA	0.03	-0.046	0.225	0.928		
(5) RI	0.773	0.714	0.714	0.085	0.849	
(6) SV	0.475	0.347	0.588	0.493	0.471	0.904

Note The diagonal values in bold are square roots of the average variance extracted (AVE)

recommendation intention ($\beta = 0.063$ ns). Of the customer value dimensions, functional value had the strongest effect on continuance intention ($\beta = 0.449^{***}$), followed by the effects of hedonic value ($\beta = 0.294^{***}$) and social value ($\beta = 0.206^{***}$). Finally, continuance intention had a strong effect on recommendation intention ($\beta = 0.773^{***}$). Offline activities, functional value, hedonic value, social value, and continuance intention were positive and significant (supporting H2, H3, H4, H5, H6, H7, and H9). These antecedents explained 61.5% of the variance in continuance intention, contributing the largest variance proportion, followed by recommendation intention with a total variance of 60.1%, and a social value variance of 24.3%. The variance explained by functional value and hedonic value were trivial (0.002 and 0.050), as according to [43], the coefficient of determination below weak, near weak, and more than moderate, hence, H1 and H8 were not supported.

5 Discussion, Implications and Limitations

The aim of this paper was to develop a model that tests the effects of offline activities on customer value and behaviour in OTCs. Thus, this study returned mixed results, finding that offline activities significantly influence social value and hedonic value but did not impact functional value. Similarly, while support was found for offline activities influencing continuance intention, meaningful support was not found regarding offline activities and recommendation intention. The results also show that the three dimensions of customer value are positive predictors of continuance intention. Similarly, the study found that continuance intention has a significant effect on recommendation intention.

Hedonic value demonstrated a significant relationship with offline activities. Consistent with the findings of [44], the incorporation of activities leading to pleasure and entertainment was found to build emotional ties of members in offline contexts and also lead to cohesiveness in online platforms. Interestingly, the case was different for functional value. Contrary to [45] who argued that every touchpoint is an opportunity to facilitate interaction and enhance the customer experience with the brand, this study did not establish a positive relationship between functional value with offline activities. Thus, this suggests that offline activities should de-emphasize on the firms' offerings but focus primarily on the entertainment value of such events. However, among the three dimensions of customer value, social value showed the strongest relationship with offline activities. Luo & Huang [46] indicated that social loneliness is a critical contributor to membership in OTCs; members find social and emotional support that lead to strong ties and a sense of identification [30]. Furthermore, it has been highlighted that offline activities such as phone calls, email communication, and gatherings like parties and picnics strengthen friendly online ties and increase the online social presence among members [47].

This study also contributes theoretically to tourism literature. First, it extends the social presence theory in OTCs—thus, a contribution to the study of post-adoption behaviour of consumers in OTCs. Offline communications strongly contribute to cohesiveness and strengthen social presence in OTCs. Second, by integrating customer value into the model, this study makes valuable contributions to the tourism literature

by describing how different dimensions of customer value respond to offline activities. Thirdly and lastly, the study has also identified customer value as critical in continuance participation in OTCs. Zhang et al. [23] identified customer value as a determinant of stickiness, but it nonetheless remains unclear how it affects continuance participation. It is evident through the findings that customer value is also critical, especially as stickiness is perceived as an antecedent of continuance participation [48].

Managerially, this study reveals two ways firms can optimize the value of OTCs. In planning offline activities, managers should de-emphasize programs that promote the firm's products and pay more attention to enhancing the social and entertainment value of such events. For instance, in planning gatherings, members are likely to derive maximum value when such meetings promote effective networking sessions with the likelihood of contact exchanges that will promote email and phone communications among members. Similarly, the food, music, and layouts of such venues should gratify members' desire for pleasure and enjoyment. However, in the day-to-day management of the OTCs, managers should encourage information sharing on travel destinations, products, and prices. These factors have been highlighted as key to member stickiness on OTCs [23].

The study is not without limitations. Only two items were used in some dimensions because other items were dropped, as their low factor loading affected other items. It is believed this likely impacts the results, and it is therefore suggested that future studies consider measurement scale validation, particularly in offline activities. Additionally, future research can look beyond the functional, hedonic and social value dimensions to examine if there are other factors that can influence customer value creation. This included shared interest around cultural value, perception of spiritual and religious values and value perceptions regarding recognition and wisdom.

References

1. Hsu SHY, Yen HR (2016) Predicting good deeds in virtual communities of consumption: The cross-level interactions of individual differences and member citizenship behaviors. *Internet Res* 26(3):689–709
2. Casaló LV, Flavián C, Guinalú M (2010) Determinants of the intention to participate in firm-hosted online travel communities and effects on consumer behavioral intentions. *Tour Manag* 31(6):898–911
3. TripAdvisor (2018) About TripAdvisor. Downloaded from: <https://tripadvisor.mediaroom.com/us-about-us>. Accessed 19 April 2018
4. Zephoria (2018) The top 20 valuable Facebook statistics. Downloaded from <https://zephoria.com/top-15-valuable-facebook-statistics/>. Accessed 19 April 2018
5. Protalinski E (2014) Facebook passes 1.23 billion monthly active users, 945 million mobile users, and 757 million daily users. Downloaded from: <https://thenextweb.com/facebook/2014/01/29/facebook-passes-1-23-billion-monthly-active-users-945-million-mobile-users-757-million-daily-users/>. Accessed 19 April 2018
6. Millington R (2015) How to stop branded communities from becoming ghost towns. Downloaded from: <https://www.prweek.com/article/1330778/stop-branded-communities-becoming-ghost-towns>. Accessed 19 April 2018

7. Sigala M (2017) How “bad” are you? Justification and normalisation of online deviant customer behaviour. In: *Information and communication technologies in tourism 2017*, pp. 607–622. Springer, Cham
8. Lin HF (2007) The role of online and offline features in sustaining virtual communities: an empirical study. *Internet Res* 17(2):119–138
9. Cova B, Pace S (2006) Brand community of convenience products: new forms of customer empowerment—the case “my Nutella The Community”. *Eur J Market* 40(9/10):1087–1105
10. Ryu K, Han H, Kim TH (2008) The relationships among overall quick-casual restaurant image, perceived value, customer satisfaction, and behavioral intentions. *Int J Hosp Manag* 27(3):459–469
11. Kuo YF, Wu CM, Deng WJ (2009) The relationships among service quality, perceived value, customer satisfaction, and post-purchase intention in mobile value-added services. *Comput Hum Behav* 25(4):887–896
12. Casalo LV, Flavián C, Guinaliú M (2013) New members’ integration: Key factor of success in online travel communities. *J Bus Res* 66(6):706–710
13. Ukpabi D, Olaleye S, Mogaji E, Karjaluoto H (2018) Insights into online reviews of hotel service attributes: A cross-national study of selected countries in Africa. In: *Information and communication technologies in tourism 2018*, pp 243–256. Springer, Cham
14. Wasko MM, Faraj S (2005) Why should I share? Examining social capital and knowledge contribution in electronic networks of practice. *MIS Q* 29(1):35–57
15. Wang Y, Fesenmaier DR (2004) Towards understanding members’ general participation in and active contribution to an online travel community. *Tour Manag* 25(6):709–722
16. Kim WG, Lee C, Hiemstra SJ (2004) Effects of an online virtual community on customer loyalty and travel product purchases. *Tour Manag* 25(3):343–355
17. Short J, Williams W, Christie B (1976) *The social psychology of telecommunication*. Wiley, London
18. Biocca F, Harms C, Burgoon JK (2003) Toward a more robust theory and measure of social presence: Review and suggested criteria. *Presence Teleoperators Virtual Environ* 12(5):456–480
19. Garrison DR, Anderson T, Archer W (1999) Critical inquiry in a text-based environment: Computer conferencing in higher education. *Int Higher Educ* 2(2/3):87–105
20. Yoo Y, Alavi M (2001) Media and group cohesion: Relative influences on social presence, task participation, and group consensus. *MIS Q* 25(3):371–390
21. Koh J, Kim YG (2004) Knowledge sharing in virtual communities: an e-business perspective. *Expert Syst Appl* 26(2):155–166
22. Licope C (2004) ‘Connected’presence: the emergence of a new repertoire for managing social relationships in a changing communication technoscape. *Environ Plann D Soc Space* 22(1):135–156
23. Zhang M, Guo L, Hu M, Liu W (2017) Influence of customer engagement with company social networks on stickiness: Mediating effect of customer value creation. *Int J Inf Manag* 37(3):229–240
24. Cravens DW, Holland CW, Lamb CW Jr, Moncrieff WC (1988) Marketing’s role in product and service quality. *Ind Market Manag* 17:285–304
25. Sheth JN, Newman BI, Gross BL (1991) Why we buy what we buy: a theory of consumption values. *J Bus Res* 22(2):159–170
26. Sweeney JC, Soutar GN (2001) Consumer perceived value: the development of a multiple item scale. *J Retail* 77(2):203–220
27. Kim B, Han I (2011) The role of utilitarian and hedonic values and their antecedents in a mobile data service environment. *Expert Syst Appl* 38(3):2311–2318

28. Karjaluoto H, Shaikh A, Saarijärvi H, Saraniemi S (2018) How perceived value drives the use of mobile financial services apps? *Int J Inf Manag.* <https://doi.org/10.1016/j.jinfomgt.2018.08.014>
29. Wang HY (2016) Predicting customers' intentions to check in on Facebook while patronizing hospitality firms. *Serv Bus* 10(1):201–222
30. Lee KH, Hyun SS (2015) A model of behavioral intentions to follow online travel advice based on social and emotional loneliness scales in the context of online travel communities: The moderating role of emotional expressivity. *Tour Manag* 48:426–438
31. Rintamäki T, Kanto A, Kuusela H, Spence MT (2006) Decomposing the value of department store shopping into utilitarian, hedonic and social dimensions: evidence from Finland. *Int J Retail Distrib Manag* 34(1):6–24
32. Matei S (2004) The impact of state-level social capital on the emergence of virtual communities. *J Broadcasting Electron Media* 48(1):23–40
33. Koh J, Kim YG, Kim YG (2003) Sense of virtual community: a conceptual framework and empirical validation. *Int J Electron Commer* 8(2):75–94
34. Zott C, Amit R, Donlevy J (2000) Strategies for value creation in e-commerce: best practice in Europe. *Eur Manag J* 18(5):463–475
35. Liang TP, Ho YT, Li YW, Turban E (2011) What drives social commerce: The role of social support and relationship quality. *Int J Electron Commer* 16(2):69–90
36. Algesheimer R, Dholakia U, Herrmann A (2005) The social influence of brand communities: evidence from European car clubs. *J Market* 59(3):19–34
37. Kumar V, Petersen JA, Leone RP (2007) How valuable is word of mouth. *Harv Bus Rev* 85(10):139–149
38. Gökerik M (2018) Surprise Me with Your Ads! The Impacts of guerrilla marketing in social media on brand image. *Asia Pac J Market Logist* 30(5):20–40
39. Chin WW (1998) The partial least squares approach to structural equation modeling. *Mod Methods Bus Res* 295(2):295–336
40. Bagozzi RP, Yi Y, Phillips LW (1991) Assessing construct validity in organizational research. *Adm Sci Q*, 421–458
41. Hair JF, Ringle CM, Sarstedt M (2011) PLS-SEM: Indeed a silver bullet. *J Market Theor Pract* 19(2):139–152
42. Fornell C, Larcker DF (1981) Structural equation models with unobservable variables and measurement error: algebra and statistics. *J Market Res*, 382–388
43. Leppäniemi M, Jayawardhena C, Karjaluoto H, Harness D (2017) Unlocking behaviors of long-term service consumers: the role of action inertia. *J Serv Theor Pract* 27(1):270–291
44. Kang J, Tang L, Fiore AM (2014) Enhancing consumer–brand relationships on restaurant Facebook fan pages: Maximizing consumer benefits and increasing active participation. *Int J Hosp Manag* 36:145–155
45. Voorhees CM, Fombelle PW, Gregoire Y, Bone S, Gustafsson A, Sousa R, Walkowiak T (2017) Service encounters, experiences and the customer journey: defining the field and a call to expand our lens. *J Bus Res* 79:269–280
46. Luo Q, Huang L (2016) Identity Construction in a travel-related virtual community: a case study on a guangzhou couch-surfing community. *J China Tour Res*, 1–20
47. Arenas-Gaitan J, Javier Rondan-Cataluña F, Esteban Ramírez-Correa P (2013) Social identity, electronic word-of-mouth and referrals in social network services. *Kybernetes* 42(8):1149–1165
48. Huang L, Jia L, Song J (2015) Antecedents of user stickiness and loyalty and their effects on users' group-buying repurchase intention

Author Index

A

Aoike, Takashi, 27

B

Balasubramanian, Sreejith, 423

Baràtovà, Andrea, 107

Benckendorff, Pierre, 212

Bernkopf, Denis, 145

Boyle, Stephen, 437

Bruce Wan, C. K., 187

Bulchand-Gidumal, Jacques, 55

C

Calvaresi, Davide, 304

Cantoni, Lorenzo, 172

Cheng, Ao, 333

Coba, Ludovik, 40

D

Deng, Zhiming, 212

Dietz, Linus W., 15

Du, Qianzhou, 321

Dubovitskaya, Alevtina, 304

E

Egger, Roman, 107

F

Favre, Pascal, 92

Ferrer-Rosell, Berta, 158, 344

Figueroa-Domecq, Cristina, 383

Filimonau, Viachaslau, 200

Flecha-Barrio, M^a Dolores, 383

G

Gore, Shashank, 423

H

Hall, Grant, 437

Hara, Tatsunori, 27

Heinonen, Johanna, 120

Ho, Bach, 27

Hong, Taeho, 333

Hung, Kam, 225

I

Ito, Naoya, 132

Ivanov, Stanislav, 237, 249

K

Karjaluoto, Heikki, 450

Keller, Barbara, 265

Koo, Chulmo, 333

Kurata, Yohei, 27

L

Lama, Sanjay, 291

Larpin, Blaise, 92

Leis, Maxine, 304

Li, Shujun, 278

Liu, Anyu, 80

Liu, Chun, 225

López-Valcárcel, Beatriz González, 55

M

Mabillard, Julien, 92

Marchiori, Elena, 172

Marine-Roig, Estela, [158](#), [344](#)
 Martin-Fuentes, Eva, [158](#), [344](#)
 Massimo, David, [3](#)
 Mayrhofer, Tanja, [107](#)
 McFee, Ashelle, [107](#)
 Melián-González, Santiago, [55](#)
 Michopoulou, Elina (Eleni), [411](#)
 Mikkonen, Jenni, [120](#)
 Miller, Graham, [278](#), [359](#)
 Milwood, Pauline A., [371](#)
 Mogaji, Emmanuel, [450](#)
 Möhring, Michael, [265](#)
 Murphy, Jamie, [120](#)

N

Nakaima, Kenshi, [172](#)
 Nam, Kichan, [333](#)
 Neuhofer, Barbara, [107](#)
 Nixon, Lyndon, [145](#)

O

Olaleye, Sunday, [450](#)
 Ong, Yi Xuan, [132](#)
 Ota, Jun, [27](#)

P

Palomo, Jesus, [383](#)
 Parapanos, Demos, [411](#)
 Paris, Cody Morris, [423](#)
 Pasanen, Katja, [120](#)
 Pesonen, Juho, [120](#)
 Pezenka, Ilona, [67](#)
 Pradhan, Sojen, [291](#)

R

Rainoldi, Mattia, [107](#)
 Ren, Gang, [333](#)
 Rentschler, Ruth, [437](#)

Ricci, Francesco, [3](#)
 Roehl, Wesley S., [371](#)
 Rook, Laurens, [40](#)
 Roy, Rinita, [15](#)

S

Scaglione, Miriam, [92](#)
 Schegg, Roland, [92](#), [304](#)
 Schmidt, Rainer, [265](#)
 Schumacher, Michael, [304](#)
 Segovia-Pérez, Mónica, [383](#)
 Shin, Seunghun, [321](#)
 Shrestha, Anup, [291](#)
 Sigala, Marianna, [396](#), [437](#)
 Stankov, Uglješa, [200](#)
 Stienmetz, Jason L., [80](#)

T

Tussyadiah, Iis P., [80](#)
 Tussyadiah, Iis, [278](#), [359](#)

U

Ukpabi, Dandison, [396](#), [450](#)

W

Wang, Jie, [212](#)
 Webster, Craig, [237](#), [249](#)
 Weismayer, Christian, [67](#)
 Wörndl, Wolfgang, [15](#)

X

Xiang, Zheng, [321](#)

Z

Zanker, Markus, [40](#)