Lorenzo Cantoni
Zheng Xiang *Editors*

# Information and Communication Technologies in Tourism 2013

## Proceedings of the International Conference in Innsbruck, Austria, January 22–25, 2013

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ISBN 978-3-642-36308-5 ISBN 978-3-642-36309-2 (eBook)
DOI 10.1007/978-3-642-36309-2
Springer Heidelberg New York Dordrecht London

Library of Congress Control Number: 2012956279



Printed on acid-free paper

Springer is part of Springer Science+Business Media (www.springer.com)

# Preface

The ENTER conference is now 20 years old!

Organized by the International Federation for Information Technology and Travel and Tourism (IFITT), the mission of the ENTER conference has consistently been focused on offering a worldwide and unique forum for attendees from academia, industry, government, and other organizations to actively exchange, share, and challenge state-of-the-art research and industrial case studies on the application of information and communication technologies (ICT) to travel and tourism. As information and communication technology continues to evolve and, as a result, challenges our thinking and way of life, the ENTER conference continues to embrace these challenges and grows to become the premier forum on ICT and travel & tourism in the world. Instead of looking backward, the theme of ENTER 2013, i.e., "eTourism: Opportunities and Challenges for the Next 20 Years", was identified to encourage the exploration of ICT concepts, applications, and business models in an increasingly interconnected and interdependent world.

In the past few months, we have received more than 110 full papers and research notes from researchers in the travel and tourism as well as ICT communities around the world (from more than 30 countries). This compilation of conference proceedings is the result of a rigorous double-blind review process, during which we took particular effort to ensure each submission to be reviewed by at least three reviewers with relevant expertise and from different institutional backgrounds and geographic locations. Out of these submissions, 47 manuscripts were invited to submit as full research papers. Final decision of acceptance was made after the authors had successfully revised and edited their papers according to reviewers' comments. Given the considerably large number of submissions, we regret that we were not able to accept more papers due to the limited space in the proceedings. As such, we invited some of the full research paper submissions to be shortened and resubmitted as research notes. Along with several papers which were originally submitted as research notes, there are, in total, 15 accepted research notes reflecting diverse research interests and emergent technologies that will be published in the electronic *e-Review of Tourism Research* (e-RTR).

This volume of ENTER proceedings reflects a variety of interesting topics, among which a number of subjects have emerged with growing popularity and significance. These subjects include the use of mobile technologies in travel and tourism, impact of social media, as well as the concept and practice of e-destinations. While these subjects are not completely new, it seems that they have attracted substantially more research effort compared to previous ENTER conferences, and are likely to become the next generation of mainstream research areas in ICT and travel & tourism. Some traditional research areas continue to pose challenges and questions; they include website evaluation and ICT adoption, recommender systems and semantic technology, information search, online distribution of travel products, user tracking

and modelling, and organizational use of ICT. We believe these papers, collectively, reflect the main trends in ICT and may offer directions for future research.

We would like to thank all authors for their contributions to this conference. We would also like to thank all members of the Scientific Committee and sub-reviewers for providing timely, rigorous, and constructive feedback during the paper review process, without which the Proceedings would not be published in a timely fashion. In addition, we would like to thank SoultanaSymeonidou for updating and maintaining a quality website, Asta Adukaite for editing the table of contents, as well as many others for getting our message across many communities around the world.

We look forward to having a conversation with you at ENTER 2013.

Lorenzo Cantoni, Chair
Zheng Xiang, Co-Chair

Innsbruck, January, 2013

*The original version of this book was revised.*
*The erratum is available at*
*https://doi.org/10.1007/978-3-642-36309-2_48*

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# Conceptualizing Context in an Intelligent Mobile Environment in Travel and Tourism

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## Abstract

Context in travel and tourism represents the bridge between a specific need and the necessary information to fulfil that requirement. The notion of context is becoming popular in travel and tourism in areas such as location-based services that support decision-making on the go. It becomes even more important within today's intelligent mobile environment for travel, which is represented by cutting-edge mobile technologies including smartphones and their apps. It is argued that it is necessary to conceptualize the notion of context in relation to the holistic tourism experience and the behavioural characteristics of travel. By bringing together literature on context-awareness computing and travel and tourism, this paper challenges existing approaches to context modelling and offers insights into the rich and multidimensional nature of the notion of context in travel and tourism. Finally, it offers a number of design principles for context modelling and calls for interdisciplinary research on understanding the notion of context in tourism.

**Keywords:** Tourism experience; travel behaviour; context modelling; human computer interaction; mobile computing.

## 1 Introduction

Information and communication technology (ICT) continues to change the nature of contemporary tourism (Buhalis & Law, 2008; Werthner & Klein, 1999). Over the past decade, ICT used for or during travel has become much faster, smaller, more intelligent, and more embedded in the user's environment. This change is even more dramatic, particularly when travellers are equipped with today's cutting-edge mobile technology represented by smartphones and their apps (Gretzel, 2011; Wang, Park, & Fesenmaier, 2012; Werthner, 2003). The fast adoption of new mobile technologies generates a huge impact on travel and will very likely transform the behavioural patterns of tourism consumption (Wang & Xiang, 2012).

One of the concepts central to the new travel environment is the context within which technology is used. The notion of context has been studied primarily as a problem in human-computer interaction in that systems capable of context-awareness are meant to be able to sense and respond to aspects of the settings in which computers are used (Baldauf, Dustdar, & Rosenberg, 2007; Dourish, 2004). Due to the growing impact of mobile devices in travel and the complexity tourism, understanding this concept requires deep knowledge about the nature of tourism, particularly the way technologies drive and transform this experience. However, the existing definitions of context and context modelling have largely been operation-based, lacking a solid understanding of the nature of the tourism experience and characteristics of travellers

L. Cantoni and Z. Xiang (eds.), *Information and Communication Technologies in Tourism 2013*, DOI: 10.1007/978-3-642-36309-2_1,

in unfamiliar environments (Lamsfus, Alzua-Sorzabal, Martín, & Torres, 2012a; Lamsfus, Martín, Alzua-Sorzabal, & Lp. de Ipiña, 2012b).

The study of tourism mobility is a complex research domain. It entails the understanding of the tourist movements as well as the personal and environmental factors linked to the decisions tourist make about where, how and when to do things (Xia, Zeephongsekul, & Packer, 2011). A major stream of this research concentrates on the tourist decision-making in short time frames at a particular place. Context modelling may be used to develop a new dimension to the tourist behavioural research while travelling.

This paper aims to elucidate the notion of context in a mobile technological environment in travel and tourism. It contributes to our knowledge by bringing together literature from the domains of tourism and human-computer interaction. Specifically, this paper examines the notion of context from three distinct perspectives, including: 1) context as a foundation of the new tourism experience; 2) context as a behavioural aspect of travel decision-making; and, 3) context as a human-computer interaction problem. Based upon that understanding, a set of general principles is proposed for context modelling in mobile environments for travel and tourism. Finally, implications for both theory and practice as well as directions for future research are discussed.

## 2 Context as a Foundation of the New Tourism Experience

Travel is a sequential process in which the tourist leaves the daily residence, visits places away from home where he/she interacts with different people, and eventually comes back to the residence. Central to this process is the idea of mobility, which is of utmost importance because contemporary means of travel afford new ways of moving, socializing, and seeing, and, thus, transform the tourist gaze (Urry, 1995). This suggests that mobilities in tourism are not merely travelling from point A to point B; rather, mobilities include a number of activities, experiences and interactions with significant others that take place in idiosyncratic personal, social, and geographic contexts (Featherstone, Thrift, & Urry, 2004; Pearce, 1982).

In the last years, the tourism experience has been undergoing changes due to today's information technologies (Gretzel, 2010). Modern transportation brought about substantial changes in the ways travellers perceive the landscape and interact with physical and social environments away from home. Today's information technologies create a new set of preconditions for the tourist experience and, particularly, serve as new "markers" that further mediate the tourist gaze. Furthermore, the Internet offers numerous means by which the tourist constructs the tourism experience by learning, understanding, and feeling the places visited and the cultures embedded in these places (Gretzel, Fesenmaier, & O'Leary, 2006). More recently, the emergence of social media enables enormous amount of travel-related contents to be created by, and shared among, travellers (Xiang & Gretzel, 2010). They constitute communication channels and platforms for the tourism experience to be constructed and re-constructed, distributed and re-distributed in a handy but far-reaching way

The consistent use of new location-based media emerges as a new form of tourism experience because this kind of technology use satisfies a variety of needs and support a variety of contexts, among which, for example, the need to keep in touch with one's social networks is becoming prominent. It also alters perceptions of time, place, distance, sociality, and other understandings that frame the conditions of tourism (Jansson, 2002). It appears that today's tourist is enabled by a collection of new machines to be more individually mobile through spaces and to form small worlds "on the go" (Sheller & Urry, 2006). Different from other media technologies, such machines are miniaturized, embodied in Internet-connected mobile devices, and are closely interwoven with the corporeal, creating the perpetual contact. As such, the use of these technologies could potentially change the contexts in which the traveller interacts with the physical, social, and business environments and thus the way he/she constructs the tourism experience.

In recognition of the significant growth of smartphone use in travel, there has been increasing interest in the tourism community in understanding its implications for tourism. Following from the notion of the network society (Castells, 2000), Gretzel (2010) and Wang, Park and Fesenmaier (2012) examined the role of smartphone apps in enriching, expanding and re-structuring the tourism experience based upon consumers' reviews of these apps. In addition, the study by Wang, Park and Fesenmaier (2012) explores the importance of instant information support of smartphones that enables tourists to more effectively solve situational problems, share experiences, and store memories.

These studies clearly demonstrate the technical capabilities of today's mobile technologies to change the tourist behavioural patterns and as thus, the fabrics of contemporary tourism. The new technology mediated world evidences the convergence of the digital, social and physical domains in travel. As a direct result, new contexts of travel emerge and they may serve as the foundation for understanding the tourism experience within a mobile environment.

## 3 Context as a Behavioural Aspect of Travel Decision-Making

Context has considerable bearing on travellers' information search and decision-making processes, the understanding of which allows product information to be identified to match the traveller's needs and wants (Fodness & Murray, 1999; Hwang, Gretzel, Xiang, & Fesenmaier, 2006). Within the sequential framework of travel behaviour, conventional research has extensively examined travel decision-making during the pre-trip stage, particularly in relation to the traveller's information search and destination choice (Crompton, 1992; Woodside & Lysonski, 1989). Specifically, destination-related decisions are generally high-level ones and are typically made when most other aspects of the trip are still undefined (Jeng & Fesenmaier, 2002). At this stage travellers usually make decisions regarding when they would like to travel, how long they would like to stay, who they would like to take along, what the purpose of the trip is, what main activity they will engage in, what the main mode of transportation will be and from which point of origin the trip will start. Generally speaking, factors influencing decision-making include the decision-maker's personal characteristics, decision frames, and situational needs and constraints (Hwang et al., 2006).

Due to the growing use of mobile technologies and the increasing amount of information accessible during the en route and on-site phases, travel behaviour and decision-making processes are gaining greater attention. The existence of these new parameters significantly alter the contexts of decision-making, i.e. decisions taken on the go at the destination, since today's travellers count on new sources of information that were not accessible to them this way until recently (Hwang, 2010; March & Woodside, 2005). It is argued that, as opposed to the pre-trip planning behaviour, travellers on the move need to make decisions that are time-sensitive, immediate, unreflective, and spontaneous, and technologies such as smartphones are considered ideal in supporting these decision-making processes (Hwang, 2010). Particularly, unplanned behaviour occurs due to a change in the travel context such as various en route or on-site stimuli. For example, once a traveller checks in a Starbucks coffee shop using the FourSquare smartphone app, he/she is instantly connected with online friends who may offer product recommendations based upon their own personal experiences (Tussyadiah, 2012b). As a result, it will fundamentally alter the context (due to increased level of product knowledge and trustworthiness of information) and, consequently, the result of decision taken.

Further, decision-making in the en route phase is dynamic in that there are a series of interdependent decisions among which the contexts of later decisions are contingent upon results of earlier ones (Hwang, 2010). The Wang, Park and Fesenmaier (2012) study has identified a number of patterns in the way smartphone apps satisfy travellers' contextual needs in decision-making on the go. Thus, the use of mobile devices such as smartphones changes the decision environment for en route and on-site decisions (Gretzel, 2010). It also indicates that information about the contexts in which travel decisions are made provide important cues for service providers to understand travellers' needs and to identify tangible/intangible products to satisfy these needs (Ricci, 2010).

## 4 Context as a Human-Computer Interaction Problem

Tourism represents an important field of application for mobile information systems (Gretzel, 2011). In fact, mobile tourism guides have come a long way since its first prototypes to all of the commercially available apps nowadays in Apple's iTunes or Android's market. Early examples of mobile tourism guides were working prototypes used in order to identify unexplored problems at the time related to primary mobile aspects such as user interfaces, interaction or user location (Grün, Pröll, Werthner, Retschitzegger, & Schwinger, 2008). The first mobile guides were driven by the information offered by the supplier, i.e. they were focused on the supply side instead of what the tourist needs within a specific context (Anegg, Kunczier, Michlmayr, Pospischil, & Umlauft, 2002).

Nowadays, the miniaturization of computing devices, the evolution of communication and connectivity technologies as well as the introduction of numerous sensors on (smart) mobile devices seem to have successfully addressed the problems first found in the development of tourism mobile guides. The current challenge is focused on location, personalisation, and recommendation aspects of tourism information consumption, together with aspects related to social interaction and mobile commerce. The most well-known examples of more advanced tourism mobile guides

are Berlin Tainment (Wohltorf, Cissee & Rieger, 2005), etPlanner (Höpken, Fuchs, Zanker, Beer, Eybl, Flores, Gordea, Jessenitschning, Kerner, Linke, Rasinger, Schnabl, 2006), MobileStutgart (Engelbach et al., 2007), CONCERT (Lamsfus et al., 2012a) and liveCities (Martín, Lamsfus, & Alzua-Sorzabal, 2011). Apart from these prototypes, there are many location-based information apps running on today's smartphones, providing information about nearby restaurants, hotels, and points of interest (POIs) in general (Wang & Xiang, 2012). Obviously, context, especially location of the user, plays an important role in these prototypes as an input variable.

The notion of context stems from, and has been extensively studied in computer science and other related fields such as HCI. As a result, there is a rich stream of literature that informs us of the conditions, modalities, processes, and outcomes of this aspect of human-computer interaction in technology use, in general, and context-aware and ubiquitous computing, in specific. With the emergence of ubiquitous computing, context-aware computing, pervasive computing, and embodied interaction, context becomes a central concept in computational systems in that these systems are meant to be able to sense and respond to aspects of the settings in which computers are used without specific human intervention.

From a conceptual perspective, Dourish (2004) suggests that there are basically two views of context. On the one hand, the positivist approach seeks to reduce social phenomena to essence or simplified models that capture underlying patterns with the goal to represent the problem. For example, one of the popular definitions of context elaborates it as "any information that can be used to characterize the situation of entities" and it is "typically the location, identity and state of people, groups, and computational and physical objects" (Dey, Abowd, & Salber, 2001). While there are numerous definitions from the positivist perspective, context is essentially seen as a form of information; it is representational and stable; and, importantly, context and activity are separable. It is, thus, the normal and appropriate concerns of the positivist approach is to "capture", "represent", or "model" context (Dourish, 2004).

On the other hand, the phenomenological approach regards social facts as emergent properties of interactions, not pre-given or absolute but negotiated, contested and subject to continual processes of interpretation and reinterpretation. Instead of a representational problem, context is seen as an interactional: it is something that describes a setting; it is something that people do; it is an achievement, rather than an observation; it is an outcome, rather than a premise. In this regard, the act of travelling may be seen as a continuum of human and social activities and interactions that have to be taken into account into the context model and to which, context-aware computer systems should respond to. This view has not been sufficiently incorporated in the existing examples of context-aware systems. Thus, this suggests that context and content (or activity) cannot be separated. It arises from and is sustained by the activity itself (Dourish, 2004).

Most of the existing literature on context-awareness related to HCI falls into the positivist approach. In fact, since the inception of research in context awareness at the beginning of the 1990s, most of the existing works have taken an operational approach to context. Thus, research carried out in context-awareness can be categorised into two types with one focused on context theory and the other on

development of standard context-aware models and methodologies. Semantic technologies, more precisely ontology-based technologies, bridge between these two categories. The main objective of all these approaches is to find out what context is and try to model it according to some computing parameters, without really taking into account the social aspect of context.

From a theoretical perspective, the work carried out by researchers during the 1990s was focused on establishing the conceptual foundations of context and context-awareness. They developed a number of applications that managed context information primarily to assist users in their interactions with mobile devices. The theoretical work carried out was so intense that the most relevant definitions of context stem from these authors (Dey, Abowd & Salber, 2001). This first generation of context-aware researchers did not reach consensus on delimiting the scope of context-awareness and neither did they agree upon a unique model or methodology to manage context information. Besides, none of the context-aware systems initially put forward suggested the use of semantic technologies to manage contextual information. At that time, i.e., the 1990s, the potential and functionalities of ontologies were still not clearly specified and researchers did not consider them an alternative for context information management and used other context management methodologies instead (Strang and Linnhoff-Popien, 2003).

Analyses of context management methods indicate that ontologies take in adequate functionalities for context information management. Hence, several authors working on context-awareness started to use semantic technologies in order to model context and manage context information. The use of ontologies fosters context data exchange at the model level. In addition, ontologies set the way for systems to share, integrate and re-use context information across different context models. Moreover, ontologies can be used to check the model's consistency at runtime as well as to infer higher level context information from low level information, thank to the reasoning capabilities that ontologies offer (Baldauf, Dustdar & Rosenberg, 2007). Researchers conducting this work were primarily focused on finding standard context management methods rather than in developing the theory that supported them.

## 5 General Principles for Context Modelling in Travel and Tourism

Technology offers plenty of possibilities in the creation of the new tourism experience and it also enables us to establish new knowledge about the traveller's situational needs. The increasing amount of tourism information available from a great variety of sources, the unfamiliarity with the place visited, and interaction constraints with mobile devices due to the reduced size of screens and keyboards make it necessary to find automated ways to assist travellers in order to reduce their cognitive overflow and enhance their tourism experience. Context and context modelling, therefore, are increasingly important issues for service providers and marketers alike in the travel and tourism domain. Based upon the literature discussed above it is argued that there are several important principles for context modelling to be effective in travel and tourism.

**Principle 1: Context Modelling Must Reflect the Holistic Tourism Experience**

As stated by Dourish (2004), context is an elusive concept. First, context in the field of human-computer interaction is highly dependant on the framework in which context theory is going to be implemented. There are some simple (context) structures that serve as a substrate to all of the existing context-aware frameworks. This would imply that there could be multiple levels of contexts and that the general approach to context modelling focused the attention on specific instances (e.g., visiting a museum) in the use of a mobile device. This, however, makes the implementation not scalable to other domains.

Another problem with the use of the notion of context in the field of tourism is that it has been used in a largely positivist flavour, directly imported from HCI without considering the specific characteristics of the holistic tourism experience and the dynamic nature of travel decision-making processes. In the existing examples of context-awareness in tourism, the definitions of context revolve around the concept of information. Thus, the resulting context models do not completely suit the requirements needed for context modelling in tourism mainly because the specific positivist approach to context modelling in human computer interaction results in applications with low scalability and disregards the travel cycle.

It is, thus, argued that the conventional definitions of context lack a holistic perspective that captures the essence of the tourism experience. Tourism, as the leisure branch of mobility (Tussyadiah, 2012a), has a rather phenomenological nature and thus, it cannot be seen as merely something to be represented in a fragmented way. For instance, the existing examples of context-awareness computing primarily emphasize on the location of tourists. However, location is just the very basic aspect of context and does not offer much relevant and useful information by itself. Location information has to be used in conjunction with other variables that give meaning to the spatial-temporal behaviour of tourists.

The tourism experience has both functional and highly emotional dimensions that constitute potentially vivid personal memories (Pine & Gilmore, 1999). The actual experiential phase of tourism, i.e., when the tourist is en route to a place or visiting the place, is highlighted by many interconnected "touristic" moments that form "stories". As such, information technologies used within such a framework must be able to capture and help establish the basis for the interpretation of tourist experiences and construction of meaning (Gretzel, Fesenmaier, & O'Leary, 2006). Therefore, there is a need for a novel approach to address the notion of context in tourism in order to derive a computational model that leverages the cognitive overflow of tourists by making it easier for them to consume the information and create new meaning that is personally relevant. In addition to this, this new approach should support researchers in having a new understanding of human mobility and behavioural patterns in decision-making on the go.

**Principle 2: Context Modelling Must Capture the Dynamic Process of Travel Decision-Making**

Travel involves constant interactions between the traveller on the move and the social, technical, and physical environments within which the tourism experience takes

place. The multiple decision-making situations that occur within such environments are interdependent of each other (Hwang, 2010). Also, there are dynamic relationships within the use of the technology itself because travellers are not merely users of the technology and they also invent novel ways to use such technology. The structuration takes place between the user, the technology, and the environment, leading to potentially different outcomes of decision-making (Giddens, 1986).

The existing commercial applications and research prototypes of mobile tourism apps in general either provide location-based information services or concentrate on delivering personalized information. However, they do not provide a combination of both as a context-aware service (Grün, Pröll, Werthner, Retschitzegger & Schwinger, 2008). There are only limited examples of context-aware mobile tourism guides (Höpken, Fuchs, Zanker, Beer, Eybl, Flores, Gordea, Jessenitschning, Kerner, Linke, Rasinger & Schnabl, 2006; Beer, Fuchs, Höpken, Rasinger & Werthner, 2007). These existing prototypes have only worked in laboratory environments and virtual scenarios, which had been designed to address mostly static contexts. Neither the existing theory nor empirical approaches have properly designed or envisioned the complex, dynamic scenarios of context for human mobility. Therefore, from an epistemological point of view, there is room for research on contextual computing in the field of travel and tourism.

It is, thus, argued that context modelling should leverage the dynamics in travellers' decision-making process to help them with unplanned and other situational decisions on the go. That is, context information should be used to facilitate the decision-making processes by bridging the gap between the need and the product. In addition, the scope and capabilities of context modelling must be aided by some of the upcoming infrastructure developments. For example, the advances in ubiquitous computing and cloud computing along with the deployment of the Internet of Things will facilitate the realisation of contextual computing applications with capabilities to discover and handle complex scenarios for both everyday users and travellers.

**Principle 3: Context Modelling Must Connect with the Traveller's Social and Everyday Life**

Travellers have not only functional information needs such as finding a restaurant but also hedonic and social needs (Vogt & Fesenmaier, 1998). When a traveller is on the move, his/her information needs arise not only from decision-making tasks at hand but also from the desire to stay connected with social circles. This is particularly important given the capabilities of today's smartphones which provide convenient ways to tap into social networks. A recent eMarketer report states that a considerable percentage of smartphone users in the US access social media sites, amongst which Facebook is the most frequently accessed (eMarketer, 2012).

Technology, while always designed for a specific purpose, is also part of the user's everyday life. This is very true in travel because, increasingly, there are very little in travel that separates it from the mundane and ordinary life. As a result, context in the mobile environment consists of not only the decision-making aspects of the trip but also the information and communication needs resulting from the traveller's everyday life. For example, a traveller has needs for entertainment such as listening to music and watching sports games on the go as well as needs for staying current with

business-related information. Thus, context-aware programs must be able to sense and detect these needs and assist the traveller in a timely, unobtrusive fashion.

## 6 Conclusions and Implications

As mobile technology represented by smartphone and their apps is becoming the new way for tourists to enhance their experience while travelling to a destination, understanding the notion of context becomes an imperative but challenging task for tourism research. This knowledge is of particular importance in tourism for user support and product recommendation via means such as contextual advertising in today's intelligent mobile environments (Gretzel, 2011; Tussyadiah, 2012a). Recent studies have shown preliminary efforts in understanding context in travel in areas such as location-based social networking (LSN) (Tusyaddiah, 2012b), decision-making processes on the go (Gretzel, 2011), mobile searches (Wang & Xiang, 2012), and on-site behavioural patterns. By bringing literature from both HCI and tourism, this paper contributes to the literature in the following ways:

First, this study offers a preliminary attempt to conceptualize context in an intelligent mobile environment. The three perspectives of context, i.e., context as foundation of the tourism experience, context as behavioural aspect of decision-making, and context as a human-computer interaction problem, provides a fairly complete understanding of the nature of context which is not limited to human-computer interaction. This broadens the scope of research on the notion of context and speaks to the core problems and limitations in context modelling.

Second, traditional approaches in context-awareness and context modelling are task-based, operation-oriented, usually focusing on an isolated scenario, and largely separated from social and everyday life. This paper argues that, due to the unique nature of tourism and complex decision-making processes in travel, context modelling must take a novel approach that reflects and captures the holistic, dynamic characteristics of human mobility. The "principles" of context modelling proposed in this paper offer a fresh look at context modelling at the conceptual level and can potentially lead to a theoretical framework that informs the field of context modelling for travel and tourism.

Lastly, this paper highlights the significance of context in travel behaviour in today's technology mediated environment. It calls for interdisciplinary research on context modelling and offers food for thoughts for tourism marketers and managers who are keen to engage tourists on the go through contextual marketing and context-aware technologies.

Future research should focus on articulating a theoretical framework for context and its implications for context-awareness computing in the field of travel and tourism. This framework should help define the notion of context to support the development of context modelling tools that can truly understand and satisfy the needs of modern tourists during the en route and on-site phases of travel. It is hoped that context modelling will fit into the bigger picture of "smart destinations" and the Internet of Things supported by today's intelligent mobile technologies in tourism.

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# Discovering Functional Requirements and Usability Problems for a Mobile Tourism Guide through Context-Based Log Analysis

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## Abstract

The actual usefulness, adoption and success of a mobile information system much depends on the appropriate design of the available functionalities and of the interaction interface. A thorough elicitation of functional requirements carried out during the system design phase is certainly essential, though it is often difficult to identify and analyze in advance all possible use-scenarios. This paper describes an evaluation method to discover additional functional requirements and usability problems through the context-based analysis of session logs. The method has been applied to evaluate a mobile tourism support system in ecological conditions to understand non-biased, free usage. The results provide evidence to the impact of contextual conditions over users' interaction behaviour and informational needs. Some general design guidelines have been derived for functionalities and forms of adaptivity to be integrated in mobile services for the tourism sector.

**Keywords:** Context-Aware Mobile Services; Session Analysis; Usability Evaluation; Functional Requirements

## 1 Introduction

Ten years ago, when mobile access to Internet was mostly in the form of WAP navigation, market analysts were already perceiving the potential big advantage of mobile electronic commerce for the tourism domain (Marcussen, 2002). Certainly, the market reaction to the new opportunities offered by the mobile Internet has outraged the early expectations, with the recent proliferation of a variety of mobile services aimed at, for example: assisting tourists in finding information about tourist products (destinations, accommodation, events, attractions) or providing them with structured location-based tour guides; supporting users in booking or getting in contact with service providers; providing useful practical information on the local services, on mobility, or on environmental conditions; providing memos and updates about travel details; allowing the sharing of travel traces and opinions with social networks (Grün et al., 2008; Rasinger et al., 2007; Ricci, 2011).

The benefits of mobile services compared to generic online services can be summarized into four main factors: the possibility of accessing services anywhere, regardless of location (ubiquity); the availability of services at all times, with the convenience for the user to access them at the point of need; the tailoring of service contents to the user location (localization) and the additional customization according to other personal variables (personalization) (Clarke and Flaherty, 2003). Indeed,

L. Cantoni and Z. Xiang (eds.), *Information and Communication Technologies in Tourism 2013*, DOI: 10.1007/978-3-642-36309-2_2,

mobile service delivery opens up several opportunities for service customization by potentially taking into account several contextual factors, such as: the type of device, the user profile and interaction behaviour, location, time, social context, environmental conditions, etc. (Dey, 2001; Dourish, 2004). The customization may impact on different aspects of the service; for example on the content data (e.g., which specific products are suggested to users), the information presentation (e.g., graphical rendering, language), or the interaction mechanisms (e.g., which browsing options or activities are proposed to users at certain points of interaction). In addition, the initiation of the service delivery may be triggered by specific user's requests (pull mode) or may be fired automatically on system initiative according to contextual factors and appropriateness strategies (push mode) (Ricci, 2011).

The actual usefulness, adoption and success of a mobile information system much depends on the appropriate design of the available functionalities and of the interaction interface, as in a mobile scenario the user typically cannot engage in complex browsing or query building, due to the many contextual constraints (e.g., device and connection limitations, concurrent activities, environmental factors, social context, etc.). For this reason, it is highly important to understand users' actual information needs and the actual patterns of usage and to adjust the user-system interaction in order to enlighten the effort required to the user to retrieve and inspect information. A thorough elicitation of functional requirements carried out during the system design phase with the direct involvement of stakeholders and final users is certainly essential, though it is often difficult in the user-centred design process to identify and analyze in advance all possible use-scenarios. This is particularly true for mobile applications conceived to be accessed anytime, anywhere and for varied purposes, for which an iterative revision of design choices is required starting from the analysis of actual usage. Controlled usability evaluation experiments might provide useful guidelines for revision, however it may not be completely clear which aspects need investigation or the organizational costs may be too high to cover all the planned activities (Tullis and Albert, 2008).

This paper describes an evaluation method for mobile systems combining techniques of web analytics and of remote usability testing, to discover functional requirements and usability problems through context-based analysis of session logs. The method has been applied to evaluate a commercial mobile tourism support system in ecological conditions to capture and understand non-biased, free usage. The results emerged from the analysis provide evidence to the impact of contextual conditions over users' interaction behaviour and informational needs. Some general design guidelines have been derived for specific functionalities and forms of adaptivity to be integrated in mobile services for the tourism sector.

## 2 Background

Several sources of information can be exploited in web-based travel support systems to derive the actual informational needs of website users. A significant amount of data comes from the search queries users make and their navigation and interaction behaviour within the pages of the eTourism portal. Session analysis techniques can be applied to fruitfully interpret the frequency of page accesses, path lengths, typical entry and exit points, to identify the most successful or weak parts (and products) of

the observed sites. More advanced Data Mining techniques –like unsupervised learning, association rule mining, sequential pattern matching– can be applied on the same data to discover meaningful groupings of pages or products that tend to be accessed together (Liu, 2007). For example, (Pitman et al., 2010) show the benefits of combining query term analysis and user clustering in the tourism domain to single out user groups with significantly differing informational needs. (Not and Venturini, 2011) explain instead how added value comes from the analysis of data contained in users' personal travel plans.

However, in a mobile application setting, web usage analysis requires the appropriate consideration of additional contextual factors (e.g., distance, time, weekday, weather,...) that may impact on the users' informational needs (Baltrunas et al., 2012). For this reason, when evaluating actual system usage, it is highly important to conduct data collection in an ecological setting, with users using the system whenever the actual need arises, and tracking the contingent contextual factors. Techniques for synchronous remote usability testing (Madathil & Greenstein, 2011) have been studied to allow the organization of controlled experiments that involve users out of the lab, but with a live connection with the experimenters who can monitor exactly what the user is doing, thinking, and perceiving. Though facilitating the involvement of a higher number and more varied types of users than in traditional in-lab experiments, these techniques suffer from high organizational costs (in terms of time required to experimenters to recruit users, conduct the live experiments and interpret the output). Also asynchronous (unmoderated) remote usability testing (Nelson & Stavrou 2011) is not always adequate, as it still requires the definition of specific controlled tasks to be monitored, additional hardware/software machinery to capture screen interaction and the recruitment of an appropriate sample of users agreeing to perform the task and willing to provide additional feedback.

For combining wide-scope usability problem discovery and the analysis of actual information needs and patterns of usage for mobile applications, a mixed evaluation approach is required that integrates the data collection and analysis techniques from both web analytics and remote asynchronous usability testing. A sample approach to this type of wide-scope investigation is described in the following sections of this paper.

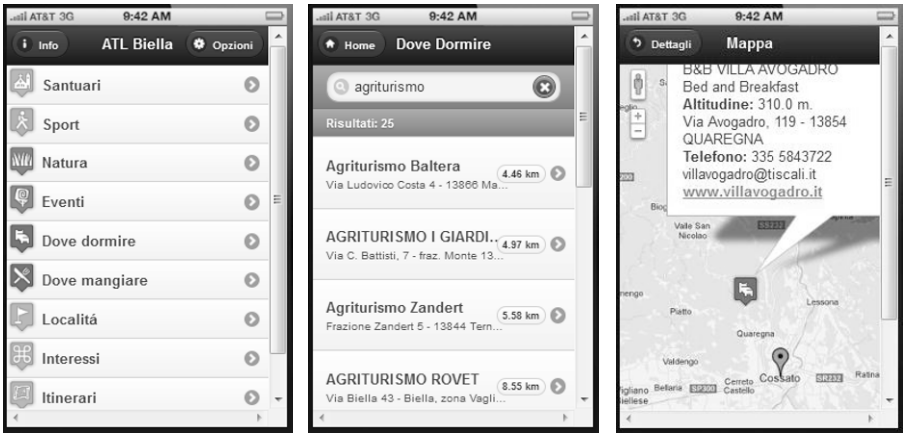
## 3 Methodology

Web analytics services are typically used for business and market research to monitor web traffic, understand the impact of advertising campaigns, discover weak and strong points of e-commerce strategies, but also to discover usability issues in the online information system (like for example, hardly reachable pages or complex interaction procedures that hamper the actual online purchase process) (Clifton, 2010). Web analytics tools trace users' page visits and interactions in an unintrusive and seamless way; they allow the setting of specific contextual variables to be used for data segmentation; they apply appropriate data anonymization strategies to comply with privacy concerns, and they are able to deal with scalable volumes of data. Our approach takes advantage of the flexibility offered by web analytics tools in terms of log collection, to design and set up interaction evaluation experiments on free system usage, according to a set of specific research hypothesis aimed at

discovering phenomena of context-dependency in informational needs and usage patterns in mobile e-tourism information systems.

### 3.1 The Evaluated System

The evaluation method was applied to the first release of Biella Mobile, the mobile version of the official tourism destination portal of the province of Biella, located in the north-western part of Italy (www.atl.biella.it). The main Biella e-tourism portal, recently renovated, is a medium sized DMO portal, with an average of 74.000 unique visitors per year. Users accessing any page of the main portal from a mobile device are automatically redirected to the home page of Biella Mobile (Fig. 1.a). The mobile system was launched online at the end of March 2012. During July and August 2012 it registered an average of 780 unique visitors per month.




a. Biella Mobile home page b. Sample results list c. Map for accommodation

**Fig. 1.** Snapshots of the Biella Mobile system interface

The information architecture of the first release of Biella Mobile is simple and uniform for all product categories. The home page provides access to thematic sections (Sanctuaries, Sports, Nature, Events, Accommodation, Restaurants, Places, Interests, Itineraries) containing lists of POIs of the corresponding category (Fig. 1.b). Items are shown in reverse order of distance with respect to the user's current location (if available). Ten items are shown at a time; a "Show more" button is available at the end of the list to get more distant items. Text-based search filters allow to select specific subsets of items. By clicking on the short descriptions of the items in the list, a page containing the detailed description of the POI is displayed, which also includes shortcut buttons to make a phone call, send an email or view the main web site of the POI. From the details page, a link is available to a map displaying the position of the POI and the current position of the user (Fig. 1.c).

### 3.2 Research Objectives and Hypothesis

The general research objectives of the study included both wide-scope usability problem discovery and the identification of context-dependent informational needs and behavioural patterns of mobile users, to eventually: (i) understand whether the current system functionalities are easily identifiable by users and are used as expected; (ii) understand how users navigate in the information tree in different interaction contexts, to possibly identify interaction modalities or forms of adaptivity that would improve usability; and (iii) identify additional functionalities that would provide added value to the current system. In particular, the following specific research hypothesis were formulated:

H1: The number of visits to Biella Mobile and the type of information searched by users depends on some specific contextual factors, in particular week day, location and type of user (i.e., whether she is a frequent visitor).

H2: Map-based functionalities have a relevant role in supporting mobile users' informational needs.

H3: Different product categories are characterized by different search and decision-making patterns.

### 3.3 Logs Collection

To analyse the interaction phenomena considered in the research hypothesis, a data collection was set up to trace both users' actions and contextual variables. The Piwik open source web analytics suite (piwik.org) was used to collect anonymized individual logs and local variables for the accesses to the Biella Mobile web application. Data collection was performed for the regular users of the system over a time span of four weeks, in the period 25 June – 22 July 2012. The following information was collected in the logs: the visit duration, the actual sequence of visited pages, the action buttons used (e.g., the "show more" button activating the display of additional POIs in a results list, the radio buttons and the bar for setting localization preferences, the buttons for activating a phone call, an email or the redirection to the personal web site of a POI), the usage of text strings to filter search results, the position in the result list and the distance from the user's current location of the POIs for which the details page is selected. In addition to information about users' actions, the following contextual variables were explicitly collected: the current position of the user (if available) and her distance from the area of the province of Biella, day and time of access, type of user – whether new or returning -, operating system and browser used.

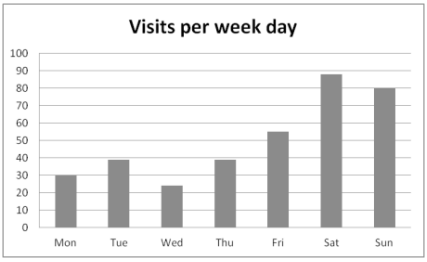
During the considered four-week period, 747 sessions of usage were collected (a session automatically expires after 30 min), with an average duration of 2:09 minutes and 20,48% of returning users. As a term of reference, we observed that in the same period the main non-mobile web site received 9.012 visits (from 6,650 unique visitors), with an average visit duration of 3:28 minutes and 35,73% of returning users. To exclude, right from the beginning, interactions that may hamper the analysis, a pre-processing phase helped remove from the logs: data relative to sessions performed by researchers and 305 sessions without any meaningful interaction (i.e., with an immediate bounce away from the home page). In the considered period of

four summer weeks, 355 valid interactions were retained for the analysis. For a subset of 108 interactions, the position of the user is known.

# 4 Results

## 4.1 Influence of Context on Frequency of Visits

To understand if and how different contextual conditions in time and space have an influence on informational needs of mobile users, we first analyzed the general distribution of visits according to the week day and to the user's location associated to the interaction session.




| | 0-50km | 51-100km | >100km | total |
|---|---|---|---|---|
| Mon | 6 | 1 | 1 | 8 |
| Tue | 7 | 3 | 3 | 13 |
| Wed | 6 | | 2 | 8 |
| Thu | 8 | 3 | 0 | 11 |
| Fri | 9 | 4 | 4 | 17 |
| Sat | 16 | 1 | 5 | 22 |
| Sun | 20 | 3 | 6 | 29 |
| total | 72 | 15 | 21 | 108 |

**Fig. 2.** Overall distribution of visits per week day (left) and distribution of visits whose user's location is known, per week day (right)

The chi-square test computed over the distribution of the 355 visits segmented by week day (Fig. 2, left) confirms that there is a significant difference in the number of active users per day (for $\alpha = 0{,}001$), with Saturdays and Sundays being more trafficated and Wednesdays more calm in terms of accesses. Repeating the same test on the distribution of the 108 visits for which the location is known (Fig. 2 right, last column), we get similar results, with the difference in the two distributions being not significant. Further investigations on data segmented both with respect to week day and location distance (Fig. 2, right) have highlighted an overall general preponderance of visitors accessing the system while being within the geographical area covered by the mobile guide, i.e., within a radius of aprox 50km from the city of Biella (the chi-square test is significant with $\alpha = 0{,}001$ for the total number of visits of the whole week and for the days of Saturday and Sunday, and significant with $\alpha = 0{,}05$ for Monday and Thursday). Overall, these data reveal that there is a concentration of accesses to Biella Mobile by users (i) within the considered area and (ii) during the weekend. These findings provide some first evidence in support to hypothesis H1.

## 4.2 Influence of Context on Product Category Search

To further investigate the type of information that is most looked for by mobile users, and under which contextual conditions, we extracted from the logs the number of users who entered into thematic POI sections (e.g. list of hotels, list of restaurants, events,..) and we segmented those data for POI category, week day and user location.

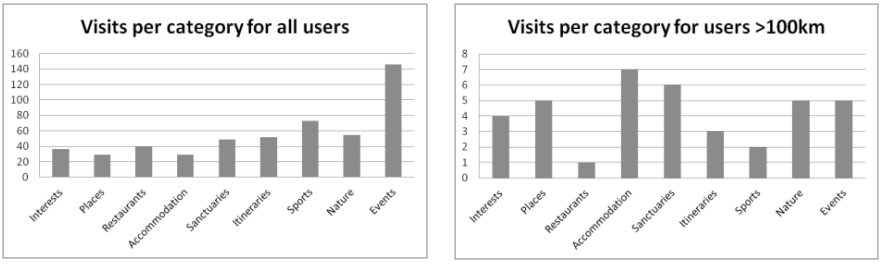



**Fig. 3.** Total number of visitors who entered a certain POI category (left) and segment of data for users whose distance is more than 100km (right)

The chi-square test (with $\alpha = 0{,}001$) computed over the distribution of visits per POI category (Fig. 3, left) shows that there is a significant difference in the interest expressed by users, with events being the most inspected type of product. The test was repeated over the distributions of each week day: for Tuesday, Friday, Saturday and Sunday there is a confirmation that events are searched significantly more than the other types of POIs (with an $\alpha = 0{,}001$ of significance threshold). The same is true for users who access the mobile services in a range of 0-50km from Biella. For users whose current distance from Biella is within the two ranges of 51-100km and >100km (Fig. 3, right), data reveal instead that users' interest is more equally distributed over the various categories, with far-away users less interested to restaurants and more to hotels, but in this case the differences are not statistically significant.

H1 receives confirmation by these results for the fact that the weekend, for onsite users, is particularly characterized by events search, suggesting that an automatic news/events alert service would be particularly compatible with these contextual conditions. Unfortunately, data about returning visitors whose position is known are too scarce to provide statistical evidence to the hypothesis that there is a recognizable group of frequent users, resident in the area, that access regularly to the list of events. This part of research hypothesis H1 is not confirmed and the investigation should be repeated over data collected in a longer time frame.

### 4.3 Patterns of Usage Depending on Product Category

To better understand whether there are varied search and decision-making patterns for specific product categories or interaction conditions, we additionally analyzed the propensity of users to visualize details pages for POIs starting from the links provided in the results list.

| | Click for details | No click for details | total | % of details visualization |
|---|---|---|---|---|
| Interests + Sanctuaries | 67 | 243 | 310 | 21,6 |
| Places + Nature | 73 | 97 | 170 | 42,9 |
| Restaurants | 83 | 34 | 117 | 70,9 |
| Accommodation | 32 | 30 | 62 | 51,6 |
| Itineraries | 96 | 65 | 161 | 59,6 |
| Sports | 80 | 58 | 138 | 58,0 |
| Events | 226 | 148 | 374 | 60,4 |
| total | 657 | 675 | 1332 | |

**Fig. 4.** Number of requests for details pages segmented per POI category

The table in Fig. 4 summarizes the number of times users selected (vs. did not select) a link to request details for POIs of a certain category (e.g., the number of times the user clicked on a link in a list similar to the one shown in Fig. 1.b above). The chi-square test over the click vs. no-click distributions (to also take into account the fact that some categories have been looked at more frequently) confirms that there is a significant difference (with $\alpha = 0{,}001$) in the amount of details visualized for the various product categories. In particular, data seem to suggest that for the "Interests" category users ask for additional details for the single POIs rarely, possibly just after a first decision-making phase is performed at the list level. Whereas for restaurants, the visualization of details seem to be integral part of the selection process. This preliminarily supports research hypothesis H3.

To further investigate the product decision-making process, we have counted for each session log how many alternative POIs for each category were inspected in detail by users. Indeed, in average, users tend to visualize more details for alternative restaurants in a session than for the other categories (average is 4, with variance 55,1). The "Interests" category is the least visualized (average is 2, with variance 3,4). However, the ANOVA test on these data does not confirm the statistical significance of these differences.

### 4.4 The Use of Maps

Map-based interfaces may be particularly effective for the mobile tourism scenario because they may allow the intuitive display of relevant features for the search/recommendation results (Burigat and Chittaro, 2008), e.g.: level of concentration of items (e.g. to decide which is the most promising area to take into account for further investigation); relative geographical position of items (e.g., to compare at a glance the convenience to reach the various items); possibility of graphically convey also other information (e.g. icons shape and/or colour to convey the level of recommendation; information about traffic jams; location of friends,…). The interaction with maps (especially on smartphones) allows to easily and intuitively enlarge or reduce the relevant geographical area for recommendations, and clustering techniques can be fruitfully used to solve visualization problems when many POIs have to be displayed on the same map area (Kriegel et al., 2011; Ilango and Moan, 2010). However, still remains to be investigated, from the functional point of view, whether maps are actually used and useful in the same way for all categories of searched products.

In the first version of the Biella Mobile system considered for the present study, advanced map-based search functionalities were not integrated yet, and map use is very simplified: search results are displayed in a list mode, the user can access a details page for POIs she identifies as interesting and from that page a map view is accessible to geographically localize the POI (as shown in the snapshot in Fig. 1.c). This simplified information architecture certainly imposes some effort to the user to access maps and it is expected that this impacts on usability. Indeed, only 4,37% of the visualized details pages are followed by the visualization of the corresponding map, therefore research hypothesis H2 is not confirmed, possibly due to a major usability issue. However, at a deeper consideration, log data still reveal some interesting phenomena on maps usage. We measured the propensity of users at displaying the maps –despite being the maps so down in the navigation tree– by additionally segmenting the data for POI category.

| | Click for map | No-click for map | details pages | % of map visualization |
|---|---|---|---|---|
| Accommodation | 4 | 32 | 36 | 11,1 |
| Restaurants | 1 | 83 | 84 | 1,2 |
| Events | 1 | 226 | 227 | 0,4 |
| Interests + Sanctuaries | 5 | 67 | 72 | 6,9 |
| Itineraries | 6 | 96 | 102 | 5,9 |
| Places + Nature | 3 | 73 | 76 | 3,9 |
| Sports | 10 | 80 | 90 | 11,1 |
| total | 30 | 657 | 687 | |

**Fig. 5.** Number of requests for map visualization segmented per POI category

By comparing frequencies of map vs. non-map visualizations from details pages (Fig. 5), we observe that different product categories have significantly different propensities at map display (chi-square test significant with $\alpha = 0{,}001$), as stated in hypothesis H3. We attempted an interpretation for this result by also considering the findings presented in the previous section 4.3.

**Events.** For events, the use of the map is practically irrelevant (only 0,4% of details pages visualization is followed by a map visualization). This phenomenon may be due to the fact that events are mostly searched by users who already know the area and are looking for entertainment activities during the weekend. This hypothesis is partly confirmed by the results of the analysis of the most searched POI categories, segmented by current location of the user and week day (described in previous section 4.2). These considerations suggest that search results for events can be effectively displayed in a list view, ordered by date, with short product descriptions for each list items (e.g., when, where, what). Indeed, in list views, by accurately selecting the features that are mentioned in the short texts it is possible to highlight those product characteristics that may be more relevant and interesting for the user or the differences between the suggested items (Jones et al., 2004).

**Accommodation, Sports, Itineraries.** For the POI categories of accommodation, sports and itineraries, by considering the higher propensity to visit details pages and maps, we can hypothesize that the most effective modality to display search results would be a map view that shows at a glance the position of each POI with some

graphical/iconic solution that conveys additional essential information on the POI, e.g. type of accommodation, type of sport, route of the itinerary.

**Restaurants.** The search for restaurants is characterized by a high percentage of details visualization, as well as by the higher average number of alternative POIs inspected. On the contrary, maps are seldom used. It is highly probable that this interaction behaviour is due to the fact that the decision-making process for selecting a restaurant involves a more careful evaluation of different aspects: type of cuisine, price, closing days,... System functionalities for easily comparing POIs or for filtering/recommending POIs according to product features (as are typically available in classical, web-based e-tourism portals) might be a desirable add-on also for mobile guides.

### 4.5 Usability Issues

The major usability issues that emerged in the study are related to:

- the scarce visibility of the map functionality, that is currently accessible just from the lower levels of the navigation tree.
- the length of the navigation paths that is often unnecessarily lengthened by the need to climb back the navigation tree to go back to the home page for changing product category.
- the internal text-based search filters that do not work as users expected. A qualitative analysis of repeated attempts of users to get the results list filtered by text, reveal that they assume in the internal search filters the same powerful behaviour of search engines like google and yahoo.
- the fixed entry landing page, that may explain a percentage of immediate bounces out of the system higher than that observed in the main non-mobile portal. A qualitative analysis of the referrals that brought to interactions with an immediate bounce shows the following unsatisfactory interaction chain: the user searched for a specific event or POI name with a general-purpose search engine (e.g., google); the engine correctly returned a link to the corresponding POI page indexed in the Biella main portal; the user gets disappointed to be redirected to the generic home page of Biella Mobile and not to the specific product page, and leaves the site without any further exploration.

## 5 Discussion and Conclusion

The evaluation study presented in this paper provides evidence to the fact that context-based analysis of session logs can be fruitfully exploited to discover functional requirements and usability problems in mobile tourism guides. Indeed, in the case of the Biella Mobile system, the asynchronous remote evaluation of free usage provided many fruitful results, despite the well known difficulties of interpreting not-controlled tasks. Apart from specific usability issues related to the simplified information architecture of the first release of Biella Mobile, we found some confirmation to research hypothesis that might be helpful for the design of any mobile tourism information system. The amount and type of information needs clearly depend on the week day and the position of the user (hypothesis H1). This

result suggests that forms of adaptivity in the interaction interface that make certain categories of information more accessible according to the interaction context might improve the usability and perceived usefulness of the system. For example, our data suggest that upcoming events should deserve a foreground position for onsite users, especially during the weekend, possibly in a recommendation, push-mode. We have not found confirmation to the hypothesis that maps are in general essential in a mobile setting (H2). Instead, we found that alternative search methods should be supported by mobile tourism information systems, as different product categories are characterized by different search and decision-making processes (hypothesis H3). This result calls for forms of adaptivity in the interface that adjust the available functionalities and interaction modalities according to the product category. For example, our data suggest that also in a mobile scenario, comparison functionalities may be of help for restaurants, whereas displaying many results on a map may be of particular help for hotels, itineraries and sports.

The functional requirements and usability issues emerged from the study will be used to guide the implementation of the second release of Biella Mobile and to improve the services offered to users. As a future work, to consolidate the general validity of the findings, for the most interesting interaction phenomena we plan to conduct a series of asynchronous remote evaluation experiments on controlled tasks with small samples of users willing to also provide feedback with a usability questionnaire.

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## 7 Acknowledgements

This research has been supported by the Trip@dvice Mobile project, funded by the Autonomous Province of Trento (Italy) under the work programme for industrial research, l.p. 1999/6.

# Engineering Augmented Tourism Experiences

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**Abstract**

Technological innovation in the tourism domain represents not only an important source of economic growth but also the means to satisfy an ever-growing demand for unique tourism experiences. The potential of Augmented Reality (AR) systems to enhance the on-trip experience of tourists is by far unmatched by other types of displays. There is still very limited research that deals with the various aspects of augmented tourism experiences. This paper contributes to eTourism literature in three ways. First, a conceptualization of augmented tourism experiences is presented. Second, the main characteristics of augmented tourism experiences are described. Third, this paper outlines a framework that captures the most significant determinants of augmented tourism experiences. The main aim is to set directions for further research but also to provide tangible help for developers and designers to engineer augmented tourism experiences.

**Keywords:** Augmented Reality, eTourism, tourism experiences

## 1 Introduction

It has long been recognized that the adoption of emerging new Information and Communication Technologies (ICTs) within the tourism domain nurtures competitiveness through enhanced operational efficiency and fast service failure recovery (Kandampully et al., 2001; Buhalis & Law, 2008). More recently, significant attention was directed towards technological innovation that is capable of satisfying a very significant societal and individual demand for memorable experiences (Tussyadiah & Zach, 2011). The visualization potential of AR to enhance on-trip experiences of tourists is by far unmatched by other displays. Many application areas already enjoy the strengths of AR in order to display information about visible (unfamiliar) objects immediately in context, resulting in better situation awareness (Livingston et al., 2011). For instance, in military scenarios (Livingston et al., 2011) AR systems are used to highlight potentially dangerous areas, buildings or streets.

Tourism features as a promising domain for utilizing AR in many reviews (e.g. Höllerer & Feiner, 2004; van Krevelen & Poelman, 2010) and has been a target application area in many early (Feiner et al., 1997; Vlahakis et al., 2001; Papagiannakis et al., 2005) and more recent (Luley et al., 2011; Linaza et al., 2012) AR studies. Such studies however do not adequately address the specific benefits and issues associated with AR use in the tourism domain. In terms of benefits, it is generally accepted that AR changes the experiences of its users. Empirical evidence suggests that it is not uncommon that such changes are both positive and negative (e.g. Olsson et al., 2009; Olsson & Salo, 2011; Linaza et al., 2012). When it comes to on-trip content delivery a number of issues have to be addressed. At the same time, improvement in design and development has to reflect the specified marketing

L. Cantoni and Z. Xiang (eds.), *Information and Communication Technologies in Tourism 2013*, DOI: 10.1007/978-3-642-36309-2_3,

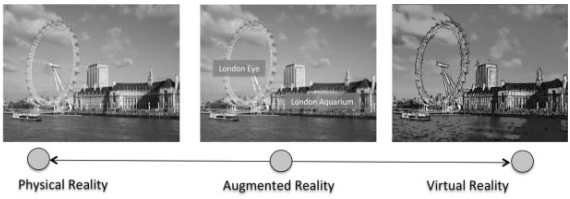
objectives of service providers. These can be achieved only if AR information systems are engineered with the target audience and target experience in mind. This is where a deeper understanding and effective use of this novel technology becomes key. Therefore, the main objectives of this study are:

- To conceptualize augmented tourism experiences. To achieve this objective, a definition of augmented tourism experiences is proposed.
- To explore the variety of augmented tourism experiences. This is based on a critical synthesis and analysis of the available past and recent literature.
- To propose a framework for engineering augmented tourism experiences. To this end, a conceptual framework is proposed, capturing the determinants that have the most significant effect on augmented tourism experiences.

## 2 Augmented Reality

Augmented Reality enhances or augments the surroundings of its user in real-time with virtual information that supplements and co-exists with the real world (Milgram et al., 1994; Azuma et al., 2001). Enhancement of the physical environment through AR can relate to any human sense (Höllerer & Feiner, 2004), including sight (visual), hearing (audio), touch (haptic AR), smell (olfactory AR) and taste (gustatory AR). The main focus of this paper is on visual augmentation of the physical surroundings through any type of visual display (e.g. smartphone, tablet, PC monitor, glass displays). Despite the availability of audio and haptic augmentation, visual displays have a pivotal role in supporting the spatial on-trip activities of tourists (Bornträger et al., 2003). The evolution and development of visual AR is closely related to the history and development of virtual reality (VR), though there is a distinct difference between the two (Milgram et al., 1994), as illustrated in the Reality-Virtuality continuum (Figure 1). Unlike the completely computer-generated world of VR and the unchanged real environment, in AR systems "a virtual world supplements the real world with additional information" (Feiner et al., 1997, p.74).

**Fig. 1.** The Reality-Virtuality continuum (After: Milgram et al., 1994)




Augmentation of the human vision with digital information started quite recently, with the first documented attempt in the late 1960s (van Krevelen & Poelman, 2009). When mobile outdoor AR systems became available in 1997 (Feiner et al., 1997), their widespread use and adoption was restricted mainly because they required heavy, obtrusive and unfashionable equipment to work (van Krevelen & Poelman, 2010). Throughout the history of the AR domain, significant attention was directed towards development of better computational platforms, displays, registration and tracking methods, input techniques and, last but not least, network data transmission protocols.

In this context, Virtual Reality (VR) and AR technologies gained from similar technological progress and are often discussed and reviewed under the same umbrella when it comes to the benefits for tourism (Guttentag, 2010). The presented definition for AR, however, underlines the substantial differences and potential of these two technologies for tourism. In this paper, the main accent is firmly placed on AR and its potential to enhance the tourist experience.

# 3 Augmented Tourism Experiences

## 3.1 Understanding technology-enhanced tourist experiences

The traditional elements of differentiating marketing products and services to consumers such as price, product and quality are no longer enough and customers now look for meanings and added value in the form of specific experiences tied to the products/services on offer (Pine & Gilmore, 1998; O'Sullivan & Spangler, 1998). Pine & Gilmore (1998) introduced the concept of experience economy as the fourth stage of the evolution/shift of economic offerings. This shift towards experience prompted the emergence of what Binkhorst & Den Dekker (2009) called 'a new hype' in marketing and economic research. The aspects and determinants of tourist experiences gained recently significant prominence in tourism literature and a number of studies have examined the influence of ICTs on tourism experiences (Volo, 2009; Tussyadiah & Fesenmaier, 2009). More recently, Neuhofer & Buhalis (2012) introduced the notion of technology-enabled enhanced tourist experiences. The authors discuss the need for conceptualization of technology-enhanced tourist experiences and introduced a holistic framework (Neuhofer & Buhalis, 2012). The study presented in this paper draws from such previous research to examine the specific role of Augmented Reality technologies and their impact on the tourist experience.

## 3.2 Defining Augmented Tourism and Augmented Tourism Experiences

The real world is not a computer screen and while on a trip tourists have to struggle to find information that is "somewhere out there" in a wide and constantly expanding virtual space. Augmented Tourism (AT) relates to a group of displays and technologies that have the ability to overlay in real-time virtual information in tourism-related surroundings. Moving through such information-rich environments has already been described in several conceptual and innovative visionary works. One of the first, building upon the works of Egenhofer (1999) and Weiser (1991), is the research exploring the idea of Augmented Spaces (Manovich, 2006) as physical space overlaid with layers of virtual information. It is important to note that Augmented Tourism is a visualization paradigm that is significantly different from Virtual Reality (VR) Tourism. Augmented Tourism strives for improving the usability and usefulness of the physical world in real-time through enhancing the (visual) perception of tourists about their environment.

Recently the resulting experience of a product or service became a popular subject within a number of areas. Customer experience is a term that has been used for a long time in management and marketing literature in a relatively loose manner (Frow & Payne, 2007). Yet, there is still no clear definition or understanding of how we can

achieve enhanced customer experiences (Palmer, 2010). A similar trend is noticed in literature that discusses virtual reality tourism experiences (Guttentag, 2010). Building on definitions within Psychology (Carlson, 1997), Product Design (Hekkert & Schifferstein, 2008), Human-Computer Interaction (Hassenzahl & Tractinsky, 2006), Tourism Marketing and Management (Frow & Payne, 2007), Augmented Reality (Azuma et al., 2001) and eTourism (Volo, 2009; Neuhofer & Buhalis, 2012) we define an augmented tourism experience as: A complex construct which involves the emotions, feelings, knowledge and skills resulting from the perception, processing and interaction with virtual information that is merged with the real physical world surrounding the tourist. An augmented tourism experience occurs when a tourist uses an AR display in order to view virtual information within their immediate field of view. In contrast, in VR tourism the experience is characterized by the degree of immersion and presence of a "tourist" into a completely synthetic computer-generated world (Guttentag, 2010). Augmented tourism experiences are not isolated but, instead, fused seamlessly with the real world. Therefore, unlike VR that is used mainly pre- and post-travel, augmented tourism experiences complement the on-trip experiences of tourists. Therefore, they unravel in situ and in real time. Due to lack of control over a dynamic and diverse environment where these experiences take place, the aspects and factors that must be considered when it comes to augmenting the on-trip tourist experience are fundamentally different from those determining a VR environment. Hence, an authentic augmented tourism experience requires particular attention to achieving a high degree of fusion between virtual and physical objects.

### 3.3 Characteristics of augmented tourism experiences

While user experience is an important notion within the Human-Computer Interaction (HCI) domain, the expected and actual experiences from using AR in the context of tourism is still an under-researched topic. Most of the recent studies and evaluations concentrate on usability aspects, particularly focusing on perceptual and cognitive issues (Swan II & Gabbard, 2005) or increasing task-specific efficiency of using AR in, for instance, military (Livingston et al., 2011) scenarios. However there are also several recent publications, documenting the actual experiences of early smartphone AR adopters (Olsson et al., 2009) and expected AR user experiences (Olsson & Salo, 2011). Olsson and Väänänen-Vainio-Mattila (2011) conducted empirical studies to uncover the characteristics of expected user experiences with AR content, interaction and functionality. Amongst others these include captivation, motivation, engagement and novelty. In this study, we extend this typology based on empirical studies and tourism-specific AR literature. As a result, several dimensions, such as safety, were added. A short synthesis of the typology is presented in Table 1. In addition, the table describes the current or potential scenarios characteristic for each augmented tourism experience.

**Table 1.** Characteristics of Augmented Tourism Experiences, their potential use within the tourism domain and examples of already developed AR systems.

| Experience | Use-case Scenario | Source |
|---|---|---|
| **Awareness** Awareness of the surroundings | An AR system overlays a layer of rich digital content on top of museum artefacts | Abawi et al., 2004 |
| **Efficiency** The system saves time and (cognitive/physical) effort | A tourist is able to see a virtual arrow pointing to POIs | Liarokapis et al., 2006 |
| **Empowerment** Enabling novel activities and access to new services | A tourist is able to see hidden objects, especially where buildings limit visibility towards interesting attractions | Furmanski et al., 2002 |
| **Engagement** Increased attention to specific objects or environmental features | A tourist is able to see a virtual reconstruction of the ancient temple in Olympia, Greece | Vlahakis et al., 2001 |
| **Fun** Feeling of being amused | A visitor is able to see herself/himself in futuristic/historic outfits overlaid on their body | Disney (2012) |
| **Liveliness** The service and environment feeling vivid and dynamic | A tourist is able to see how virtual characters come to life to tell stories about the artefacts in a museum | MindSpace Sollutions, 2012 |
| **Meaningfulness** AR content which is personally meaningful, relevant and reliable | An AR system overlays dynamic, updated and timely information on a paper-based map | Reitmayr et al., 2005 |
| **Motivation** Being more motivated to participate or to do tedious tasks | A user of an AR system is able to view a complex dance performance from all angles, learn movements and participate | Cheok et al., 2002 |
| **Novelty** Experiencing the environment in a new and unfamiliar way | An AR system revives extinct animal species or show the future fauna and flora of the Earth | Futuroscope, 2012 |
| **Playfulness and entertainment** Feelings of joy and playfulness | Animated characters re-enact the historic life at the Gyeongbokgung in Korea | Kim & Park, 2011 |
| **Safety** The system increases the feelings of safety and control | A driver is able to swiftly detect moving/static targets on the road that may compromise the safety of the car | Narzt et al., 2006 |
| **Surprise** Positive surprises and wonder due to surpassed expectations | An anthropomorphic (human-like) AR virtual character interacts with the tourist and provides information about POIs | Schmeil & Broll, 2007 |
| **Tangibility** Feelings of coherence, which lead to senses of presence and unity with the surroundings | A tourist is able to see a 3D miniature overview model of their surroundings displayed immediately in their field of view | Bell et al., 2002 |

After: Olsson & Väänänen-Vainio-Mattila, 2011.

Recently, a lot of attention within industry and academia was directed towards increasing the awareness of consumers for products and services. This is evident in the proliferation of smartphone AR browsers (Madden, 2011) that deliver information about different points of interest in urban (Linaza et al., 2012) or rural (Luley et al., 2011) tourism scenarios. However, as our typology reveals, the on-trip tourist experience can be enhanced in many additional ways and result in novel, memorable, exciting and overall extraordinary experiences. Each aspect of such enhanced tourist experiences is tied to a specific situation (use-case scenario) and can be manipulated through a number of critical design decisions. The next sections discuss the key factors that influence the resulting augmented tourist experience.

## 4 Engineering Augmented Tourism Experiences

The presented augmented tourism experiences typology (Table 1) reflects the potential of AR to enhance the on-trip experiences of tourists in a positive way. However, as a number of empirical studies suggest, the introduction of AR in tourism-related settings does not necessarily lead to positive experiences. There is evidence in fact to suggest that various AR displays and content can lead to confusion, dissatisfaction, physical fatigue and disappointment (Herbst et al., 2009; Olsson et al., 2009; Linaza et al., 2012).

When engineering a desired augmented tourism experience, two equally important categories of determinants are crucial: (i) the delivered content that is used to augment the surrounding environment and (ii) the surrounding context. Figure 2 describes these two major categories. In each category, a number of factors need to be taken into account when introducing AR to tourism settings. In this section we present a framework that could be used for engineering the desired positive AT experience. All of the factors in the framework are inter-related and need to be taken into account in order to create the desired positive augmented tourism experience.

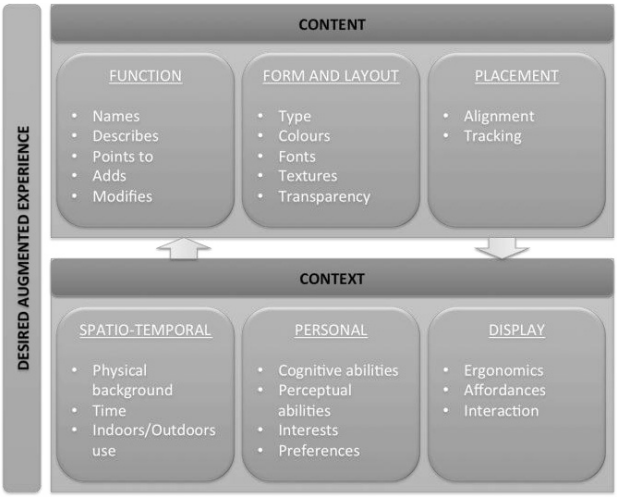



**Fig 2.** Framework for engineering augmented tourist experiences

### 4.1 Content

***Function -*** The different properties of presentation of information are an important determinant of an AR experience. AR content can have several functions: it names, describes, directs to, adds to, and modifies. The names, describes and directs to functions can be performed by traditional paper-based or mobile guidebooks (e.g. Bornträger et al., 2003). AR, however, decreases the time and cognitive workload for the tourist to look up this information, since it is attached to a specific context (Kjeldskov, 2003). What distinguishes AR from other information sources are the adds to (e.g. Piekarski & Thomas, 2003) and modifies (e.g. Vlahakis et al., 2001) functions of delivered content. The selected function however has to reflect the tasks of the user, since it could otherwise lead to confusion and feeling of dissatisfaction with content.

***Form and Layout -*** According to van Krevelen & Poelman (2010, p.10) "commercial success of AR systems will depend heavily on the available type of content". Virtual information delivered through an AR display can be in the form of individual pieces of text, pictures, images, animations, 3D models, animated 3D models or combinations of these elements. Apart from the alignment and seamless fusion of virtual and physical objects, one concern that is specific for the domain of tourism is the quality of the (computer-generated) virtual content displayed on a visual display. Lack of accuracy and currency, as well as realism (shading, shadows, textures) may ultimately lead to negative reactions. Furthermore, when it comes to smartphone devices, an additional concern is content personalization. Choosing the right content and adapting it to the specific context of use (see below) often requires a multi-disciplinary effort, special expertise and skills.

***Placement -*** Seamless fusion means that the user of an AR system perceives virtual content as part of the real world (Azuma et al., 2001) in a way that blurs the "boundary between what is real and what is not" (Larsson et al., 2010, p.143). Although it may seem simple, this requirement is one of the most challenging aspects for AR (Bell et al., 2002; Kjeldskov, 2003; Madden, 2011). Various tracking methods have been developed and are primarily concerned with aligning the virtual content with the real world (Azuma et al., 2001). In general, there are three main tracking approaches: marker-based, marker-less and hybrid. While discussion of each is out of the scope of this paper, selecting a tracking approach has implications for the resulting user experience and needs to be considered carefully. More detailed descriptions can be found elsewhere (e.g. Henrysson & Ollila, 2004; Madden, 2011).

### 4.2 Context

While for many types of interactive tourism systems context-awareness and adaptation are still optional, AR depends on being adaptive to the physical context in which it is used (Kjeldskov, 2003). Context-aware AR (CA AR) systems deliver information that is optimally placed in the context in which it is used.

***Spatio-temporal context -*** At the very least, obtaining spatial information (location and orientation) is a key requirement for mobile AR systems. Currently, location-based adaptation and personalization are the most widely utilized adaptation types. Similar to other types of mobile tourism information systems (Buhalis & Law, 2008),

personalization is also very important for AR systems, especially when it comes to accessible tourism. Personalized AR systems can provide information according to the special needs of tourists. Ideally, a CA AR system would adapt the information that is delivered to the user not only to his/her location, orientation and task (Bell et al., 2001), but also to many additional contextual factors. Amongst many others these include field-of-view (Kjeldskov, 2003), proximity to objects and subjects (Kjeldskov, 2003) and whether the user focuses attention on them or not (Ajanki et al., 2010). Lightning conditions and shadows (Papagiannakis et al., 2005) plus textures of the surroundings and their colours are also important (Mendez & Schmalstieg, 2007). However, both natural and artificial environment settings are dynamic and might change abruptly. There is still an on-going debate on what is the exact range and nature of the contextual parameters an AR system has to adapt to. This is why their selection and combination is often determined on an ad hoc basis.

***Personal aspects -*** When designing AR experiences, it is important to take into account the perceptual (the ability to recognize and interpret visual stimuli) and cognitive (the ability to reason about those stimuli) abilities of humans (Furmanski et al., 2002). As Bell et al. (2002) note, if the tourist is mobile in an unfamiliar environment, the virtual overlay has to "enrich and explain, rather than clutter and confuse, the user's physical surroundings" (Bell et al., 2002, p. 213). This means that, irrespective of application and display, it is fundamentally important to deliver clear representation of meaningful information, in a way that enhances perceptual learning and prevents cognitive overload. This is probably the reason as to why user-based empirical studies within the AR domain have predominantly concentrated on perceptual issues (Swan II & Gabbard, 2005; Dünser et al., 2008). Significant challenges are connected with displaying occluded structures and objects (Furmanski et al., 2002) but also with impaired sight due to changing environmental conditions, such as bright sunlight (Thomas et al., 2000). Cognitive issues include the ability of users to make sense of the presented content. A number of user studies reveal that content may be unclear and ambiguous (Thomas et al., 2000; Schmeil & Broll, 2006; Linaza et al., 2012). Such results emphasize the need for simplicity. Addressing this problem within is not trivial since its solution would depend on the characteristics of the target user group. Within the tourism domain this target group is extremely variable in terms of age, experience, skills and knowledge, interests, preferences and education.

***Display -*** The display, where virtual content is visualized and presented to the user, is probably the most important part of any AR system and an important constituent of an AR experience (Azuma et al., 2001). There are a number of displays that can be used to deliver an AR experience and their general characteristics have been amply described in literature (Azuma et al., 2001; Bimber & Raskar, 2005; van Krevelen & Poelman). For instance, significant challenges are posed especially for AR public displays where the "diversity of behaviours…[makes it] very difficult to find profiles and patterns of usability" (Alzua-Sorzabal et al., 2007). For instance, the height of an AR telescope, the position of interaction buttons or limited field-of-view might be a problem (Alzua-Sorzabal et al., 2007). Head-worn displays have a wider field-of-view but pose challenges with respects to portability due to large and cumbersome displays and fragile connections between the various components of the system (van Krevelen

& Poelman, 2010). Modern handheld displays, such as the smartphone or tablet, solve this problem. However, the user has to hold the device upright with an extended arm for prolonged periods of time, which can be very awkward. A surface-based augmentation is suitable to accommodate multi-user collaborative experiences and does not require tourists wearing any special equipment (Bimber & Raskar, 2005). This makes surface-based AR systems especially suitable for museums, special indoor events and exhibitions, but also in hotels or airports.

## 5 Conclusions

This paper contributes to eTourism literature in three ways. First, it introduces the notion of augmented tourism experiences, distinguishing in this manner the medium from VR tourist experiences which are not only different by nature, but unravel in substantially different circumstances. Second, several streams of state of the art research were integrated to conceptualize the key characteristics of augmented tourism experience. Third, we develop a framework that examines the key determinants of positive (desired) augmented tourism experiences. As suggested in the framework, the quality of the resultant experience with AR systems during on-trip activities of tourists depends on the provided content. Additionally, for AR technology to be useful, attractive, engaging and proactive for visitors to unfamiliar environments, the provided content needs to fit within the wider spatio-temporal, personal and technical context where the system is used. The fit between context and content will ultimately determine the value that AR systems bring to the holistic tourist experience.

The developed framework has both practical and academic implications. From a practical point of view, it serves as a tangible guide for designers and developers of augmented tourism experiences, outlining the key factors that need to be considered. The field of AR is constantly growing in many directions and it is naturally difficult to make accurate long-term predictions for its future direction. However, looking at current academic literature, one key observation that can be made is that development is still driven from areas outside the tourism domain. Therefore, it is suggested that further research within tourism should be carried out. In this sense, the developed framework can serve as a starting point for identifying additional gaps within academic literature. Although outside the scope of this study, further empirical research could assess and enhance the effectiveness of the proposed framework. Field-based experiments and observations could also validate the link between the identified factors and their specific influence on the overall augmented tourism experiences. Finally it should be noted that this study is part of a bigger research project that uses the proposed framework to engineer aspects of AT experiences, such as awareness, comfort and efficiency. The results from an on-going, mobile, field-based trial with smartphone AR browsers will be eventually used to validate the proposed framework.

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# Exploring the Role of In-Trip Applications for Sustainable Tourism: Expert Perspectives

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## Abstract

There is little research that examines both the in-trip use of Information and Communication Technology (ICT) and the role ICT applications play or could potentially play in supporting sustainable tourism. This study identified specific in-trip ICT applications that could be used by leisure tourists to support sustainable tourism. A survey amongst eTourism experts was conducted and the results indicated that 48% thought that the promotion of sustainable tourism practices should be a "very important" factor in the design of eTourism applications. Location-based services, destination management systems and intelligent transport systems were among the top rated in-trip applications to support sustainable tourism. The study may be partially qualified due to it's European orientation however, it is anticipated that future research will establish the reality on the ground in terms of tourists' actual use of in-trip technologies and linkages to sustainable tourism.

**Keywords**: Information and Communications Technology (ICT), sustainable tourism, in-trip, eTourism

## 1 Introduction

The tourism literature is replete with studies on the influence of technology during the travel planning phase. Buhalis and Law (2008) noted that the Internet is one of the most influential technologies that have affected the behaviour of travellers. More recently, consumer generated content facilitated by Web 2.0, has allowed social networking sites, travel blogs and the like to flourish, and is increasingly influencing the trip planning process (Cox et al., 2009; Xiang & Gretzel, 2010; Yoo & Gretzel, 2012). However, how tourists use technology during a trip, hereafter referred to as in-trip, is an area of research that is still evolving. Gretzel (2011) has noted that despite the fact that ICT have become key elements of value generating strategies for tourism, surprisingly, there is a lack of research in the tourism literature about how ICT mediates tourism experience.

Similarly, the tourism literature has a rich discourse in sustainable development and sustainable tourism with agreed definitions proving elusive (Sharpley, 2009). For the most part, scholars have moved beyond this debate and often accept an operational definition jointly produced in 2005 by the United National Environmental Programme (UNEP) and the then World Tourism Organisation (now UNWTO). The aims of sustainable tourism produced by UNEP-WTO (2005) provide an assessment tool for determining how specific in-trip applications used by tourists contribute to sustainability at the destination.

Definitional issues aside, some researchers are more concerned with the value-action gap, that is, given increased consumer knowledge about the environment, it has done

L. Cantoni and Z. Xiang (eds.), *Information and Communication Technologies in Tourism 2013*, DOI: 10.1007/978-3-642-36309-2_4,

very little to change consumer behaviour (Department for Environment and Rural Affairs, 2008; Pickett-Baker & Ozaki, 2008; Miller et al., 2010). While this gap described in the literature is limited only to the environmental dimension of sustainable tourism, the point is that knowledge about key issues has not resulted in any significant change in behaviour. More recently, several scholars have noted that given the ubiquitous nature of technology, there is a tremendous opportunity to use ICT to support sustainable tourism (Liburd, 2005; Ali, 2009; Touray & Jung, 2010) and to overcome consumer disempowerment (Miller et. al, 2010). This paper presents the results of the first phase of a mixed method study examining the role of ICT in supporting sustainable tourism from the perspective of in-trip leisure tourists.

## 2 Theory

The eTourism, marketing and information systems literature abounds with studies on technology adoption, with the Technology Acceptance Model (TAM) being one of the most cited models (Chuttur, 2009; Eriksson & Strandvik 2009). The TAM developed by Davis (1989) has its foundation in the work of Fishbein and Ajzen (1975) who developed the theory of reasoned action (TRA). The TRA is based on the belief that a person's intention is determined by a personal factor and the person's perception of social pressure to perform or not perform a particular behaviour (social influence). Central to the TRA is that attitudes and subjective norms are a function of belief (Ajzen & Fishbein, 1980) which ultimately influences intention and consequently behaviour. The original TAM construct posited two main variables: perceived ease of use (PEOU) and perceived usefulness (PU) as key determinants in influencing a person's behaviour to use a specific technology in an organizational context. PEOU is the extent to which a person believes that using a particular system would be free of effort and PU is the extent to which a person believes that using a particular system would enhance their job performance (Davis, 1989). Though the model's application in the organizational context was cited as a criticism for wider application, there were other criticisms leveled against the TAM including the fact that it only explained 40 per cent of the variance in usage intentions and behaviour (Venkatesh & Davis, 2000). Venkatesh and Davis (2000) extended TAM and Venkatesh et al. (2003) further addressed limitations by developing the unified theory of acceptance and use of technology (UTAUT) offering eight key competing user acceptance models to explain intentions to use technology. The UTAUT was itself not without criticism, amongst them being the lack of generalizability due to the fact that the models were tested in either an organizational or academic environment, each with its own inherent shortcomings (Legris et al., 2003). One of the successes of the UTAUT has been its ability to explain 70 per cent of the variance of intention to use a technological system (Venkatesh et al., 2003).

The variables included in the various user acceptance models have sought to explore the factors that influence an individual's intention to use a specific technology, with intention being a predictor of future behaviour. However, Bagozzi (2007) argued that an individual's accepted PU and positive attitude toward a technology are insufficient reasons to compel action, as one may still explicitly decide not to act despite a favourable assessment of a technology. Bagozzi (2007) also cited several other shortcomings of technology acceptance research and argues that self-regulation

moderates the effect of desires on intentions, thus allowing an individual to exercise some control over their desires and intention with the possibility of reformulating one's intention and to act differently. When these arguments are extended to the tourism context, which is voluntary and in the case of the leisure tourists, primarily hedonistic and utilitarian in nature (Chien-Hung & Mort, 2007), there are several intervening factors that for practical purposes could limit in-trip adoption or use of technology despite previous intentions. Such intervening factors include *inter alia* costs, technological infrastructure in the host destination (to facilitate roaming, availability of hot spots etc.) and multiple language options. The technology adoption models are limited in their broader application to the consumer domain, particularly in the tourism context. Baron et al. (2006 p. 112) posited that the "theory available to explain and predict consumer acceptance of technological innovation, especially information and communication technology" is unsurprisingly limited due to the lack of inclusion of the social and cultural context of the process. Bouwman et al. (2012) have also criticized the TAM model for its inability to account for the social context, limited explanation of user intentions, lack of consideration for the consumer context and the hedonic factor. Earlier work by Mick and Fournier (1998) examined the emotional side of technology adoption and more recently research by Chtourou and Souiden (2010) demonstrated the importance of emotional motivators on consumers' adoption of technological products. They found that, consistent with a study by Bruner and Kumar (2005) consumers perceive that the fun aspect of a device was an important antecedent affecting consumers' attitude toward the use of a mobile device.

Baron et al. (2006) proposed a consumer TAM, which is an adaptation of the UTAUT (Venkatesh et al., 2003). According to Baron et al. (2006) previous measurements ignore the technology paradoxes (Mick & Fournier 1998), and advocate that the development of theory associated with perceived enjoyment, PU and PEOU should not be confined by the existing quantitative models of technology, and draw more on the theory from studies of consumer practices (Baron et al., 2006). Therefore, the works of Chtourou and Souiden (2010) and Baron et al. (2006) focused on qualitative approaches which could possibly explain the remaining 30 percent variance unexplained by contemporary acceptance models. They also used actual consumers rather those with an intention to use a particular technology and have included emotional aspects of technology adoption. Much of the existing research in tourism focuses on intention with a very limited number of studies dealing with actual use or adoption of technology while tourists are in-trip. Several trials have been conducted or prototypes tested with in-trip tourists, but these have been limited in scope given the aim of such studies to work out kinks during the product development stage and with an implicit use of behavioural intention as a predictor of future adoption or uptake. Additonally, there is a dearth of literature as it relates specifically to leveraging ICTs to promote sustainable tourism at a destination from the consumer's perspective (Ali, 2009; Liburd, 2005). As new technological innovations emerge, the challenge will be for destinations to develop and provide opportunities for the "computer-mediated empowerment" (Hawkins, 1996 cited in Buhalis, 1998) of tourists in order to realize some of the aims of sustainable tourism.

## 3 Research Method

The primary purpose of this study was to identify the specific in-trip ICT applications available or emerging, that could potentially be used by leisure tourists to support sustainable tourism and to address the research question: "What specific ICT applications can best influence in-trip tourists to choose more sustainable tourism products/practices?" This exploratory study presents Phase 1 of a sequential mixed-method research design where a 'less dominant-dominant design' was employed, with the quantitative component less dominant than (Phase 2) the qualitative component (Tashakkori & Teddlie, 1998; Creswell & Plano Clark, 2011). Phase 1, the quantitative component, served a substantial developmental purpose which would improve the confidence of the findings (Bryman & Bell, 2011), and thus set the foundation for the interviews to be conducted with in-trip tourists (Phase 2).

Phase 1 involved a cross-sectional study focusing on eTourism experts. The main sampling frame for the quantitative strand were derived from three main sources: the professional database of experts of the International Federation for Information Technology and Travel & Tourism (IFITT), eTourism experts from publications over the period 2009-2011 and industry contacts. The intent was to draw on international and contemporary experts that were not biased to any particular market. Students and administrative staff positions were excluded from the IFITT database with a combined total from the three groups reaching 667 persons which was later reduced to 490 persons after eliminating account failure delivery notices and automatic responses in cases where contacts had left the organisation. A web survey was designed, piloted and revised before being disseminated to the total group. The questionnaire was designed to garner information about available and/or emerging in-trip tourists' technologies and how and if these can be used to support sustainable tourism initiatives. The questionnaire comprised seventeen questions with an additional optional item for the input of contact information. A mixture of closed and opened questions were delivered by an online survey which was accessible over a three-month period November 2011- February 2012 and three minders were sent after the initial invitational letter.

## 4 Results and Discussion

A total of 66 usable responses were received. The first two sections of the web-survey sought to establish the key characteristic of the eTourism experts in terms of their professional details, geographic location and expertise in the ICT and the Tourism domains, respectively. Most of the respondents were in the field of Education (47%), with Research (26%) being the second most significant area of work activity. Just under one quarter of the experts (23%) identified their main industry of activity as Tourism & Hospitality. A significant percentage of the eTourism experts were based in Europe (80%) with 11% from the Americas, 6% from the Asia and the Pacific regions, and 3 % from Africa. Though included as a category of choice, there were no respondents from the Middle East.

Recognising that eTourism is a field of study that cuts across both ICT and tourism research domains, survey respondents were required to conduct a self assessment about their level of expertise in the respective domains. Close to half (48%) of the

respondents had over 10 years experience. Further segmentation of the responses indicated that 11% of the eTourism experts had more than 15 years but less than 20 years experience and 11% had more than 20 years of experience. The findings also indicated that 10% of the respondents had 1-3 years experience in eTourism. More than half (56%) of the experts rated their expertise as high, with 21 % rating their expertise as very high, 20% percent as average and 3% as low. None of the respondents deemed their expertise in the tourism domain to be very low. eTourism experts had more "very high" ratings in the ICT domain when compared to the 21 % experts "very high" ratings in the tourism domain. 32% of the eTourism experts rated their expertise in the ICT domain as very high, 45 % as high and 23 % as average.

As highlighted in the literature review, many researchers have focused their attention on the use of ICT tools and applications by prospective tourists during the pre-trip phase. When the eTourism experts' opinions were sought about the relative importance of ICT applications during each of the phases: pre-trip, in-trip and post trip phases, the results demonstrated that the majority (91%) felt pre-trip applications were very important while during the in-trip phase only 35% felt it was very important, compared with 23% seeing it as very important in the post-trip phase.

Excluding the use of technology to capture photographs and/or video, eTourism experts were asked to rank the most important use of technology by in-trip tourists. The use of technology to retrieve information on maps & driving directions was ranked first out of the 7 options provided, with the use of technology for email being ranked the lowest as seen in Table 1.

**Table 1.** Ranking of Uses of Technology by In-Trip Tourists

| Ranking | Uses of Technology |
|---|---|
| **1** | Maps & Driving Directions |
| **2** | Information on events/attractions |
| **3** | Information on restaurants/bars |
| **4** | Weather/travel advisory |
| **5** | General information |
| **6** | Social media |
| **7** | Email |

eTourism experts were asked to assess the relative importance of 12 attributes that in their opinion influence the use of technology by in-trip tourists. These attributes were derived from both information systems literature, as well the eTourism literature. The findings from the eTourism experts for each of the 12 attributes are illustrated in Table 2. The findings demonstrate that the PU (of the application), content and cost were three attributes that enjoyed the highest level of ratings (i.e. very important) by the eTourism experts. When the combined positive ratings, which included very

important and fairly important ratings were examined, the most significant attributes were PEOU (92%), PU (91%), and cost (91%). The results are not surprising given what has already been established in the literature about the predictive influence of PEOU and PU on behavioural intention but some destination specific issues are independent of the users' attributes and fall strictly in the domain of service providers or the destination management organisation or both working in concert with each other. Local infrastructure that facilitate easy and cost effective connectivity in the language understood by the users are worthy of deeper assessment in the future, in light of the likelihood of increasing adoption of location based services and recommender systems.

Expert views on how important promoting sustainable tourism practices should be in the design of eTourism applications showed that just under half of the eTourism experts (48%) thought that the promotion of sustainable tourism practices should be a "very important" factor in the design of eTourism applications with 30% of the respondents of the belief that it was fairly important and 20% seeing it as neither important nor unimportant. Interestingly though, half of the eTourism experts thought that sustainable tourism is not a consideration for eTourism application developers. The remaining respondents were almost evenly split- with 24% indicating that they believed developers did consider sustainable tourism while 26% indicated that they didn't know.

**Table 2.** eTourism Experts Views on the Relative Importance of Selected Attributes in Determining the Use of Technology by In-trip Tourists

| **Attribute** | **Rating on the Determinants of the Use of Technology by In-trip Tourists (Percent)** | | | | |
|---|---|---|---|---|---|
| | Very important | Fairly important | Neither important/ unimportant | Not important | Very unimportant |
| Skill | 38 | 46 | 5 | 9 | 2 |
| Experience | 38 | 51 | 8 | 3 | - |
| Other's use of technology | 12 | 35 | 36 | 17 | - |
| Cost | 58 | 33 | 3 | 6 | - |
| Perceived ease of use | 51 | 41 | 3 | 3 | - |
| Perceived usefulness | 64 | 27 | 8 | 1 | - |
| Promotion by destination | 23 | 39 | 32 | 4 | - |
| Promotion by provider | 21 | 33 | 33 | 12 | - |
| Interoperability | 20 | 44 | 23 | 14 | - |
| Content | 62 | 26 | 8 | 1 | - |
| Interactivity | 26 | 44 | 23 | 8 | - |
| Multiple Language Options | 36 | 36 | 20 | 8 | - |

Utilizing the contemporary eTourism literature, nine specific ICT tools/applications as illustrated in Figure 1 were identified. These nine applications were previously assesed by the researchers based on their potential to meet the aims of sustainable tourism from the perspective of the in-trip tourist and not the perspective of the Destination Management Organisation (DMO). eTourism experts were asked to select from among the nine tools/applications, the ones they felt could support a destination's sustainable tourism thrust. As illustated in Figure 6, location-based services (73%), destination management systems (62%) and intelligent transport systems (61%) were the most highly favoured in-trip applications to support sustainable tourism at a destination. Virtual reality technologies (26%), augmented reality (29%) and carbon calculators (33%) were among the least favoured applications by the eTourism experts, to support sustainable tourism initiatives at a destination.

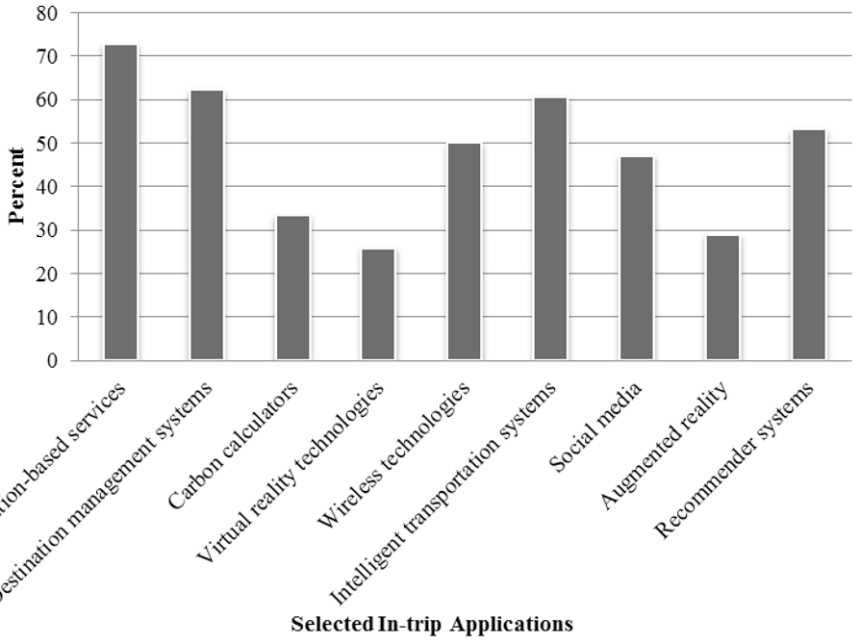


**Fig. 1.** eTourism Experts Selection of Applications that enable In-trip tourists to support Sustainable Tourism at a Destination

Additionally, eTourism experts were asked to identify any other applications, that could support sustainable tourism intitiatives at a destination. This was an optional item and only yielded 3 distinct responses but two of them were still arguably overlapping with one of the 9 previously identified ICT applications. These responses were: "visitor management applications", "application eco-labelling" and "unified financial transactions through use of different POS systems through a variety of local service providers". Visitor management techniques are often employed by DMOs to *inter alia* control visitor numbers, manage tourist flows, protect sensitive areas and

manage visitor waiting times in queues (Page & Connell, 2009). In-trip tourists can benefit from the demand pricing strategy which can offer them a discount and simultaneously enhance visitor fulfilment if there is an option to visit a site when there is less or more traffic, depending on the preference. However, a visitor management application is more of a tool for the DMO rather than the in-trip tourist and therefore not within the scope of this study. An eco-labelling application suggested by one eTourism expert could be subsumed under a recommender system which would aid in choice selection for in-trip tourists with the requisite sensitivity or awareness level. Similarly, a local level unified financial transaction point of sale system maybe deemed to fall under the category of LBS. At the local level, in-trip tourists can benefit from localization and personalization which are key features of LBS. The benefit to a local business is the transmission of localized content that promotes the business thereby enhancing local prosperity and economic viability. It is unclear if the idea of a local POS includes using a mobile phone as a digital wallet which offers convenience, but how this enhances the tourist's experience from a hedonic perspective is unclear.

eTourism experts were also asked to identify new and/or emerging ICT tools/applications that could allow in-trip tourists to support sustainable tourism at a destination. Some of the eTourism experts identified technologies that could not be considered new and were already identified earlier in the survey as applications that could enable in-trip tourists to support sustainable tourism. Some of the identified technologies also reflected a destination management/manager's perspective, rather than technologies than could be specifically used by the in-trip tourists. Some of examples of these cited by the eTourism experts were "Destination Customer Relationship Management" (application), "Destination Knowledge Management System based on a balanced scorecard approach" and "Attraction Information Systems." Other responses that reflected the emerging technologies that could change the way tourists experience a destination included: geocaching/game based-applications, cloud sharing knowledge, ambient intelligence, QR codes, Near Field Communication (NFC), Internet TV, tablets, cheap telecommunications for international tourists and context aware applications.

Some of the new and/or emerging technologies identified by the eTourism experts need to be examined in the context of research recently conducted by Amadeus (2012) which suggests that the next decade of travel will me more collaborative, and will emphasize depth of experience rather than breath. Context aware applications, QR codes, ambient intelligence, geo-caching and cloud sharing do offer opportunities for collaboration and deepening of the tourist's experience. NFC technology is already in use in mobile devices but its wider use is likely to grow as travel experiences will increasingly reflect our embedded world. If some industry players subscribe to Budeanu's (2007) suggestion that very few tourist specifically select sustainable products, then DMOs have a crucial role to play in ensuring sustainability is embedded in the their development and practices. They must also use the technological advances to promote sustainable practices. Martin et al. (2011) highlight that several tourism based projects are using context parameters and support push notifications and pull based information retrieval. Additionally, there is some level of consumer consciousness of resource efficiency and social equity (aims of

sustainable tourism) in retailing, as evidenced by “fair trade” and “responsibly sourced” labels. Such market-based approaches can modify individual behaviour and reduce environmental impacts (Buckley, 2012) and as the eTourism experts suggest, eTourism applications can be used to promote a sustainable tourism agenda. Tussyadiah and Zach (2012) submit that once people use technology in their everyday lives to get particular types of information, tourists will increasingly begin to express such ordinary behaviours at the destination.

## 5 Conclusions and Future Research

One may ask, given the ubiquity of mobile devices, the investments being made in location-based services, and the new or emerging technologies identified by the eTourism experts in the study, why only 35% of the respondents see in-trip ICT as very important? 73% of the eTourism experts saw LBS as a key application to support sustainable tourism. The commercial opportunities that new mobile technologies can provide when tourists are in-trip has been mooted as an opportunity to boost local businesses through advertising and other push technologies services that allow location based services and recommender systems to provide context-aware and location aware services. Customization opportunities ultimately enhance visitor fulfillment; and local content enhances local prosperity, economic viability and employment quality in a destination. Social equity is only enhanced if small and large players alike have the resources (human and financial) to take advantage of the new and emerging technologies. DMOs through the DMS, identified by 62% of the eTourism experts as an important in-trip application to support sustainable, can provide such a platform for all industry partners. Many destinations include sustainability as part of their overall strategy and therefore will need to use technological advances to embed this deeper into the psyche of tourists.

This study highlighted eTourism experts views on specific ICT tools/applications that can best influence in-trip tourists to choose more sustainable tourism products/practices. Location-based services, destination management systems and intelligent transport systems were among the top rated in-trip applications to support sustainable tourism. While attempts were made to make the study as international as possible, it may be limited due to it’s a Euro-centric perspective and the high percentage of responses from educators and researchers compared to industry practitioners. Phase 2 of the research will seek to establish the reality on the ground in terms of tourists’ actual use of in-trip technologies and linkages to sustainable tourism, by conducting interviews with tourists visiting the city of Edinburgh, United Kingdom.

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# The Adoption of Smartphone Applications by Airlines

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## Abstract

Given the increasing number of smartphone users worldwide, the use of applications as marketing tools can have a significant impact on the tourism industry. More tourism businesses, especially airlines, have begun using smartphone applications as a corporate marketing strategy to cater for customer needs. This article presents the findings of a study of the adoption of such applications in the airline industry. Data on 453 airlines were accessed to investigate whether the company provided smartphone applications and the influence on this decision of different characteristics (such as location and business coverage). The results show that the type of airline has a significant impact on its adoption of smartphone applications. This paper serves as a guide for airline enterprises considering adopting this new technology to enhance future innovation and competitiveness.

**Keywords:** Smartphone application; Airline; Marketing tool

## 1 Introduction

The number of smartphone users worldwide has increased rapidly in recent years, with the devices seeming to have gradually come to dominate the mobile phone market. Smartphones are a type of mobile handset with higher connectivity and more advanced computing capabilities than ordinary feature phones. A smartphone is often regarded as a "pocket/handheld computer" due to its capacity to install and run more advanced applications on particular platforms (Raaum, 2010). People in general are expected to increase their use of smart devices in daily life (Lopez & Bustos, 2006). According to a study conducted by ComScore (2012), smartphones are the fastest-growing segment of the mobile phone market and by February 2012, over 104 million people in the US owned one. Smartphone applications (in this study, only those available from the Apple App Store are considered), which were first developed in 2008 by Apple, Inc., have developed rapidly in recent years and are now considered one of the most salient functions for smartphones. The increasing popularity of such applications also seems to have had a significant impact on tourism. One study shows that smartphones have changed tourists' preference and behavior (Wang, Park, & Fesenmaier, 2011). Moreover, nearly one in five (19%) Americans have downloaded travel-related applications to their smartphones (Ypartnership & Harrison Group, 2010).

In the context of the airline industry, smartphone applications have become a new marketing tool which can provide online flight booking, baggage services, and flight information search functionality to travelers. In order to gain competitive advantage and succeed in a highly competitive airline market, many airline companies have created such applications. Through this new communication and distribution technology, tourism companies may increase customer loyalty, reduce internal

L. Cantoni and Z. Xiang (eds.), *Information and Communication Technologies in Tourism 2013*, DOI: 10.1007/978-3-642-36309-2_5,

operating costs, decrease delivery costs to intermediaries, and enhance corporate culture. Although airline products have some limitations, such as rapidly changing prices, perishability, and scarcity in quantity, smartphone applications can help vendors effectively overcome these limitations.

Smartphone applications provide a more convenient way for customers to access real-time flight information and manage their travel. It is therefore not surprising that flight information applications account for 17% (the largest number) of the top 100 tourism applications in the App Store (Wang et al., 2011). One reason for their popularity is that they allow both business and leisure travelers to book flights more quickly and conveniently. Business travelers use advanced smartphone applications as a source of flight information and as a tool to manage their trips more efficiently. Apps also help leisure travelers, who are usually price sensitive, to find cheaper flights, many of which are offered by airline companies directly. Many large and technology-friendly airline companies have actively adopted this new platform to broaden their service offering. For example, United Airlines' smartphone application has numerous features allowing tourists to book flights, search for airport maps, gather relative information, and use mobile boarding passes.

Some airline companies provide even more powerful applications. For instance, Alaska Air's "Travel App" allows passengers to book and modify their seat selections, add notes to their hotel and car rental services, and enable mobile flight check in. Through these applications, airlines can also collect feedback from tourists in the form of user ratings and comments, which are valuable information for companies seeking to understand their customers better.

With these numerous user-friendly functions and the rapidly developing market for smartphones and other mobile devices, these applications have become a very "hot" new topic in the tourism industry. However, as yet no study has been carried out looking at their adoption by airlines, so there is a lack of information about this innovation in this context. The purpose of this study is therefore to examine and understand the current application and development status of smartphone applications in the airline industry. This paper starts with a comprehensive literature review covering the development of smartphone applications in tourism. It then presents an analysis of airline information and their adoption of smartphone applications in order to understand the stage of development of this area. Finally, it proposes suggestions for managers and areas for further research. These recommendations are provided to help airline companies to make better use of smartphone application technologies to deliver their products smoothly, operate efficiently, increase customer loyalty, and provide a better service to tourists. They also set forth a solid foundation for further studies on this topic.

## 2 Literature Review

With the growing popularity of mobile devices, many studies have looked at the role of mobile technology applications in tourism. The development of wireless technology and mobile networks means that cellular phones now not only provide voice communication, but also allow customers to access relevant data through the Internet (Buhalis, 2003; Buhalis & Law, 2008). Mobile phones were firstly used and

studied as multimedia electronic guides for destinations such as museums and urban areas. In June 2007, Apple, Inc. launched its first iPhone, which featured the first generation of advanced applications used in smartphones. Since then, many more smartphone applications have been developed for travelers. Based on statistics from iTunes (2012), around 17,000 smartphone applications designed for tourism were available from the Hong Kong App Store in August 2012. Using such applications, travelers can search for and track flights, reserve hotels and cars, obtain information about a destination or an attraction such as Hong Kong or Disneyland, access details of local facilities such as cheap gas stations, carry out conversions between time zones, and access language translation services (Wang et al., 2011).

As the study of smartphone applications is still at its early stage, there is limited prior work to draw on. Some studies give us a first glance at the adoption of smartphone applications by the tourism industry and demonstrate the huge potential for further research. Kim and Adler (2011) look at the relationship between the use of hotel mobile applications and their effects on brand loyalty to help managers develop a better knowledge of such new technologies in marketing. Hafele (2011) shows that smartphone applications can improve the quality of customer service in theme or amusement parks by pinpointing exact locations, automatically planning a journey, making online reservations, and enabling information searches. Smartphone applications can also be used as a strategic tool to help theme and amusement parks generate revenue, increase the efficiency of communication with customers, and enhance customer loyalty.

Apart from the hotel and theme park industries, one study focuses on the travel industry and examines the use of smartphone applications in the tourist experience. It shows that Apps can help tourists gain a wide range of information, solve problems efficiently, share their experiences, and store memories (Wang, Park, & Fesenmaier, 2012). These studies examine the use of smartphone applications in particular areas such as hotels, theme parks, and travel. Additionally, Wang et al. (2011) provide an overview of smartphone applications used in the tourism industry and propose that the most frequently used Apps relate to flight information management. They also show that tourists make heavy use of airlines' smartphone applications.

Smartphones have only come to be widely used in recent years. Based on the diffusion theory proposed by Rogers (2003), the population can be divided into five segments; innovators, early adopters, early majorities, late majorities, and laggards, according to their adoption of a specific innovation. It seems that airlines are currently transiting from early adopters to early majority. As such, many companies may not have sufficient knowledge of smartphone applications. As they are a useful tool for airlines, many airlines may use or consider using this new technology in their marketing. In order to help airline companies make the right decisions, the first step is to develop a general understanding of the current adoption of smartphone applications in the airline industry worldwide.

## 3 Methodology

This study focuses on the use of smartphone applications by airline companies, as the industry seems to be heavily influenced by new technologies and to be one of the

most active adopters of such tools. Thus, by studying the smartphone applications used in the airline industry, this research will help stakeholders to understand the adoption issues in this sector.

In this study, airline information was collected in two ways. Company details were firstly gathered from the International Air Transport Association (IATA) website (http://www.iata.org/Pages/default.aspx [Jun. 10, 2012]). IATA has 240 airline company members in over 115 countries, including the world's leading passenger and cargo airlines (IATA, 2012). However, this list is not exhaustive, since some major airline companies, such as Air Asia, are not members of IATA. Hence, we also collected information by looking up the airline lists provided by the top-50 largest airports worldwide, based on the 2011 annual passenger traffic figures from Airports Council International (ACI). A total of 453 airlines were identified in this study through these approaches.

In order to differentiate the 453 airlines, we classified them according to the following categories. Only passenger scheduled airlines were analyzed in this study.

**Location.** This was determined by the location of airlines' headquarters and categorized into six regions; North America, Europe, Asia, Oceania, Latin America, and Africa.

**Business coverage.** We divided airlines into three categories; international, regional, and domestic, according to the area covered. International airlines operate flights among multiple continents. Those operating within a continent but across two or more countries are considered regional. Domestic airlines provide flights within a single country only.

**Destination.** The number of flight destinations of the airlines ranged from 4 to 378. We divided them into eight categories; 0-50, 51-100, 101-150, 151-200, 201-250, 251-300, 301-350, and 351-400 destinations.

**Alliance.** Some airlines are members of strategic alliances which facilitate cooperation to build a network of connectivity for international services. Oneworld, Star Alliance, and SkyTeam are the three largest such alliances in the world.

**Frequent-flyer programs (FFP).** A FFP is a marketing program provided by airlines to keep and attract customers. One of the advantages of smartphone applications is the functionality they provide to serve loyal customers. Some smartphone applications from airlines provide services to FFP members only.

The smartphone applications offered by the airlines in this study were identified from the Apple Hong Kong App Store for iPhone, since they are considered as the most active applications (Wang, 2011). As at 10 July, 2012 at 22:00, 57 airlines offered some form of smartphone application to their customers via this AppStore. Some airlines had created more than one program. For instance, Air France have not only launched a smartphone application for flight-related services but also one called "Travel Book by Air France" for travelers to write down stories during their trips and share their experiences with friends on Facebook.

# 4 Research Findings

The adoption status of smartphone applications for the 453 airline companies in this study was examined. As noted above, the airlines were categorized in terms of location, service area, flight destination, airline alliance, and FFP. The likelihood of airlines in different categories offering smartphone applications was analyzed.

## 4.1 Adoption of smartphone applications in different locations

Table 1 summarizes the number of airlines worldwide with and without smartphone applications. It can be seen that the distribution is uneven. For instance, 28 airlines in Asia provide applications, constituting 49.1% of all airlines worldwide doing so. However, although only seven airlines in North America provide smartphone applications, the percentage of airlines doing so in North America is the second highest. Latin America and Africa have the lowest numbers of airlines offering applications, implying that the rate of adoption in these locations is lower than in other regions. However, the results of a chi-squared test show that there is no significant difference ($p$=.357 >.05) between the six regions in terms of the adoption rate of smartphone applications.

**Table 1.**Total number of airlines offering smartphone applications by region

| | **All airlines** | | **Airlines with smartphone applications (ASA)** | | | | |
|---|---|---|---|---|---|---|---|
| **Region** | **Total no.** | **%** | **No. of ASA** | **%** | **% ASA based on total no. of airlines** | $\chi^2$ | **Sig.** |
| **North America** | 40 | 8.8 | 7 | 12.3 | 15.0 | .826 | .363 |
| **Europe** | 145 | 32.0 | 16 | 28.1 | 11.0 | .465 | .495 |
| **Asia** | 182 | 40.2 | 28 | 49.1 | 15.9 | 2.40 | .121 |
| **Oceania** | 15 | 3.3 | 2 | 3.5 | 13.3 | .008 | .929 |
| **Latin America** | 35 | 7.7 | 2 | 3.5 | 5.7 | 3.11 | .078 |
| **Africa** | 36 | 7.9 | 2 | 3.5 | 5.6 | 1.76 | .185 |
| **Total** | 453 | 100 | 57 | 100 | 12.6 | 5.56 | .351 |

One of the possible reasons why there are no significant regional differences is the imbalance between countries in terms of economic development. We might expect that airlines based in the developed countries are more likely to offer smartphone applications to their customers. For instance, Hong Kong, Japan, Korea, and Singapore are more developed than other parts of Asia, and many applications have been developed in these countries. However, the development status of Apps in these areas cannot represent that in Asia as a whole. It appears that the location of airline headquarters is not a strong impetus for companies to adopt Apps. In general, as a new technology, smartphone applications have not yet been widely adopted across the world. The competitive advantage and value they offer are still waiting to be discovered and developed by companies.

### 4.2 Adoption of smartphone applications in terms of business coverage

Table 2 shows that 41 international airlines (71.9%) have adopted smartphone application technologies, the highest percentage. The result of a chi-squared test indicates that this difference is statistically significant ($p$=.002< .05). This shows that the provision of international services is one of the major characteristics of airlines offering smartphone applications. Four domestic airlines, including three from mainland China and one from the US, also use smartphone applications as marketing tools. The US and China are the third and fourth largest countries in the world, so will have a broader domestic air travel market. This suggests that the larger the business coverage of airlines, the more likely they will be to use smartphone applications as a marketing tool. In other words, applications create more benefit for airlines with larger business coverage.

**Table 2.** Total number of airlines offering smartphone applications by service area

| | **All Airlines** | | **Airlines with smartphone applications (ASA)** | | | |
|---|---|---|---|---|---|---|
| **Service area** | **Total no.** | **%** | **No. of ASA** | **% ASA based on total no. of airlines** | **$\chi^2$** | **Sig.** |
| **International** | 240 | 53 | 41 | 71.9 | 9.40 | .002 |
| **Regional** | 166 | 36.6 | 12 | 21.1 | 6.65 | .010 |
| **Domestic** | 47 | 10.4 | 4 | 7.0 | .791 | .375 |

### 4.3 Adoption of smartphone applications in terms of flight destinations

Looking at the number of flight destinations, 90.7% of airlines offered no more than 100. However, Table 3 shows that the cumulative percentage of smartphone applications used in airlines offering fewer than 100 destinations as compared to all airlines is 68.4%. However, all four airlines (100%) providing more than 250 flight destinations also offered applications. The percentage of airlines offering Apps in a certain range (under 200 destinations) shows a tendency for the number of destinations to be positively related to App availability. A chi-squared test indicates that there is a significant difference ($p$=.000< .05) between the number of flight destinations and whether or not an airline provides smartphone applications. Similar to the previous section, it can be seen that airlines with more flight destinations are more willing to use smartphone technologies in marketing.

**Table 3.** Comparison of total number of airlines with airlines offering smartphone applications in terms of number of flight destinations

| | All Airlines | | | Airlines with smartphone app. (ASA) | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| **No. of flight destin.** | **No. of Airlines** | **%** | **Cumulative %** | **No. of ASA** | **%** | **Cumulative %** | **% ASA in range** | **$\chi^2$** | **Sig.** |
| **1-50** | 299 | 66 | 66.0 | 15 | 26.3 | 26.3 | 5.0 | 72.68 | .000 |
| **51-100** | 112 | 24.7 | 90.7 | 24 | 42.1 | 68.4 | 21.4 | | |
| **101-150** | 20 | 4.4 | 95.1 | 7 | 12.3 | 80.7 | 35.0 | | |
| **151-200** | 14 | 3.1 | 98.2 | 6 | 10.5 | 91.2 | 42.9 | | |
| **201-250** | 4 | 0.9 | 99.1 | 1 | 1.8 | 93.0 | 25.0 | | |
| **251-300** | 2 | .4 | 99.6 | 2 | 3.5 | 96.5 | 100 | | |
| **301-350** | 1 | .2 | 99.8 | 1 | 1.8 | 98.2 | 100 | | |
| **351-400** | 1 | .2 | 100 | 1 | 1.8 | 100 | 100 | | |

It is easy to understand that it is costly for airlines with a large number of destinations to market their services in each location using traditional tools such as advertisements, brochures, and marketing campaigns. However, by adopting smartphone applications, airlines can connect with customers anywhere there is Internet access. This approach can also help international airlines reduce marketing costs and enhance their corporate image.

### 4.4 Adoption of smartphone applications in relation to alliances and FFP

It can be seen from Table 4 that 134 airlines (29.6%) are members of at least one alliance and 35 of these (61.4%) provide smartphone application services. A chi-squared test shows that there is a significant difference ($p$=.000<.05) between airlines in alliances and airlines providing smartphone applications. Airlines which are not members of any alliances are less willing to invest in applications.

**Table 4.** Comparison of total number of airlines with airlines offering smartphone applications in terms of alliances and FFPs

| | Total airlines | | Airlines with smartphone applications (ASA) | | | | |
|---|---|---|---|---|---|---|---|
| | **No. of Airlines** | **%** | **No. of ASA** | **%** | **% ASA based on total no. of airlines** | **$\chi^2$** | **Sig.** |
| **In alliances** | 134 | 29.6 | 35 | 61.4 | 26.1 | 31.70 | .000 |
| **Not in any alliance** | 319 | 70.4 | 22 | 38.6 | 6.8 | | |
| **With a FFPs** | 271 | 59.8 | 51 | 89.5 | 18.8 | 23.85 | .000 |
| **Without a FFPs** | 182 | 40.2 | 6 | 10.5 | 3.3 | | |

Table 4 also shows that 271 airlines (59.8%) had FFPs, of which 51 provided smartphone applications, accounting for almost 90% of all the airlines offering Apps. Only six airlines without FFPs provided applications. The results of a chi-squared test indicate a significant difference between airlines providing FFPs and those with smartphone applications ($p$=.000<.05). This suggests that airlines which provide FFPs are more able to understand the importance of applications and hence more willing to focus time and resources on their development. Moreover, some of the smartphone applications launched by airlines can be considered part of their FFP. For instance, Alaska Airlines allows customers to use their Mileage Plan number to make an online reservation. Such functionality, created for loyal customers, may encourage airlines already providing FFPs to make more use of smartphones.

## 5 Conclusion

With the rapid advances in information technology and the increase in the user population, smartphones are having a significant impact on consumer behavior and daily lives. People seem to like to manage their flights using smartphones rather than desktop computers during their trips. Companies and managers in the airline industry should start to consider using smartphone applications as a critical marketing tool to connect with their customers. The growing population of users is also a potential market for the airline industry. Travelers anticipate that Apps will give them a more convenient way to manage their flights, while airline companies can attempt to use them as a more efficient marketing tool. Smartphone applications can help airlines to achieve their goals and meet customers' needs. Since their development is still at its early stage, only 57 airlines (12.6%) in this study used them as marketing tools.

With the development of further application functionality, travelers can use their smartphones to check and book their latest flights, check in, pay for baggage, view and change their seat, order meals, manage their flights, and look up aircraft details. Hence, competition between airlines on their smartphone applications is inevitable. From the outset, it is critical to have a better understanding of the current status of the use of applications in the industry. Therefore, the aim of this study was to provide an overview of the adoption of smartphone applications by different types of airlines. It has attempted to provide airline companies and tourism researchers with a basic knowledge of the development status of applications in this sector.

In this empirical study, the characteristics of 453 passenger scheduled airlines and 57 smartphone applications offered by airlines were examined to analyze the use of such applications by different types of airlines and the relationship between airline characteristics and App adoption. The purpose of this was to identify the characteristics of airlines which make them more likely to have already adopted smartphone applications.

Our findings demonstrate that several factors seem to affect whether an airline offers a smartphone application. Firstly, airlines in North America, Europe, Asia, and Oceania are more likely to have done so. Secondly, international airlines are more likely to adopt smartphone applications than regional and domestic airlines, based on chi-squared statistics. However, regional airlines are more willing to provide application services to their customers than domestic airlines. Thirdly, airlines

offering a larger number of flight destinations are more willing to offer mobile applications. Fourthly, airlines who are members of one or more strategic alliance are also more likely to offer smartphone applications. Moreover, in the data collection process, it was found that some alliances had also created applications for their members, such as SkyTeam. This is a great opportunity for airlines which have not yet launched their own smartphone application to develop this side of their marketing. Finally, airlines providing FFPs are more likely to offer a smartphone application.

## 6 Limitations and recommendations for future research

In this study, the data on airlines' smartphone applications were only current up to 10 July, 2012 at 22:00, and only the Hong Kong App Store was included. The Hong Kong App Store lists most, but not all, Apps available worldwide, but due to constraints of time and resource it was the only App Store accessible to the authors for data collection. The choice of which App Stores a new application will be launched into depends on its target market. Although the Hong Kong App Store lists all Apple applications whose target market is both the world and Hong Kong, it does not cover all the Apps available worldwide. Moreover, it is not known whether the Hong Kong App Store includes all available airline applications for airlines.

By exploring the characteristics of the airlines currently offering smartphone applications, it is recommended that international airlines, airlines with a larger number of destinations (especially those with 100 or more), those which are members of strategic alliances, and those offering a FFP should consider adopting such applications as a tool to enhance their marketing power in a competitive market.

Airlines should also note that the requirements for designing a smartphone application are different from those of a mobile website. The technology and development are more complex because each operating system platform (such as Apple iOS, Google Android, or Microsoft Windows Phone) requires a different application. Therefore, when airline companies decide to develop smartphone applications, they need to consider the various operating systems in use. In addition, future airline applications should provide not only basic information and functionalities for potential customers but also incorporate the incentives and dividend miles account management available for frequent flyers in order to maximize the benefits.

Since the development of smartphone applications is only at an early stage, many more airlines are expected to provide such services in the near future. We may also expect airlines already providing applications to keep updating them. Future research could provide updated data on airlines' adoption to assist other companies in the sector. Since the data for this study came from the Hong Kong App Store only, it is also recommended that future research replicates this approach in other App Stores to improve the comprehensiveness of the findings. Moreover, in this study, only data on scheduled airlines were collected. In fact, many cargo airlines also offer smartphone applications, such as Air France Cargo. Future work may examine these cargo carriers and/or other types of airlines. Besides, although the Apple App Store is the most mature Apps market, currently Google Android has the largest number of customers. It will therefore be desirable to include Android and other operating system platforms such as Microsoft Windows Phone in future research. This study also focused on

evaluating five factors which influence airlines to adopt smartphone applications owing to time and resource constraints. On the basis of the current findings, future work may examine more aspects such as service mode (full service or no-frills carriers), and market capitalization. Such work should provide airlines with more valuable information and help their managers to make better decisions about adoption.

As research on smartphone applications in tourism is still at a preliminary stage, there are many relevant research questions that remain unanswered. Some major questions deserve further exploration. For example, as more and more airlines adopt applications, it is both important and urgent to explore their content and consider how best to use this new marketing tool to attract customers. Moreover, one of the most important functions of airline smartphone applications is to enhance the customer service experience. It would therefore also be of interest to explore the relationship between application adoption and customer satisfaction.

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## 8 Acknowledgements

The authors would like to thank the three anonymous reviewers for their valuable comments on the earlier version of this paper. The authors also express their gratitude to Daniel Leung and Tianzheng Wang for their kind suggestions as well as Jing Liu and Ada Guo for their participation in data collection process.

# Transforming the Travel Experience: The Use of Smartphones for Travel

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## Abstract

The goal of this study was to develop an in-depth understanding of the use of smartphones and their impact on the travel experience. The results indicate that the use of smartphones can significantly transform the travel experience by changing travel planning, constructing and destructing one's sense of tourism, and reconfiguring the relationships among tourists, places, and others. Importantly, the findings establish a strong foundation for reconceptualising the travel experience within the context of mobile technology, and in turn, provide practical implications for mobile marketing and destination marketing.

**Keywords:** Travel, Smartphones, Mobile, Travel experience, Technology

## 1 Introduction

In recent years mobile phones have evolved into "smartphones" that are fully functional computers with a variety of input-output capabilities which provide reliable Internet access (Want, 2009) and seem to perfectly match travellers' needs for mobility and ubiquitous information support. As such, smartphones appear to be particularly able to facilitate travellers in many ways. A number of studies have been conducted to assess the impact of smartphones on the travel experience where most have taken a very limited perspective in that they have focused on the impact of mobile tour guides on travel activities (e.g. Kramer, Modsching, Hagen, & Gretzel, 2007; Wang, Park, & Fesenmaier, 2011). With the increasing penetration of smartphones on people's life and rapidly expanding information services (Wang & Xiang 2012), however, it is argued that it is important to obtain a more comprehensive understanding of the use of smartphones and the travel experience. Indeed, the emerging literature on travel and mobile technology (e.g. Jansson, 2007; Mascheroni, 2007; Tussyadiah & Zach, 2011) suggests that mobile technology has the potential to transform the overall travel experience by changing the nature and role of travel planning, construct and destruct the sense of tourism, and reconfiguring tourists, places, and others (Gretzel, Fesenmaier & O'Leary, 2008). Following from this literature, this study examines the different uses of smartphones (e.g. communication, entertainment, facilitation, information search) and the impact of these uses on different aspects of the travel experience.

L. Cantoni and Z. Xiang (eds.), *Information and Communication Technologies in Tourism 2013*, DOI: 10.1007/978-3-642-36309-2_6,

# 2 Theoretical Background

Travel is a complex process that is shaped by the interaction of objective entities and subjective perceptions (Jennings & Nickerson, 2006). As such, the understanding of the impact of smartphones on the travel experience requires the deconstruction of the travel experience and the reflections of the current relationships between traveller, space and time (Tussyadiah & Zach, 2011). This section first briefly reviews the literature regarding travel experience, deconstructs travel experience into three dimensions, and then discusses the potential influence(s) that mobile devices such as smartphones may have on the travel experience.

## 2.1 Travel experience: An integration of activities, interpretations, and sensations within space and time

Travel is a process in which people move to some other place other than the one they are usually living; they interact with people and objects in those places, and they document the process and perceptions (Tussyadiah & Fesenmaier, 2009). Based on this understanding of travel as a "linear" process, some scholars have defined the travel experience from a temporal perspective (Jennings & Nickerson, 2006) which involves three phases: 1) the anticipatory phase; 2) the experiential phase; and 3) the reflective phase. In this process, travellers are involved in a wide variety of activities including planning, reservations, traveling, documenting etc. (Craig-Smith & French, 1994); therefore from the temporal perspective, travel is often referred to as an "activity-based" process.

Considering that experiences are reflective and inherently personal, some scholars argue that the travel experience lies "beyond" the temporal dimension. For example, Volo (2009) defined travel experience as everything between perception and sensation, and is a kind of inner psychological status. Urry (1990) proposed the concept of "tourist gaze," arguing that the travel experience is different for each individual because the traveler subjectively objectifies and interprets the places he/she visits. More recently, Uriely (2005) refined this viewpoint by suggesting that the diverse characteristics of the travel experience can be explained by the diversity of traveler's motivations. Therefore, Jennings and Weiler (2006) concluded that travel is a sense-making process in which travellers construct the travel experience by learning, understanding, and feeling the places visited and the culture embedded in these places.

Based on the above understanding of an "activity" and "interpretation and sensation" dimensions of travel experience, some scholars posit a third dimension of the travel experience based upon space and time. For example, Tussyadiah and Zach (2011) defined travel experience as a performative action that is contextualized in a specific geographic environment and in the forms of sensation and perception. Jansson (2007) also emphasized the differences of travel experience with people's daily experience in terms of the context constructing by geographic environment and time.

## 2.2 The impact of mobile technology on travel experience

Mobile technology such as smartphones has the potential to transform the travel experience in many ways (Gretzel, Fesenmaier, & O'Leary, 2008; Lagerkvist, 2008;

Tussyadiah & Fesenmaier, 2009). Specifically, the use of mobile technology during trips can influence travelers' en-route activities. Kramer et al. (2007) and Wang, Park, and Fesenmaier (2011) found that the use of smartphones can create spontaneous deviations such as the changes of travel route, duration, and walking distance. In addition, mobile tour guides Poslad et al., 2001) have been designed to direct tourists during their traveling by providing recommendations and visualizing the surroundings of tourists.

Additionally, the use of mobile technology during travel can influence the travel experience by enabling a traveler to obtain a better "sense" of the place or by reconnecting them with every-day-life. These impacts of mobile technology are described by Jansson (2007) as "decapsulation" and can have both negative and positive impacts on the travel experience. For example, clear expectations of an upcoming experience may destroy the sense of adventure brought by the uncertainties of a trip, or connections with the ordinary life (e.g. issues in workplace) through emails or text messages breaks the feeling of "escape". However, Jansson argued that mobile technology can also enrich the travel experience through scripting, navigation and representation. An example of this positive aspect of decapsulation is that tourists can reduce the risk of cultural shock or alienation.

Finally, the use of mobile technology during travel enables the emergence of mobile and network sociality (Mascheroni, 2007) and more extensive interactions of tourists and other people in/out of the context of travel. Moores (2003) argued that the Internet actually pluralizes the time and social spaces whereby tourists can keep social activities with families and friends through mobile technology during the trip even without co-presence. Thus, continuous and instant communication with family and friends can trigger reflection and new interpretation of the current experience.

## 3 Methods

The goal of this study is to understand the impact of the use of mobile devices such as smartphones on the travel experience. In order to achieve this goal, this study adopted a qualitative research paradigm which is based on the ontological assumption that reality is subjectively constructed and multiple realities coexist (Lincoln & Guba, 1985). It is argued that this qualitative paradigm is appropriate for the studies of the travel experience because traveller's interpretations of their experiences are the focus of study (Volo, 2009). In order to obtain rich descriptions of the use of smartphones in travel and the factors influencing this use, the informants were required to own a smartphone, to have an unlimited data plan, and to have travelled at least once during the previous three months.

In particular, American travellers meeting these criteria were accessed using a panel maintained by Survey Sampling International, and resulted in a total twenty-four qualified informants participating in this study. The interview protocol was developed through a series of pilot studies which focused on testing its validity. The resulting interview protocol included the following three key questions: 1) For the most recent trip you mentioned, how did you use smartphones to plan or facilitate your trip? 2) Why did you use the smartphone, rather than other alternatives? And, 3) How did your travel experience differ between now and before you used a smartphone?

Analysis started with data organization whereby verbatim transcripts were created based on interview audio records. Following Van Kaam (Moustakas, 1994, p.120-121), the text corpus was then deconstructed whereby the unit of analysis was either sentence or paragraph depending on meaning of informant's description. Additionally, several analyses including member check, inter-coder reliability, and triangulation were used to ensure the trustworthiness of the data.

# 4 Results

The results of this study are reported in two sections: 1) the uses of smartphones for travel; and, 2) the impact of the uses of smartphones on travel experience.

## 4.1 The uses of smartphones for travel

Analysis of the interviews of the twenty-four informants identified 25 unique uses of smartphones which can be organized into four categories according to the purpose: communication, entertainment, facilitation, and information search. In particular, the majority of the informants used smartphones as communication tools to connect with others through calls, emails, text messages, and social networks (i.e. Facebook) during their travel. These communications were either relevant with or irrelevant to the trips that informants were involved in. For example, informants reported calling their families to pass along information of their safety on the road and to share moments of excitements. Informants also sent text messages to their families and friends to communicate non-travel related issues. As Informant #8 mentioned:

> *"Just calling home to check—we've got a daughter-in-law who was getting ready to have a baby at that time and we were calling to check and see how things were going and just checking on her health and everything."*

Informants also reported checking emails to remain informed of the activities and events in the workplace; for example, Informant #20 mentioned:

> *"Just to keep up with what's going on because email is the primary way in my workplace that people contact each other, so if something comes up then I hear about it by email and that's what I was trying to keep track of."*

In addition, several informants reported using social networks (i.e. Facebook) during trips to check friends' posts and to update statuses.

The smartphone is an agglomeration of functions of multiple digital devices and software such as MP3 Player, Internet Explorer, computer games, camera, and movie player. As such, the travellers used smartphones as self-entertaining devices to take and share photos, listen to music, play games, read books, surf the Internet, read or listen to news, and to watch movies. The most popular entertainment activity was photographing and sharing with others through social networks (e.g. Facebook, Instagram), emails, or text messages. Different from other self-entertaining use of smartphones during travel, primarily to fill the downtime, the photographing and sharing activities were main hedonic activities during trips. The informants described their use of smartphones to capture and share photo the important parts of the travel experience. For example, Informant #6 described:

> *"I wanted to share it say with my daughters and they weren't with me and they wanted to see pictures; they've never been to Niagara Falls and so I took pictures and sent it to them, emailed it to them and texted. You can text, so I texted the picture."*

The informants also reported using smartphones to facilitate their activities before and during trips. Before actually traveling the informants used smartphones to manage their itineraries, check weather, check-in for flights, and purchase tickets for trains, buses, and shows. For example, Informant #1 mentioned usually planning trips during commutes to work, and she used the smartphone to purchase bus tickets. And, Informant #15 mentioned planning trips during breaks at work, using the smartphone to shop for and to buy flight tickets during lunch at café.

> *"Because I was in the cafeteria and it was a break time for me and that's what I use things in which I cannot do on laptop, but I do it, because in the cafeteria we were like eight people sitting down together. And all the people wanted to come along with us. ..... So all of the people wanted me to check on the smart phone if there are tickets available to they can join me. …… So I went ahead and booked tickets for eight people using my credit card at that point of time." (Informant #15)*

Many of the informants used smartphones to track flights, plan and purchase tickets for transportation and shows, and to navigate their tours. Apparently, navigation is one of the most popular uses for smartphones (13 informants mentioned this activity). Tourists adaptively used smartphone's functions for location awareness and GPS applications (apps). That is, they not only used the navigation apps to find directions, but also used the apps to understand geographic environments for safety. For example, Informant #5 said:

> *"I used Google Maps, map function……Because the trip was planned for us. So we had very little information about where we were going. So we had, at least one of us – sometimes the girls, we actually had our phones, and so we could tell where we were." (Informant #5)*

Last, the results of the study suggest that smartphone is an effective and handy tool to search for information regarding transportation, accommodations, dinning, things to do during trips, travel ideas, and deals both before and during trips. Before the trip, some of the informants used smartphones to monitor flight prices, search for deals at destinations, and plan for accommodations; for example, Informant #19 remarked:

> *"When it comes to the phone about the travel, I fly standby a lot, so I use the phone. And the phone is very valuable for the checking in, because I fly standby, so I do check in on my flight with the phone and I do check to see what my chances of making the flight are on my phone as well." (Informant #19)*

Smartphones were also used to identify a restaurant during the trip (15 informants mentioned this). The descriptions of the specific circumstances when "finding a restaurant" revealed that travelers used smartphones to: 1) find reviews and addresses of known restaurants, and 2) search for dinning ideas. For example, the informants sometimes knew the restaurants they wanted, and then used smartphones to find customer reviews to justify their choices and to find directions. In addition, "finding a restaurant" seems to be a spontaneous activity for many of the travelers where several different contextual factors stimulated or somehow encouraged travelers to decide or

change decisions for dinning arrangements, so they used smartphones to search for dining options. For example, Informant #3 mentioned needing to decide on a restaurant because a companion suddenly wanted to meet some friends. They needed to choose a restaurant, which was appropriate for both of them in terms of distance. Informant #22 reported always needing to search for restaurants because of vegetarian preference; particularly, when overseas, planning was difficult and resorted to smartphone to search for restaurants upon arriving at a destination:

> *"the biggest thing for me was trying to find restaurants that I could eat at when I was in Asia 'cause I am a vegetarian so it is kinda hard." (Informant #22)*

The travelers also used smartphones to search for activities to do at destinations or search for hotels if plans changed during trips. For example, Informant #4 mentioned:

> *"Oh yeah, definitely. I remember me and my friends went down to the beach last year at Atlantic City. And one of the days we were there it was raining miserable. So I remember looking up on my phone – we found shopping outlets and we found a movie theatre to go to."*

The use of Twitter during trips appears to be different from its use in daily life. In daily lives, people used Twitter as one of sources to acquire news. In the context of travel, travelers tried to follow "tweeted" information associated with visited destinations. As such, Twitter became one of the more important information sources for travelers for planning activities during trips and to obtain local news. For example, informant #1 mentioned:

> *"So they said there is the movie festival at the – Tribeca Movie Festival. So after I saw that, the Tweet message, I checked their website. …… I went to Tribeca Movie Festival by myself." (Informant #1)*

In summary, the results indicate that the American travelers prefer two features of smartphones: easy access to multiple digital devices and their strong computational capability which enable them to connect to the Internet. Besides using the basic functions for communication, the travelers used smartphones to "replace" many other devices such as MP3 players, GPS devices, Kindle (digital reader), and cameras. As such, the travelers indicated that they enjoy travel more by capitalizing on preferences as usual (e.g. listen to music, read books, take photos) while avoiding carrying multiple devices; also, travelers took advantage of ubiquitous Internet connections to facilitate and plan their trip. As such, the results clearly indicate that contextual factors can substantially influence the functions of smartphones used and travelers' use of these functions.

### 4.2 The impact of the uses of smartphones on the travel experience

The second stage of this study focused on the impact of smartphone use on travel. The results of this analysis indicate use of smartphones for travel leads to changes in travel planning and the activities before, during, and after trips and travelers' interpretations and sensations toward their trips (see Fig. 1).

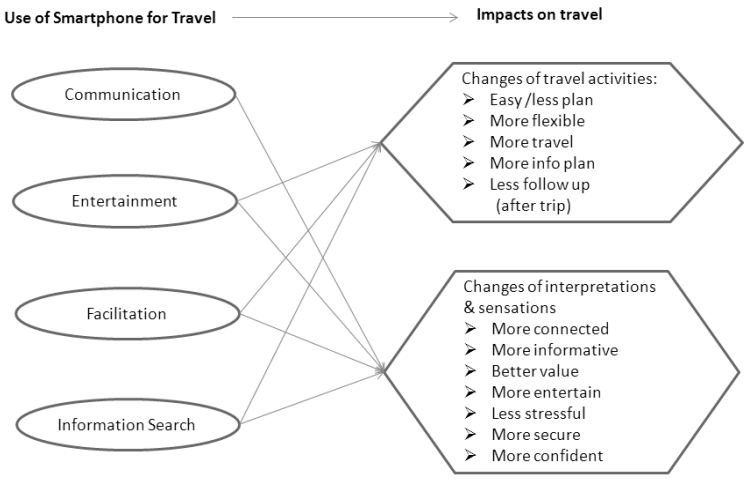


**Fig. 1.** Uses of Smartphones for Travel and the Impacts on Travel Experience

In particular, the informants reported that travel planning is now "easier" than the time before they adopted smartphones where "easy" can be interpreted two ways. For example, some of the informants reported that it is unnecessary to plan out everything and prepare all travel information (e.g. directions, phone numbers) before trips and as such, the travel planning process became easier and quicker. As Informant #18 mentioned:

> *"I would say I worry less, I do less of map gathering, I don't do that anymore and I don't worry about the extracurricular stuff like what buses to take and what cabs to take because I make sure I have an app on the phone that I can go into immediately and find out how to get on the cab ……" (Informant #18).*

For some of informants, "easy plan" referred to the ease of use of smartphones as compared to alternative ways of planning. For example, for most of planning during trips, smartphones provides "the most convenient" solution to search for information to understand geographic environment (Informant #1and #2), arrange the things to do in the destinations (Informant #3, #8, and #9), and cope with the unexpected situations (Informant #6 and #17). Also for travel planning, some informants highlighted a different perspective which is the increased planning. Some informants (#10 and #14) mentioned that they now tried to do more planning than before because they had the Internet access all the time in both daily lives and travel contexts. That is, before the adoption of smartphones, due to the restrictions of desktop computer (e.g. fixed, only for work purpose), they only had limited time to search for information to plan their trips. The adoption of smartphones granted them the ubiquitous access of Internet on another device besides their desktop or laptop computers. As such, the results indicate that they can plan their trips by using their breaks from work, lunch times, and the time commuting to work. Thus, they felt that they did more travel planning than before. Interestingly, Informant #15 mentioned that he tended to become more "picky" for the travel plans because of the easy access of Internet, and

that he always tried to re-evaluate plans during trips in order to improve the current situation.

However, a number of informants indicated that they had become more "flexible" because smartphones afford them access to information sources almost anywhere and anytime. That is, a number of the informants indicated that they now can change their plans if the planned activities did not meet their expectation. As Informant #17 mentioned:

> *"it's definitely easier because you know, like say I am in New York City and like we are at a restaurant and the wait is going to be a long time. It's easier to look up something else close by and where there is not such a wait or whatever, if you are hungry or you know, you want something different or it's not what you expected it to be……".*

Finally, Informants (#1, #15, and #17) reported the smartphone even changed their travel experience after their trip. For example, for photo lovers and social media users, before the adoption of smartphone, they uploaded photos to the social networks after trips because there was limited Internet access during trips. After the adoption of smartphones, they uploaded photos during trips. Finally, Informants (#2 and #21) reported that they intend to travel more because of the convenience and flexibility brought by the smartphones.

The second dimension of impact relates to travelers' interpretations of trips and their sensations. First, many informants indicated that they were more connected with their families, friends, and the news in other places. In particular, the informants reported that they can keep the routines of communication (e.g. check emails, update Facebook, read newspapers) during trips with smartphone. For example, Informant #3 compared recent trips with those before she adopted the smartphone, indicating that she felt isolated with her friends:

> *"I would say it's pretty different. I remember when I was little and I'd go over to Ireland with my dad ……Now looking back at it like now, I wouldn't want to leave the country without my phone because I've just become so used to it. To me like I get worried if I didn't know what's going on with some people. So it's definitely a different experience…… So when you're younger you don't have Facebook, you don't have Twitter."*

The convenient connections with family and friends also enable greater input during trips from the others out of the context of travel, and resulted in much greater satisfaction. For example, Informant #1 described that she added one more stop to a winery during her trip because of her friend's recommendation after she updated her status on Facebook about her trip. Informant #15 mentioned that he really enjoyed the happiness from the instant photo sharing with his sister in India. He said:

> *"I'm a newly married guy, so everything I spend with my wife, every moment – these not the little moment I treasure a lot. ……. I mean I posted pictures from Grand Canyon too when we were doing the helicopter ride. So those are very precious. Those are things my sister cannot do when she's not here in America. I just posted her to know that we're really in the best place in the world Las Vegas……. People log onto their Facebook to wish me on my birthday. And they also liked all the photos, which I posted during the trip. I'm really enjoying the whole piece and instant happiness I never ever had before."*

Also, some informants reported that they felt more informative than previous trips because whenever they wanted to know something and they could get assistance from smartphones. For example, the Informant #8 described that:

> *"Sure yeah, it's been quite amazing—well travelling because before you'd have to call, you know call information perhaps if you wanted to find out about a restaurant, and then call the restaurant. Whereas now you can just look it up online and typically find out the location, the hours, the menu and then you can check Trip Advisor, which I like to do a lot. I like Trip Advisor."*

Some informants also indicated that obtained "good value" because they can take advantage of last minute deals. Informant #15, for example, mentioned that he did not plan a helicopter trip in the Grand Canyon, but he did it because of the push alert from the Groupon which offered a great deal.

The results of the interviews suggest that smartphones enabled them to consume the "down time" (e.g. transit time, on the flight) during trips in the same way of consumption in their daily lives. They reported that their trips became more fun (or less boring) because they could watch movie while waiting for flight or watch Youtube videos when they were not driving. Finally, the informants reported that they felt less stressful before and during trips, more secure during trips, and more confident towards their trips because of the ubiquitous access to the Internet. Informant #18 described her experience in dealing with the airline changes.

> *"……But when you get to the airport, if there was a change and the airplane was delayed or canceled, you just don't know unless you are going up to the gate and asking what's going on, but now with the smart phone connection, I think it's more convenience is another good word. It's faster to let me know what's changing on my itinerary and the airline trip and it gives you an instant message for the alert change, so I think that's the big relief."*

Several female informants (#5, #6, and #22) highlighted the sense of security brought by the smartphone and some of the informants (#4 and #9) felt more confident in that they always can make better decisions during trips with smartphones

> *"If I travel alone, being a female, I have my cell phone; it's just safer. I feel safer. I like to just go and I feel like I have…it's just readily available to you. You can find a hotel quick, you can get around, you can look everything up on the phone to book a hotel and find a restaurant and find local happenings and things that are in the area. I think the word I want to use is safer. I feel safer having my cell phone and having the technology." (Informant #6).*

While embracing the benefits brought by the use of smartphones, some informants mentioned the "evil side" of smartphones in travel. For example, Informant #11 complained that the smartphone connected him with work during holidays and these connections sometimes ruin the vacation.

> *"a double edged sword because I don't have any privacy…People can reach me 24/7 which is a great thing but at the same time, you know, I am under constant pressure from outside sources because people know they can reach me on weekends, on holidays, on Saturday, anytime, night time."*

In contrast, Informant #12 indicated that the smartphone took away her sense of adventure in her trips:

*"As a traveler prior to the Smartphones, I was always one to want to discover things naturally, organically, never actually researching prior to, say, leaving my hotel room. But now, with the cell phone or with the Smartphones, I think that that essence has been taken away by that…… and I forget that the biggest pleasure of my travels is just to get lost somewhere in the city……"*

# 5 Conclusions and Implications

The findings of this study provide a broad description of the transformation of the travel experience due to the use of smartphones. As shown in Figure 2, it is posted that the use of smartphones "unlocks" the three-stage model of travel experience by shortening or eliminating the pre-consumption and post-consumption stages and extending the consumption stage. This transformation has the potential to fundamentally change the travel experience in a number of important ways. In particular, travel activities may become more spontaneous and the scheme of travel decision-making may change substantially because input information for on-site travel decision-making is different from pre-trip decision-making. Additionally, feedback from others (e.g. friends or family at home) may become an important part of the consumption stage, which in turn, may influence travelers' activities and emotions. Following Tussyadiah and Zach (2011), it is argued that these changes in the three stages of the travel experience highlight the importance of time and space in conceptualizing the foundation of the travel experience.

The findings of this study also provide a much better understanding of the potential impact of "decapsulation" of mobile technology such as smartphones (Jansson, 2007). In particular, this study identified the spillover effects in which the daily lifestyle, habits or social relationships influence travel experience. It is argued that spillover effects decapsulate travel experience in at least two ways. On the one hand, the travellers carried routines or habits such as listening music, playing games, watching movie during down time to the context of travel. The performance of these routines/habits made travel less boring. On the other hand, the uses of smartphones enable travellers to stay connected with work. These connections influence the travel experience in both positive and negative ways depending on traveller's willingness to stay connected with the workplace. Finally, the uses of smartphones leverage the impact of mobile and network sociality (Mascheroni, 2007) in that smartphones enable more extensive interactions of tourists and other people in/out of the context of travel, and in turn, may lead to changes of en-route activities, travellers' interpretations of the destinations, and travellers' sensations. In this sense, the use of smartphones for travel enhances the travel experience by enabling the traveller to better experience of the authenticity of a destination.

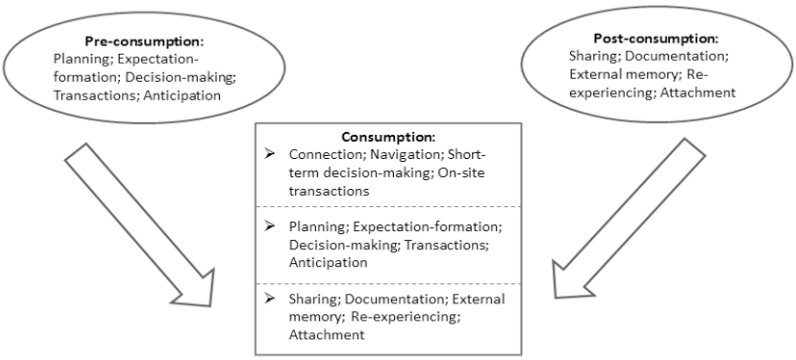


**Fig. 2.** Smartphones and the Transformation of Travel Activities

The results of this study offer several managerial implications in the areas of mobile marketing, destination marketing and management, and the design of travel information services on the smartphones platform. For example in mobile marketing, the findings of this study confirm the power of ubiquitous interaction (Okazaki, 2012). For example, people accomplish pre-trip planning anytime they desire: while waiting for bus, waiting in the line at the grocery checkout, and in restaurants, tennis courts, or a train stations. This indicates the importance of making travel products or destination information available on the smartphones where people can initialize the decision-making process anytime during trips to respond to unexpected situations or dissatisfaction with original plans.

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# Time-of-Arrival Estimation in Mobile Tour Guides

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## Abstract

In recent years advanced car navigation systems have emerged as a key tool for commuters. For tourists and visitors, analogous mobile tour guides are equally important when exploring urban and outdoor spaces. During the development of a mobile tour guide designed specifically for hikers and cyclists the need for route planning based on individualized time estimates became evident. Despite progress in accurate time-of-arrival estimation for cars, relatively little research has focused on hiking and cycling. This paper therefore discusses a number of approaches to time estimation, introducing a nearest neighbour model which, based on a preliminary evaluation, is applicable in scenarios where limited learning data is available.

**Keywords:** Mobile tour guides, Estimated Time-of-Arrival (ETA).

## 1 Introduction

Mobile tour guides are intelligent systems which support tourists by offering individualized and highly relevant information as well as mobile decision-support (Gretzel, 2011). They go beyond the customization offered by traditional electronic tour guides by providing an "always on" experience. Utilizing a rich profile created by continuously monitoring the tourist's context and collecting feedback, the guide is able to automatically schedule and optimize the tour in real time without overwhelming the tourist. Such timely recommendations of what to do lead to the best possible experience, increase tourist involvement and ultimately spending.

Accurate travel time estimates are a vital component of tour scheduling, allowing the guide to determine what is feasible within a time budget (reachability, i.e. isochrones) and to choose between different routes.

In the brick-and-mortar world simple sign posts are used to provide static travel time estimates, however, these are often inaccurate and a cause of frustration as they are unable to consider the hiker or cyclist's context, such as their abilities or current weather conditions. Furthermore, such signage is inappropriate for individualized route planning where personalized time estimates are required for the accurate development of route alternatives.

L. Cantoni and Z. Xiang (eds.), *Information and Communication Technologies in Tourism 2013*, DOI: 10.1007/978-3-642-36309-2_7,

Despite the fact that sophisticated estimation techniques are well-developed for car travel, utilizing difficult but well-understood constraints such as road capacities and speed limits, relatively little research has focused on hiking and mountain biking, particularly under varying conditions.

Two distinct possibilities for improving estimates exist: extracting information from the track and other information sources (e.g. weather information services) themselves and / or exploiting feedback from other users.

Pitman et al. (2012) built upon traditional models such as those of Naismith (1892) and Tranter (Langmuir, 1995), and introduced a model capable of predicting the time required to complete a hike specified by a series of geographical points, i.e. without user data, and demonstrated its superiority to more oblivious models.

In comparison, modelling the time requirements for mountain bikers is more difficult due to the complexity of the equipment involved in cycling. Performance calculators, such as Bike Calculator[1], build upon basic relationships between time, distance, speed and elevation and include more advanced physical parameters, such as rider and bicycle weight, transmission efficiency, tire configuration, and weather conditions (temperature and head wind). These factors are difficult to reliably estimate in the domain of mountain bike tourism where riders may be unfamiliar with their equipment (e.g. rental bikes) or unable to completely calibrate such a model (due to time or usability constraints).

This work subsequently focuses on collaborative methods and demonstrates the applicability of a nearest neighbour model to determine individualized time estimates. However, such a technique suffers from a bootstrap problem and therefore is only suitable in situations where a sufficient corpus of user data is available.

Following this introduction, Section 2 provides an overview of the O-STAR project and describes the context in which this research was developed. Section 3 presents a time estimation model based on track data and summarizes the results of an evaluation carried out on an extensive set of hiking data from South Tyrol, Italy. In Section 4, the main contribution of this work, a nearest neighbour time estimate, is described and evaluated. The paper finishes with a discussion of results and conclusion in Section 5 and 6 respectively.

## 2 Background

The O-STAR project aims to develop an innovative tour guide system designed specifically for use by hikers and cyclists in alpine areas. An early study on tourists' usage intention of mobile services (Rasinger et al., 2007) supports this focus on *transport and routing* which, together with *weather and news services*, were rated as the most likely to be used among a representative sample of over 950 tourists in the alpine region of Tyrol. Through close cooperation with operators in these regions, the system should also promote local attractions and specialities. The main deliverable created by the project will be a mobile application and associated infrastructure that

[1] http://bikecalculator.com/

provide timely information and tour recommendations that are synchronized with public transportation schedules.

In the requirements analysis phase a series of focus group sessions were held in three target regions where representatives of potential user groups were invited to participate. Several rather novel requirements – compared to the traditional route planning problem – were identified:

- Round-trip schedules that include public transportation at the beginning, in between or at the end of a tour.
- Monitoring of current progress and dynamic rescheduling in the event that tour progress falls behind schedule or circumstances change unexpectedly (e.g. due to bad weather or equipment failure). In such cases, shortcuts and alternative routes in order to reach a public transportation connection or alternative points-of-interest should be proposed.
- Coordination of groups with different preferences or levels of mobility. For instance, two subgroups might receive recommendations for different tours that meet at a common restaurant at lunchtime.

Several additional requirements, such as offline usage scenarios[1], became also evident during requirements elicitation workshops; however the three listed above provide qualitative empirical evidence for the practical relevance of time-of-arrival estimates in mobile guide applications.

We anticipate that individualized time-of-arrival estimates will consider two of the three context dimensions described by Höpken et al. (2010) in their taxonomy of context-based adaptation in mobile applications, namely *content* and *interaction modality*. Content adaptation will be supported by filtering, for instance, points-of-interest based on reachability constraints due to personalized progress estimates. In addition, recommendation strategies, such as those described in Jannach et al., 2010, will be used to rank recommendable objects based on presumed user preferences. Collaborative strategies that learn from community behaviour as well as explicitly encoded domain expertise (see Jannach et al., 2009) will also be employed.

Zanker et al. (2012) presented a tourism application capable of personalized filtering of objects according to their geographic proximity, exploiting the ensemble of other objects in the neighbourhood to derive semantics, such as *nightlife factor* or *aptness for families with small children* (Zanker et al., 2009a). Later, the framework was refined to harvest, for instance, biking or hiking trails from the Web and exploit them to derive semantic annotations for accommodation services or even different regional areas of a destination such as *aptness for biking enthusiasts* (Zanker et al., 2009b).

In contrast to earlier approaches to mobile guidance such as the etPlanner framework (Höpken et al., 2006), the third dimension of Höpken's taxonomy (Höpken et al., 2010), *user interface adaptation,* receives less focus in our application scenario: although the diversity of end-devices continues to increase (in terms of screen size,

[1] Note, that Fuchs et al. (2011) also identified roaming costs as a major impediment towards full acceptance of mobile applications in the tourism context.

processing power, communication technologies, sensors etc.), application development for smartphones now centres around 2-3 dominant and homogeneous platforms (such as Android or iOS).

Lamsfus et al. (2011) propose an alternate categorization of the data required for context-aware systems that places additional focus on the traveller, namely data about the individual, the environment and tourism objects. Thus, accurate arrival-time estimates that indicate if the individual is on, ahead of or behind schedule would, in addition to improving the accuracy of reachability data, add additional value to Lamsfus' context modelling framework.

Over the past years a myriad of mobile applications for tourists and visitors have been developed. Ricci (2011) provides an encompassing survey of mobile recommender systems in a tourism context. Most public transport information offered by mobile tour guides is limited to access point and timetable data, for instance routing users to bus stops and informing them about the next arrivals. The PECITAS system developed by Tumas and Ricci (2009) goes a step further by computing personalized routes that include public transportation alternatives as well as an individualized selection of points-of-interest. Our proposed work builds upon this approach by basing the scheduling of routes on more accurate time-of-arrival estimates.

Research in advanced transportation systems, such as car navigation and fleet management, has also considered time-of-arrival estimation. Recently, Fagan and Meier (2011) presented an approach that predicts travel time based on past observations and considers situational parameters such as driver behaviour and traffic flow patterns. While traffic flow is not usually an important feature of the learning space for routing hikers and bikers, route and hiker parameters heavily influence travel time. Pitman et al. (2012) were able to produce more accurate estimates by modelling route features such as ascent or descent and (situational) hiker parameters such as speed on flat ground or a hiker's tiredness as will be explained in the next section. However, in initial work in the biking domain, the approach was not successful, presumably due to a lack of feature data describing the physical parameters of the bike and the biker as well as the track. However, as GPS track data with limited learning features is rather common in bike tourism context, we subsequently propose a very promising neighbourhood model.

## 3 Hiking time estimation

In general, a hiking route may be described as a sequence of positions $P = \langle p_0, p_1, \ldots, p_n \rangle$. A hiker walking along a route produces a corresponding sequence of time measurements $T = \langle t_0, t_1, \ldots, t_n \rangle$, where $t_0$ is the time associated with $p_0$. Collectively these may be referred to as a *GPS trace*.

Pitman et al. (2012) introduced a model (Equation 1) for estimating the speed $\hat{v}_i$ for each segment from $p_{i-1}$ to $p_i$ based on a weighted sum of a feature vector $\vec{z}_i$ extracted

from $P$ at $i$ based, with the weights $\hat{A}$ being determined through linear optimization applied to historical GPS traces.

$$\hat{v}_i = \hat{A} \cdot \hat{z}_i$$

These speeds were then integrated along each segment to derive an estimate for the overall time required to hike between $p_{s_1}$ and $p_{s_2}$:

$$\hat{r}(s_1, s_2) = \sum_{i=s_1+1}^{s_2} \frac{dist(p_{i-1}, p_i)}{\hat{v}_i}$$

As outlined in Equation 3, each feature vector $\vec{z}_i$ for a given track included elements specifying the angle of section's gradient ($\Theta$), the length of the track ($l$), the proportion of total distance, ascent and descent covered at the end segment $i$ ($x$, $a$ and $d$), as well as various higher order powers of these.

$$\vec{z}_{ki} = b(1, \Theta, \Theta^2, \Theta^3, \Theta^4, \Theta^5, \Theta^6, \Theta^7, x, x^2, x^3, a, a^2, a^3, d, d^2, d^3, l, l^2, l^3)$$

Each feature vector was scaled using a personalization factor $b$, the hiker's speed on flat ground, calculated using track sections with an angle of gradient between -5° and 5°. When applying the model at position $i$, this parameter was estimated by comparing the actual elapsed time $r(0, i)$ with the estimated time for the elapsed portion of the track $\hat{r}(0, i)$.

$$\hat{b} = \frac{r(0, i)}{\hat{r}(0, i)}$$

The methodology was evaluated using a set of 360 hikes logged between March 2011 and March 2012 in South Tyrol, Italy. In general, each GPS trace originated from a different hike and hiker. Following pre-processing to remove artefacts such as pauses, the data was resampled to reduce inconsistencies between logging devices. The 360 hikes were then randomly split into two equally sized sets for learning and testing.

In a first step the regression model was fitted using linear optimization, demonstrating a clear improvement over the standard Naismith estimate used as a baseline. Estimates were produced for 100 evenly-spaced check points along each track and compared using mean absolute relative error (MARE). As presented in Equation 5, for each check point $x$, the metric averages the relative error between the estimate,

$\hat{r}_{kx}$, and the actual recorded remaining time, $r_{kx}$, of each of the $q$ hikes. Relative error is used as each hike requires a different amount of time to complete. Furthermore, errors are considered in absolute terms to penalize over and under estimation equally.

$$MARE(x) = \frac{1}{q}\sum_{k=1}^{q}\left|\frac{\hat{r}_{kx} - r_{kx}}{r_{kx}}\right|$$

By applying the regression model, mean average relative error (MARE) was halved for much of the recommendation range compared to the baseline method, translating to average error being reduced from 1 hour to 30 minutes for a 3 hour hike.

# 4 Bike trail time estimation

## 4.1 Time estimation models

Continuing the development of travel time estimation in the context of alpine tourism, this work examines the sub problem of mountain biking. As outlined in Section 1, the inherent complexities involved in cycling make modelling more difficult, particularly when combined with severely limited quantities of learning data (i.e. tracks).

As a result, this work introduces a nearest neighbour model which is applicable in scenarios where other cyclists have already ridden along a trail. The basic idea of exploiting observations of other users to derive predictions has been successfully applied, for instance, to produce collaborative filtering recommendations (Jannach et al., 2010). The basic mechanism is to identify peers with similar behaviour from a database of past observations and generate a prediction for the current user based on data from these *nearest neighbours*. Thus, remaining time, i.e. the time required to complete a trail, is predicted as the remaining time of the participant with the closest elapsed time at the given location on the track. In addition to the regression model described in Section 3, two further models were specified and utilized as baseline approaches:

- Basic extrapolation model: remaining time is predicted by multiplying remaining distance with average speed calculated from elapsed distance and time.
- Global average model: remaining time is predicted as the average remaining time of all participants at the given location on the track.

## 4.2 Datasets

To test the applicability of the nearest neighbour approach, three datasets originating from two mountain bike races were examined. In each instance GPS traces were gathered from individual participants, containing their location and elapsed time at various intervals along the track. The Brixen Hill Climb[1] dataset was collected on 24 June 2009 and required competitors to climb 570m over a distance of 5.6km. Two

[1] http://www.kitzalpbike.at/en/hill-climb-brixen-im-thale.html

further data sets, originating from the Kitzhorn Challenge[1], were collected on 5 July 2010 and 4 July 2011 respectively from a course of 7.1km and an elevation gain of 946m. The elevation profiles of both tracks are presented in Figure 1. While both events were uphill races, the Kitzhorn Challenge offers a more uniform gradient and almost no descent.

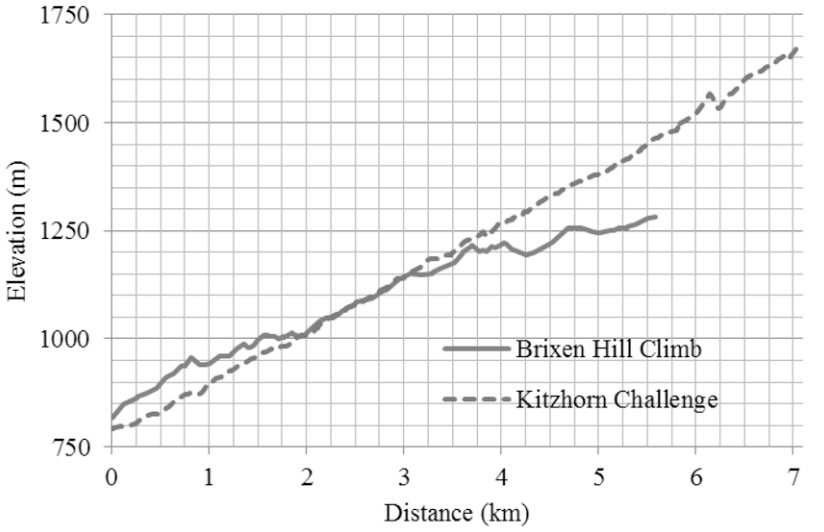


**Fig. 1.** Elevation profiles of the Brixen Hill Climb and Kitzhorn Challenge tracks

Further properties of the datasets are presented in Table 1. Interestingly, the times recorded in the Kitzhorn 2011 dataset were significantly faster and more uniform, however this may be more of a reflection on the data collected than on the event itself.

**Table 1.** Properties of the GPS bike track datasets

| Dataset | Brixen Hill Climb | Kitzhorn 2010 | Kitzhorn 2011 |
|---|---|---|---|
| Participant count | 19 | 17 | 13 |
| Length (m) | 5.6 | 7.1 | 7.1 |
| Elevation gain (m) | 570 | 946 | 946 |
| Time required (s) | 1693 ± 203 | 3460 ± 1164 | 2567 ± 377 |
| - After 25% | 1249 ± 175 | 2711 ± 924 | 1956 ± 405 |
| - After 50% | 767 ± 140 | 1816 ± 521 | 1296 ± 247 |
| - After 75% | 411 ± 117 | 862 ± 183 | 643 ± 147 |
| Av. speed (km/h) | 11.9 | 7.39 | 9.96 |

[1] http://www.kitzhornchallenge.at/

The datasets were processed to trim GPS traces to the exact extents of the race and to ensure that the logged data was within acceptable limits, i.e. participants kept to the course. To ease comparisons between competitors, the traces were then synchronized to derive elapsed times for each participant at 100 evenly-spaced check points along the course.

### 4.3 Evaluation Setup

The evaluation was carried out using a "leave one out" approach, i.e. each model was required to produce estimates for each participant using only the data from the other participants and the time elapsed to the current checkpoint. The consequences of these restrictions for each model are given below:

- Regression model: model coefficients were learnt using the data of the other participants; the elapsed time of the current participant was used to estimate the personalization factor $b$ as described in Section 3.
- Nearest neighbour model: all other participants were considered as neighbours; the elapsed time of the current participant at a given checkpoint was used to determine the closest neighbour(s).
- Basic extrapolation model: only the elapsed time of the current participant was utilized.
- Global average model: the remaining times of all other participants were used; the elapsed time of the current participant was ignored.

Estimates were produced for each of the 100 check points and compared using mean absolute relative error (MARE) as presented in Equation 5.

### 4.4 Evaluation Results

Figures 2, 3 and 4 present the MARE measures of the four prediction functions for the Brixen Hill Climb, Kitzhorn 2010 and Kitzhorn 2011 datasets at different points of progress. With the exception of the Kitzhorn 2011 dataset, the regression estimate was largely out of range, with a MARE of up to 100% for the Brixen Hill Climb and 100% – 200% for Kitzhorn 2010.

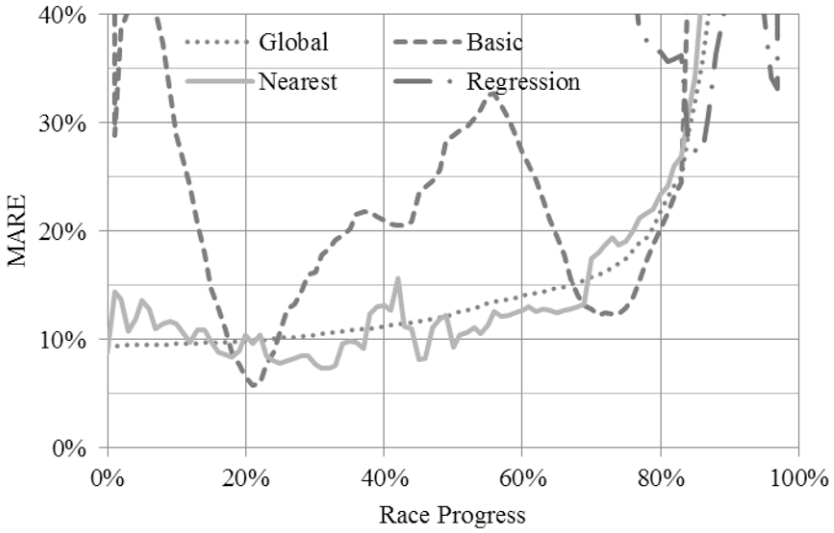


**Fig. 2.** Performance of estimates for the Brixen Hill Climb dataset

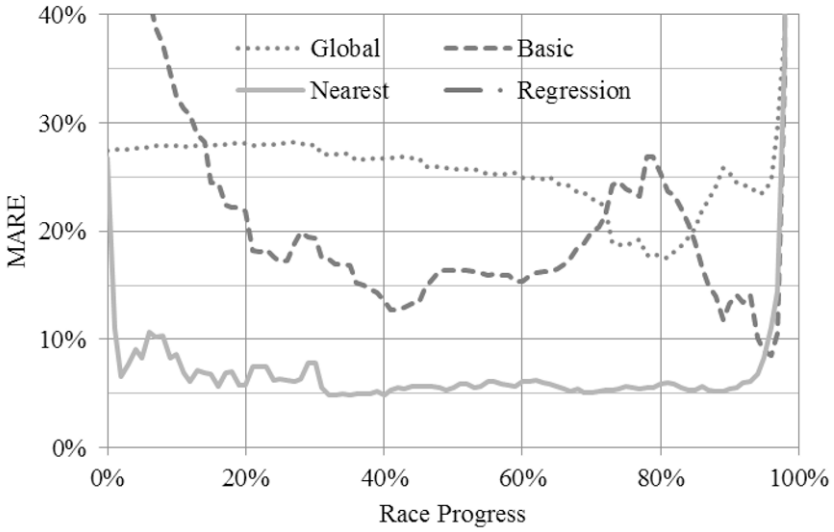


**Fig. 3.** Performance of estimates for the Kitzhorn Challenge 2010 dataset

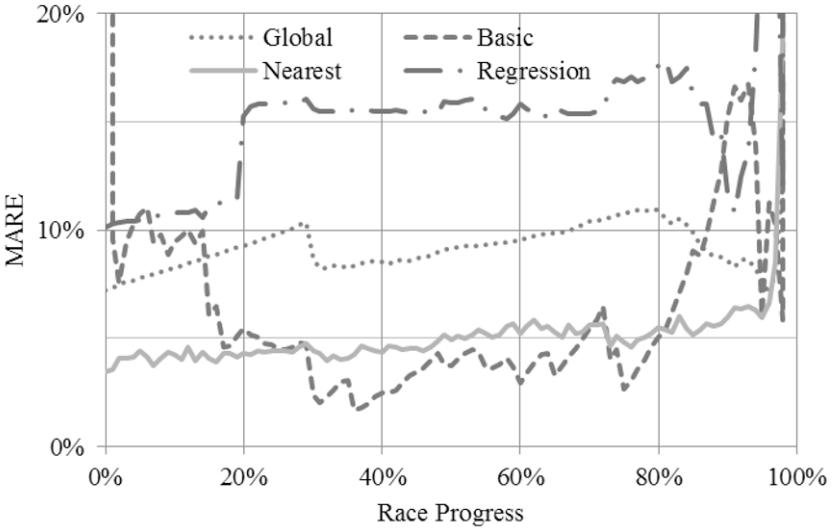


**Fig. 4.** Performance of estimates for the Kitzhorn Challenge 2011 dataset

## 5 Discussion

With the exception of the Kitzhorn Challenge 2011 dataset, which is the most uniform in terms of competitors and gradient, the regression model performed extremely poorly, producing deviation values (MARE) typically an order of magnitude greater than the other estimates. This is understandable, considering the limited quantity of data available for learning.

The basic extrapolation model suffers from some initial instability, as it is highly sensitive to local changes in average speed. Furthermore the premise that the future average speed is related to previous speed is highly dependent on the competitor and the track. The basic model preforms well for the Kitzhorn 2011 dataset where the gradient of the track is relatively uniform, but remains unstable for the more varied profile of the Brixen Hill Climb dataset.

The global average model behaves more consistently than the basic extrapolation model in all three datasets; however its impersonal nature typically leads to lower performance in terms of estimation accuracy. This is particularly evident for both Kitzhorn datasets (Figure 3 and 4).

Including a degree of personalization and exploiting data from other users, the nearest neighbour model consistently offers the best performance for all three datasets. The benefits of this approach are particularly visible in situations where there is more variance in the remaining time, such as for the Kitzhorn Challenge 2010 dataset (Figure 3). Furthermore, by selecting a neighbour based on the current average speed the estimate is able to adapt to current user but avoid the instability of the basic model during the first 10% - 20% of the race. In addition, the nearest neighbour model is

better able to cope with a more varied track, such as the Brixen Hill Climb (Figure 2). In our experiments we varied the neighbourhood size from 1 to 5 without significant accuracy improvements. However, once larger datasets are available we assume that enlarging the neighbourhood size should lead to accuracy improvements and reduced variation in prediction accuracy.

All the estimates also become more unstable during the final 10% – 20% of the race as small variations in the absolute estimate (in seconds) have a large effect on the MARE metric due to its relative nature.

The nearest neighbour model could be improved by computing similarity using other criteria than just elapsed time, including for example performance on other tracks or even categorical data such as bike type, weather conditions or demographics. In such a scenario, the current elapsed time and the elapsed time of the nearest neighbour could be used to scale the remaining time estimate, similar to the approach used in the regression model.

## 6 Conclusion

This work presented an extension of the work of Pitman et al. (2012), contributing a nearest neighbour time estimate for mountain biking and hiking. Despite its limited nature, the evaluation provided further insight into the problem of time estimation for cyclists and hikers, indicating that such an approach is applicable in scenarios where only small quantities of learning data are available.

For a nearest neighbour model to work in practice, significant quantities of user data must be collected, processed and stored. The difficulty of this task is further exacerbated by the fact that the system, when deployed in the field, must operate entirely locally, i.e. without network access, as hikers and mountain bikers often find themselves in some very remote locations. Such managerial aspects will have to be addressed through the O-STAR project's infrastructure.

Future work will combine both modelled and nearest neighbour estimates in a hybrid recommender to provide dynamic estimates that can exploit both track properties and data from other users. The combined algorithm will be evaluated as part of the O-STAR prototype application due for launch in early 2013.

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## 8 Acknowledgements

Authors acknowledge the financial support from the European Union (EU), the European Regional Development Fund (ERDF), the Austrian Federal Government and the State of Carinthia in the Interreg IV Italien-Österreich programme (project acronym O-STAR).

# When Cell Phones Become Travel Buddies: Social Attribution to Mobile Phones in Travel

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## Abstract

Applying the computing technology continuum of perspective model into mobile technology, this study investigates tourists' social attribution to mobile phones while travelling. The tendency to place social attribution to and interact socially with mobile phones in the context of travel is influenced by tourists' perception of the positive social characteristics of mobile phones (i.e., object attribution) and the intensity of mobile phone use for travel-related purposes at tourism destinations (i.e., circumstance attribution). It was found that tourists' core self-evaluation did not exert an influence in the process of social attribution to mobile phones. This supports the importance of anthropomorphism in the designing of mobile technology for tourists, in that more intelligent and social phones are potentially more persuasive to influence tourists' behaviour regardless of their personality.

**Keywords:** mobile technology, social attribution, anthropomorphism, CASA, continuum of perspective

## 1 Research Background

Tourists make an increasing use of mobile technology to assist them while traveling. The ability of mobile technology to facilitate communication and exchange a large amount of data and information has allowed mobile devices to be widely used in the tourism industry as mobile guides, recommender systems, as well as location-based services (Edwards et al., 2006; Rasinger, Fuchs & Höpken, 2007). In fact, numerous studies have supported the importance of mobile phones for tourists in terms of their roles to support tourism experiences (Wang, Park & Fesenmaier, 2011). According to the concept of "functional triad" suggested by Fogg (1998), mobile technology can have three different roles for its users: as tools, as media, and as social actors. The roles of mobile technology as tools and media have been widely researched in the context of travel and tourism (see Gretzel, 2011; Kabassi, 2010; Martin, Alzua, & Lamsfus, 2011). However, their role as social actors (i.e., to provide social support for tourists on the move) has yet to be explored. It is posited that, as tourists are displaced while travelling, it is important to investigate how mobile phones could give the needed social support while experiencing tourism destinations.

The idea that people have social perceptions of and relationships with technology has been around since the early 1980s (Turkle, 1984). In the context of human-computer interaction (HCI), the paradigm of Computers as Social Actors (CASA) suggests that users respond socially to computing technology in the same manner as they respond to other people (Nass, Steuer, & Tauber, 1994; Nass et al., 1995), even when they know they should not have to (Reeves & Nass, 1996). As computing technology fills the role traditionally held by humans, CASA researchers identify a tendency that

L. Cantoni and Z. Xiang (eds.), *Information and Communication Technologies in Tourism 2013*, DOI: 10.1007/978-3-642-36309-2_8,

users treat the social relationships between them and the technology devices as literal (Nass & Moon, 2000). Hence, the persuasive effects of mobile computing on consumers' opinion and behaviour can be comparable to those of human contacts. Therefore, it is important to understand the social support that mobile computing can provide to tourists on-the-go that may lead to some forms of travel behaviour.

From the technology design perspective, studies on computing technology as social actors cannot be separated from the concept of anthropomorphism, which is the attribution of humanlike traits to non-human agents (Guthrie, 1993) typically to simplify people's understanding of technology. Sundar (2004) suggests that anthropomorphic behaviour is, in fact, responsible for users' social responses to technology. Anthropomorphism has been an integral part of the design and use of technology (Marakas, Johnson & Palmer, 2000), including those of mobile devices. As a matter of fact, a considerable amount of researchers have focused their emphasis on designing mobile devices to have humanlike characteristics (Lee, 2010; Schmeil & Broll, 2007). Most recently, in 2011 Apple, Inc. introduced Siri (i.e., speech interpretation and recognition interface), a feature on their iPhone 4S devices that resembles a personal assistant. Siri is capable of speaking, hearing and understanding commands, as well as completing delegated tasks (Apple, Inc., n.d.). This prompts the significant potential social cues that people receive from mobile technologies that might lead them to interact socially with these devices on a daily basis.

From the users' perspective, there has been an increasing interest in studying social attribution to computing technology. Drawing from CASA researchers, Marakas, Johnson and Palmer (2000) developed a model called computing technology continuum of perspective (CP) in an attempt to explain the social roles of computing technology in the society at large. The continuum is considered to be anchored by individuals with a locally simplex perspective at one end (i.e., users see computers as mere tools) and with a globally complex perspective at the other (i.e., users believe computers have agency and can influence their lives). They suggest that most people interacting with computers do not reside at the extremes of the continuum, but somewhere in between (Johnson, Marakas, & Palmer, 2008). The application of computing technology CP in the context of mobile phones has not been explored. As mobile devices are often considered the most familiar technology for people, due to its portability and capability in supporting complex tasks for daily activities, testing the applicability of computing technology CP for mobile phones is considered important.

The outcome of social attribution to mobile phones can be both positive and negative for users. Anthropomorphic behaviours among tourists may lead to higher interactions in terms of processing information, which may result in a greater confidence in decision making processes. However, tourists with unrealistic expectations toward the social support from mobile phones may find themselves too reliant on the devices and, hence, make the decision making processes more problematic. Therefore, the goal of this study is to investigate the social attribution of mobile phones in the context of travel by applying the computing technology CP model (Johnson, Marakas & Palmer, 2006; 2008; Marakas, Johnson & Palmer, 2000). The results of this study provide an understanding of the social attribution to mobile technology and the potential social interactions between tourists and mobile devices at the destinations.

## 2 Computing Technology Continuum of Perspective

People's daily communication with technology has been highly formalized by the metaphor personification of computers. People anthropomorphize computers in order to use them comfortably for work, so as to increase productivity, as well as for other daily activities. While CASA researchers provide a considerable amount of evidence showing the social relationships between users and computers, one of the main critiques is the fact that most of their studies are experiments conducted in laboratory settings. Hence, it is difficult to assume the applicability of their findings to a general use situation in the real world (Hall & Henningsen, 2008). To this end, Marakas, Johnson, and Palmer (2000) conceptualize a continuum of perspective with regards to computing technology in social settings that is anchored by two different viewpoints. At one end, there are those who view computing technology as locally simplex; they see computers as just machines, which are programmable, alterable, and controllable by humans. At the other end, there are people who perceive computing technology as globally complex (i.e., incomprehensible); they see computers as outside entities that have agencies and autonomy. People with locally simplex perspective are likely to carry their perspectives when interacting with technology and view themselves as an agent of causation of their behaviour. On the other hand, people with globally complex perspectives are likely to view the technology as responsible for their behaviour.

Furthermore, using attribution theory (i.e., a theory that focuses on how individuals interpret and ascribe causality to events) as their theoretical lens, Marakas, Johnson, and Palmer (2000) argue that social attribution to computing technologies can be caused by the characteristics of the object (i.e., stimulus attribution), themselves (i.e., person attribution), the circumstances (i.e., situation attribution), and some combination of these. Hence, they suggest that the degree to which certain perspective in the computing technology CP dominates is influenced by four factors: (1) the social characters of the computing technology, (2) the core self-evaluation of users, (3) the context and nature of interactions with computing technology, and (4) the presence or absence of attribution information cues.

To support the applicability of the concept, Johnson, Marakas and Palmer (2008) developed a scale to measure the computing technology CP in order to understand the diverse set of users' beliefs toward technology. They argue that in order to fully understand the continuum, a deeper investigation toward the dimensions of users' beliefs of the characteristics of computing technology is necessary. Based on previous literature (e.g., Turkle, 1984; Sproull et al., 1996), they identify four dimensions of technology characteristics: perceived socialness, intelligence, emotions, and control. Perceived socialness occurs when users interacting with computers sense that the technology is responding to their action. Perceived intelligence explains users' perception toward knowledge within technology. Perceived emotion occurs when users sense an emotional reaction from the technology. Finally, perceived control occurs when users perceive that their interaction with technology is directed or supervised by the technology. However, their scale development study tested 13 items representing three dimensions to explain the dimensions of computing technology CP as previously suggested by Johnson (2001): perceived socialness, intelligence, and

control. An additional dimension, called perceived control of rights, emerged from the analysis (Johnson, Marakas & Palmer, 2008).

Since the model was introduced in 2000, there has been a limited application using empirical data to test the conceptualized relationships between computing technology CP and the other factors influencing social attribution of technology. A study from Johnson, Marakas and Palmer (2006) tested the relationship between social characters of computing technology, computing technology CP, core self-evaluation, and attribution. Their study suggests than people who interact with an interface with stronger social characteristics as well as those in the position closer to the globally complex perspective in the continuum tend to make more social actor attribution to technology. Additionally, people who evaluate themselves negatively tend to have a globally complex, hence, make more social actor attribution to technology. In summary, their study provides empirical support for the social attribution to technology, in that people utilize the same processes to explain their interactions with technology as they do with human beings (Johnson, Marakas & Palmer, 2006).

To date, the context of computing technology CP research has been "the interaction between a person and some computing technology in a computer-mediated activity" (Johnson, Marakas & Palmer, 2008, p. 169). However, as mobile technology has becoming more and more prevalent in the society, it is of a great importance to investigate the applicability of this model to explain the social attribution to mobile phones. Specifically, travel and tourism provides a context for various interactions between tourists and mobile phones that might result in decision making activities and behaviours that are important for tourism organization. To that end, this study attempts to apply the technology CP to mobile computing (i.e., cell phones) and test the hypothesized relationships among mobile technology CP and tourists' social attribution to mobile phones while traveling. Specifically, the following hypotheses are proposed in this study:

H1: People's perception on the social characteristics of mobile phones has an impact on their social attribution to mobile phones while traveling. (*Object Attribution*)

H2: People's self-evaluation has an impact on their social attribution to mobile phones while traveling. (*Person Attribution*)

H3: The intensity of use of mobile phones for travel has an impact on their social attribution to mobile phones while traveling. (*Situation Attribution*)

# 3 Methodology

## 3.1 Measures

**Social Characteristics of Mobile Phones.** The 13 items measuring computing technology CP developed in the study by Johnson, Marakas and Palmer (2008) were modified, reworded, and applied into mobile computing. After the pilot study, confirmatory factor analysis was conducted to test the multidimensionality of the Mobile Technology CP (MTCP). The items loaded into three dimensions labelled

perceived intelligence, socialness, and control. Three items with factor loadings lower than .6 were excluded from further analysis; 10 items were retained.

To capture the perceived emotion of mobile technology, 20 participants in a series of focus group discussions about mobile technology were asked to describe the emotional characteristics of their mobile phones. This resulted in 32 keywords expressing positive and negative personal characters of mobile phones (e.g., arrogant, humble) instead of emotional expressions (e.g., angry, happy). All keywords were integrated into the first draft of questionnaire. After an evaluation by experts in tourism and technology and the pilot study, the list was shortened using random generator into 15 keywords in order to increase responses in the main survey. The items loaded into two constructs: Positive Characters and Negative Characters.

**Self-Evaluation.** *First,* the construct of neuroticism was used to represent core self-evaluation using eight items from Eysenck personality inventory neuroticism scale (Eysenck & Eysenck, 1968). *Second*, seven items measuring locus of control from Levenson's (1973) scale were adopted, but two items were dropped due to substantially low factor loadings. *Third*, seven items measuring the generalized computing self-efficacy (GCSE) (Marakas, Johnson & Palmer, 2000) were reworded and adapted into mobile context.

**Intensity of Use of Mobile Phones for Travel.** To measure the intensity of use of mobile phones while traveling, four items measuring the frequency of use of mobile phones were developed based on a previous study by Tussyadiah and Zach (2012) on the use of geo-based technology for travel. These items correspond to the functionalities and applications of mobile phones typically used for direction and navigation, information search, social networking, and general communication. The items were measured by 5-point scale from Never to Always.

**Social Attribution to Mobile Phone.** The social attribution of mobile computing was measured using three items that describe the social roles of mobile phones for tourists on the move, which include a companion (i.e., who accompanies), a personal assistant (i.e., who gives assistance), and a personal guide/mentor (i.e., who gives guidance) tourists to experience tourism destinations. All items were presented in 5-point Likert-type scale with Agree–Disagree anchor statements.

### 3.2 Data Collection

A pilot study to test the reliability of measurement items was conducted from December 21 – 31, 2011 with convenience sampling through social media channels resulted in 111 respondents. After accommodating some necessary adjustments to the questionnaire, the main survey was conducted from March 20 – 30, 2012. An invitation to participate in the survey was distributed to 10000 email addresses of American travellers who have requested travel-related information through *vacationfun.com*, resulting in 355 completed responses (a total of 3.5% response rate).

### 3.3 Participants

The majority of respondents were female (71%) and older, with 29.1% between the ages of 55 – 64 years, 27.7% between 45 and 54 years old; only about 31% respondents were younger than 45 years old. Respondents were highly educated, with

34.6% holding Graduate or Advanced Degree and 30.6% Bachelor's Degree. Most respondents (84%) have been using a cell phone for more than five years. In terms of mobile devices, 54.2% respondents use smart phones (e.g., iPhone, Android, Blackberry, etc.) and the rest of them use traditional cell phones.

### 3.4 Data Analysis

To measure the simultaneous effects of the mobile technology continuum of perspectives, the perceived social characters of mobile phones, core self-evaluation, and the use of mobile phones for travel-related activities on the social attribution of mobile technology while traveling, path analysis was conducted using Mplus software (Muthén & Muthén, 1998-2011). Several model fit indices were consulted: Comparative Fit Index (CFI) and the Tucker-Lewis Index (TLI) of .90 or higher (Hu & Bentler, 1999), root mean square error of approximation (RMSEA) up to .08 (Bagozzi & Yi, 1988).

## 4 Results

The constructs' composite reliabilities (CR) and the average variance extracted (AVE) were calculated to assess internal consistency, reliability, convergent validity and discriminant validity of the construct measurements. As seen in Table 1, composite reliability scores for every construct are well above .70, which is the suggested benchmark for acceptable reliability (Chin, 1998). Additionally, the AVEs of all constructs are also above the cut-off point of .50, which is an indication of convergent validity (Dillon & Goldstein, 1984). All of the items have loadings at .60 or above with *t*-statistic significant at $p \leq .01$. These results indicate that the measurement model displays both internal consistency reliability and item convergent validity. The scale items loadings on their assigned construct are larger than their loading on any other latent variable, which support discriminant validity (individual factor loadings are not reported due to space limitation). Additionally, AVE square roots that appear in the diagonal in Table 2 are larger than any correlation between the associated construct and any other construct (Chin, 1998), which suggests that the measurement model displays discriminant validity.

**Table 1.** Internal Consistency, Composite Reliability and Average Variance Extracted

| Construct | Number of Items | Mean (SD) | Chronbach 's Alpha | CR | AVE |
|---|---|---|---|---|---|
| Perceived Intelligence | 5 | 3.59 (0.80) | .84 | .75 | .53 |
| Perceived Socialness | 3 | 2.17 (0.98) | .86 | .90 | .79 |
| Perceived Control | 2 | 3.00 (1.24) | .87 | .93 | .86 |
| Positive Characters | 7 | 2.20 (1.03) | .96 | .94 | .88 |
| Negative Characters | 8 | 1.83 (0.90) | .98 | .96 | .93 |
| Neuroticism | 8 | 2.25 (0.85) | .91 | .85 | .68 |
| Mobile Self-Efficacy | 7 | 3.63 (0.92) | .92 | .89 | .76 |
| Locus of Control | 5 | 2.16 (0.79) | .86 | .85 | .69 |
| Mobile Use for Travel | 4 | 2.24 (1.29) | .93 | .94 | .87 |
| Social Attribution | 3 | 2.75 (1.19) | .92 | .92 | .83 |

**Table 2.** Correlations and Square Roots of AVE

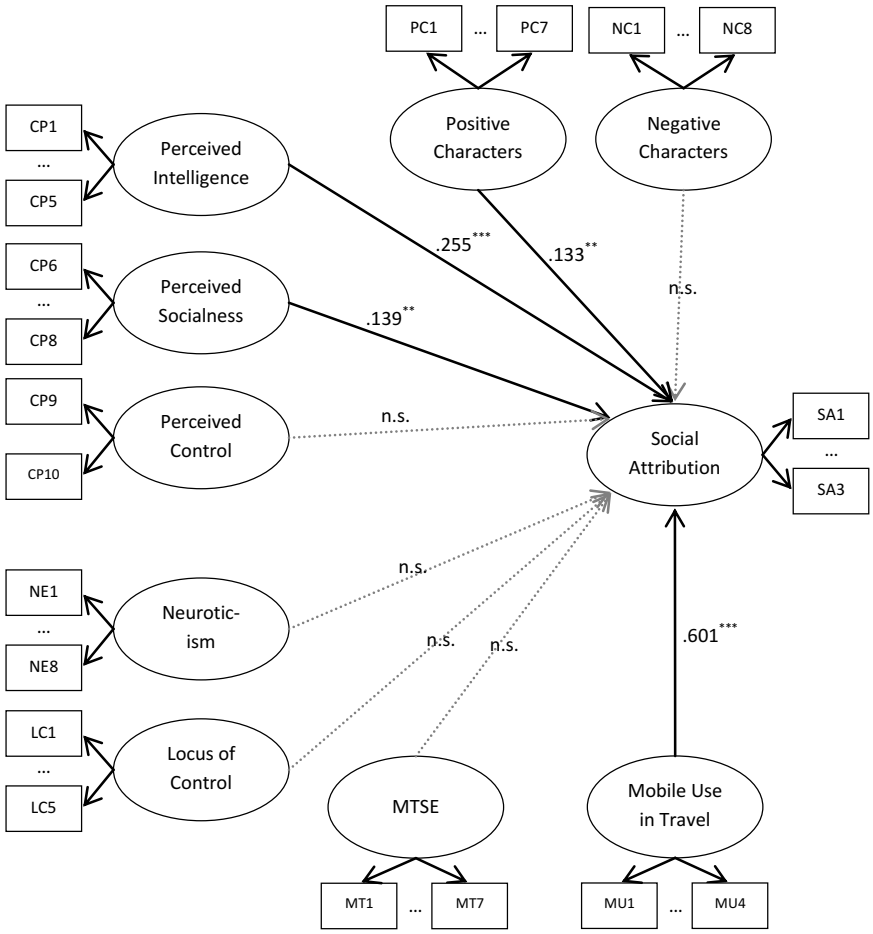
| Construct | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
|---|---|---|---|---|---|---|---|---|---|---|
| (1) Perceived Intelligence | **.73** | | | | | | | | | |
| (2) Perceived Socialness | .48 | **.89** | | | | | | | | |
| (3) Perceived Control | .27 | .15 | **.93** | | | | | | | |
| (4) Positive Characters | .33 | .63 | .22 | **.94** | | | | | | |
| (5) Negative Characters | n.s. | .26 | .30 | .55 | **.96** | | | | | |
| (6) Neuroticism | n.s. | .12 | .14 | n.s. | .14 | **.83** | | | | |
| (7) Mobile Self-Efficacy | .41 | n.s. | n.s. | .16 | n.s. | -.13 | **.87** | | | |
| (8) Locus of Control | n.s. | .23 | .23 | .22 | .27 | .47 | -.16 | **.83** | | |
| (9) Mobile Use for Travel | .37 | .21 | n.s. | .27 | n.s. | n.s. | .45 | n.s. | **.93** | |
| (10) Social Attribution | .54 | .48 | n.s. | .47 | .16 | n.s. | .33 | .12 | .73 | **.91** |

Note: the diagonal represents square roots of AVE

The CP model suggests that the data should follow a normal distribution. However, from Shapiro-Wilk test of normality, the *p*-values of all 10 constructs of MTCP were less than .05, indicating that the data do not have an approximate normal distribution. Most items measuring Perceived Intelligence and Perceived Control are negatively skewed, indicating that the majority of respondents lie closer to the globally complex perspective. On the other hand, items measuring Perceived Socialness are positively skewed, indicating that the majority of respondents lie closer to the locally simplex perspective. In other words, the majority of respondents perceive mobile phones as smart and capable of infringing the users' rights, but less social. The perception toward social characteristics of mobile phones is also quite low, indicating that the majority of respondents did not see their cell phones as showing emotional characters.

In terms of self-evaluation, the majority of respondents evaluated themselves quite high in terms self-efficacy related with mobile technology (i.e., they know how to use mobile phones to their fullest capacity), relatively low in neuroticism (i.e., they are more emotionally stable and less reactive to stress), and relatively low in locus of control, which suggests low external orientation (i.e., they are less likely to attribute the outcomes of events on external circumstances). Finally, in terms of mobile phones use, most respondents indicated they used mobile phones less frequently to assist them during traveling.

As shown in Table 2, correlations were identified among the different constructs measuring a broader concept. For example, the perceived social characteristics of mobile phones are correlated with most constructs measuring MTCP. Also, the three constructs representing self-evaluation are significantly correlated. Interestingly, mobile use for travel is positively correlated with perceived intelligence, perceived socialness, perceived positive characters and mobile technology self-efficacy. In other words, respondents who are highly capable in working with mobile phones and perceived that their cell phones are intelligent and social may use their cell phones more frequently when they travel.




Note: $\chi^2$ = 2704.633, *df* = 1229, *p* = .000, *CFI* = .914, *TLI* = .908, *RMSEA* = .058, *N* = 355, β was significant at *<.1, **<.05 ***<.01, n.s. = not significant, correlations between independent variables not pictured (please refer to Table 2).

**Fig. 1.** Model of Social Attribution to Mobile Phones in Travel

The full model to test the hypothesized effects of perceived social characteristics of mobile phones, self-evaluation and mobile use for travel on the social attribution of mobile phones is presented in Fig. 1. For legibility of the figure, correlations among dependent variables are not pictured (referred to in Table 2). The fit of this model is good with CFI = .914, TLI = .908, RMSEA = .058, and SRMR = .049. Significant positive effects were identified from perceived intelligence ($\beta$ = .255, $p$ < .005), perceived socialness ($\beta$ = .139, $p$ < .05), positive characters ($\beta$ = .133, $p$ < .05), and mobile use for travel ($\beta$ = .601, $p$ < .005).

This shows that people tend to place social attribution to mobile phones if they perceived that the mobile phones are intelligent (i.e., capable of providing information and knowledge) and are able to facilitate positive social interactions. People who perceived their mobile phones are polite, persuasive, friendly and kind tend to place social attribution to their phones when traveling. In other words, friendly and intelligent phones have a higher tendency to be considered travel buddies by tourists. This supports the supposition of object attribution (Hypothesis 1 was partially supported).

None of self-evaluation constructs showed significant effects on social attribution to mobile phones (Hypothesis 2 was not supported). This indicates that people's personality has no influence on their perception and behaviour toward mobile technology, specifically in the context of travel, which does not support the supposition of person attribution. This also suggests that regardless of their emotional stability, capability, and orientation of control, people may or may exhibit a tendency to anthropomorphize technology as long as the design of the technology and the circumstances allow.

Lastly, social attribution to mobile phones in the context of travel is highly affected by the intensity of use of mobile phones for travel-related activities. The more the tourists turn to mobile phones to assist them with various tasks at a destination (e.g., give them direction and information, navigate them around, etc.), the more they tend to interact socially with their mobile phones, which leads to social attribution (i.e., mobile phones as travel buddies or personal travel guides). This supports the concept of circumstance attribution, in that tourists have social interactions with mobile phones due to the situational context of travel (Hypothesis 3 was supported).

## 5 Conclusion

This study provides empirical evidence supporting the application of computing technology CP model to mobile technology. The MTCP captured users' position in the continuum that stretches between locally simplex to globally complex perspectives, with the assumption that the majority of them would lie in the middle of the continuum. Even though the data do not show a normal distribution, the mean scores for most items measuring MTCP are indicative of this suggestion with the majority of them lie closer to the median value. Most respondents perceive their mobile phones as highly intelligent (i.e., closer to globally complex perspective), but relatively low in terms of socialness (i.e., closer to locally simplex perspective). Further, the majority of respondents also indicated a lower perception towards the social characters of mobile phones, which are the approximation of perceived emotion in this study. In summary, there is a partial support towards groups of people who regard their mobile phones as having humanlike characteristics, which confirms the previous studies on CASA and computing technology CP.

Furthermore, this study also tested the effects of MTCP and the perceived social characters of mobile phones, respondents' core self-evaluation, and the intensity of use of mobile phones for travel on social attribution to mobile phones while traveling. The results provide a deeper understanding on what prompted people to respond socially to mobile technology in the context of travel. The results demonstrate that

social attribution to mobile phones during traveling is influenced by the perceived intelligence of the mobile phones (i.e., the capability of mobile phones to provide intelligent support), the perceived socialness of the mobile phones (i.e., the capability of mobile phones to provide social cues), the positive social characters of mobile phones (i.e., the phone's positive humanlike characteristics) and the frequency of use of mobile phones for different purposes while traveling. To put it briefly, people anthropomorphize and react socially to smart, social phones and regard them as social companions while traveling. Drawing from attribution theory, social attribution to mobile phones while traveling occurs by object attribution (i.e., the cell phones are "social") and situation attribution (i.e., the context of travel allows tourists and cell phones to interact more intensely). However, self-evaluation constructs were not significant in affecting the social attribution to mobile phones.

As a theoretical contribution, this study supports and extends the results from CASA researchers by applying the concepts outside the laboratory settings into real use situations (i.e., the travel context) using commonly-used consumer devices (i.e., cell phones), hence adds to the generalizability of the results. The findings emphasize the importance of the technology characteristics and use situation to stimulate social interactions between users and technology, regardless of users' personality or characteristics. It is important to note that the demographic characteristics of respondents in this study are slightly different to the previous studies on CASA or social attribution to mobile phones; most respondents in previous studies were younger (i.e., college students), while most respondents in this study were older. However, statistical tests showed no significant effects of age and other demographic characteristics on mobile computing CP and social attribution to mobile phones. Future research should capture general demographic characteristics to support generalizability of the findings.

As for managerial implications, the results support the relevance of attaching humanlike characteristics in the designing of mobile technology devices, applications, and features, as well as different functionalities of mobile technology for tourism and travel contexts. Consequently, destination marketers embracing mobile technology for persuasion, especially in influencing on-site consumption decisions, should consider designing mobile technology and applications that suggest high intelligence, socialness, and express positive characters. In other words, smart mobile devices that act as travel companions should be developed to provide social support and increase the persuasive power of mobile phones for tourists.

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# Building Destination Image through Online Opinionated Discourses. The Case of Swiss Mountain Destinations

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## Abstract

Tourism decision-making reflects the unique characteristics of tourism products, that are intangible, heterogeneous, perishable and expensive, and are therefore regarded as high risk. Consumers often engage in extensive information search in order to reduce the risk of deceptions. In high-risk decisions, word-of-mouth represents a more influential source of information than impersonal or official media sources, because of their perceived high reliability. From a logic-pragmatic point of view, argumentation is the form of reasoning used for decision-making, and arguments are the basis for evaluating the alternatives at hand. The paper presents a study where a corpus of forum posts about the top five Swiss mountain destinations covering the time frame of one year have been analyzed, in order to identify and classify tourists' arguments for recommending/not recommending a visit. The analysis of arguments allowed to sketch the destination image resulting from online discourses.

**Keywords:** online travel forum; arguments; decision-making; mountain destination.

## 1 Introduction

Argumentation is the form of reasoning used for decision-making, and the argument is the logical basis for practical reasoning; that is, when one has to take a decision, he engages in an argumentative process (Perelman & Olbrechts-Tyteca, 1969). As Rigotti & Greco (2009: 11) explain: "to argue is a form of discursive move in which we do not limit ourselves to expressing or communicating ideas, opinions, proposals, wishes, projects etc., but we want to justify them, prove them by reasoning." Arguing always happens towards a *decision-maker*, who can be a person, a group of people or the arguer himself. The decision-maker is not only a spectator, but a real stakeholder, who is interested in argumentation, since he has to take a decision. A group of friends who has to choose the destination for a trip, a court who has to judge on a defendant's guilt, the board of directors of a bank who has to approve the strategic plan, a scholar who has to choose the research method to employ: they all are decision-makers, who have to take a decision among a series of alternatives.

Prospective tourists face several challenges when making travel decisions, because of the very nature of tourism products, which are intangible and expensive, and because of the extraordinary variety of options available. Since they cannot be viewed or trailed prior to purchase, the decision of which product to choice requires considerable time and effort. Tourism services are, then, a class of product regarded as high risk, and consumers are often lead to engage in extensive information search (Ballantyne et al. 2009). The evaluation of alternatives in the decision process is based on the information obtained, and crossed with personal aspects like

L. Cantoni and Z. Xiang (eds.), *Information and Communication Technologies in Tourism 2013*, DOI: 10.1007/978-3-642-36309-2_9,

expectations, desires, values and beliefs, and socio-cultural elements related to the experience of travelling and to the tourism product itself.

Information and communication practices related to tourism, as they occur in the frame of web 2.0, constitute a peculiar context where argumentation assumes specific features. People increasingly rely on electronic Word-Of-Mouth to make different consumer decisions, thanks to their easiness of access and multiplicity of contributors. eWOM is spread through a variety of User Generated Media (UGM), which allow consumers to voice their opinion and experience and, conversely, to get fresh information and recommendation. The witness of others is, indeed, an element which plays an important role in risk and uncertainty reduction in decision-making. The evidence of people who experienced the tourism product one is interested in represents a highly credited information source, because perceived expertise is more a criterion than anything else for advice seeking (De Capua & Dunham, 1993), and because people reporting their experience are presumed to not lie, unless they have precise reasons to do it. Among the different UGM, travel forums are the place where to ask and to give quick and concise information and advices. Interactive discussions can arise, mostly about specific tourism destinations or trips. Forum posts are short texts and appear in a dialogical form in an asynchronous discussion. They can support prospective tourists mainly when a decision about specific aspects of a trip have to be taken; travel reviews or blogs, on the other hand, may help more in the first phase of organizing a trip, that is when the destination to be visited or the type of trip have to be decided (De Ascaniis & Greco-Morasso, 2011).

An investigation of the argumentation topics discussed by people when giving advice online allow to point out the aspects of a tourism experience which (positively or negatively) impressed the tourist the most. Arguments, in fact, are a particular type of information, that is opinionated information: opinions imply a person's ability to be critic, that is to take and defend an idea, to compare alternatives, to reflect upon experience. When giving an opinion, one is not just giving an information, but presenting the "result" of a critical thinking process. Arguments, therefore, can reasonably be considered to have a huge influence on the image people create and share of a destination or a specific tourism product, because they are based upon the arguer's reflection on her experience and make an appeal to the reader's own critical ability.

This paper presents a study where the image of Swiss mountain tourism destinations was investigated, by identifying and reconstructing the arguments advanced by tourists on forum posts when giving recommendations. The study unveiled the core of tourists delight and expectations, this way highlighting areas for marketing intervention and destination management improvement.

Conceptual underpinnings of the study rely on argumentation theory, that is an ancient discipline, which developed along the centuries critically combining insights from a number of other disciplines: from logic to rhetoric, from philosophy to psychology. Argumentation is able to provide a reliable and fine set of tools for deeper investigating human reasoning and use of language. This approach is, indeed, original and unique in the field of travel decision-making. The most cited and established consumer behaviour theories are here left out, because they adopt

completely different perspectives which do not relevantly add to the study presented. The same observation holds for literature about destination image: the claim of this paper is one which considers opinions the core of destination image building, and this claim is fully argued. A comparative study might in the future highlight points of agreement and disagreement with other approaches (i.e. consume behaviour and destination image theories) to the issue.

# 2 Theoretical Foundations

## 2.1 Decision-making as an argumentative practice

"Decide" comes from the Latin verb "deciděre", formed by the prefix "de", which indicates a removal, a separation, and the verb "caeděre", which means to cut; to decide is, thus, to select in a range of alternatives the one which appears to be the best one, cutting off all the others. Choice inherently involves *uncertainty*, either because it commits the decision-maker to actions to be performed in the future, or because it is not based on absolute knowledge or principles but rather on deceptive statements and opinions lead by personal values, beliefs, prejudices. When a choice has to be made, argumentation comes into play. "Argumentation and critical decision making describes a process by which you seek the best possible choices within a context of uncertainty and ambiguity. Most of the decision making people do occurs in this context. (...) The better you use the process, the better you are at making decisions. But unless you are genuinely willing to open your mind to alternative ideas (...) and accept the inevitable uncertainty of the outcome, you cannot make critical decisions" (Rieke, Sillars and Peterson, 2005: 17).

A distinction needs to be done between two types of decision-making. Decision-making shall be distinguished in *cognitive decision-making*, that brings a person to the adoption of a standpoint, and *practical decision-making*, that presupposes the activation of the person's will towards the realization of an action (Rigotti and Greco Morasso, 2011). In the first case the decision to be taken refers to an event of the past, upon which one has to construct a *cognitive judgment*; it has, thus, an essential cognitive component. In the second case, the decision concerns events of the future, and is oriented towards the realization of an action; one has, therefore, to construct a *practical judgment* for leading the actions. In ordinary language, when we speak of decision-making, we normally refer to the second type, that is to a practical reasoning which leads to perform a certain action.

## 2.2 Factors driving tourism decision-making

The issue of the identification of factors driving travel decision-making and the relation among them has been investigated from different points of view, mainly relying on psychological models for explaining consumer behaviour, and emphasizing the role either of internal (i.e. psychological) or external (i.e. environmental) variables. Sirakaya and Woodside (2004) undertook a comprehensive review of the tourism literature tackling the issue of decision-making, describing the trends in the development of models. Their main criticism is that the models developed so far do not move beyond borrowing the main concepts from the "grand models" of decision-making in consumer research; the grand models, however, were build to explain

decision-making for manufactured products, that are fundamentally different from tourism products. Tourism decision-making, in fact, reflects the unique characteristics of tourism products, that are intangibility, heterogeneity, inseparability, perishability, high cost.

Besides that, travel decision-making has not to be seen as a static behaviour, but rather as a process which follows temporal, dynamic, successive, and multistage contingent steps (Vogt & Fesenmaier, 1998). Decisions have to be taken at different levels of the travel planning: *core decision* refers to the destination to visit; *secondary decisions* include the selection of secondary destinations close to the main one, activities to do and attractions to visit, types of accommodation, trip route. Secondary decisions are usually considered before the trip, but are likely to be finalized once at the destination and adapted to the circumstances. There are, finally, the so-called *en route decisions*, that are the "decisions on the go", to be taken during the travel experience, like where to eat, which events to attend, where to go shopping. The *specificity* of the travel decision to be taken determines the decision frame that guides the decision-making process of tourists (Jeng & Fesenmaier, 2002).

In high-risk decisions, indeed, word-of-mouth represents a more influential source of information than impersonal or official media sources (Murphy, Mascardo & Benckendorff, 2007); because of their perceived high reliability, they play a major role for customers' buying decisions and are considered to reduce the risk of deceptions (Dellarocas, 2003). WOM from friends and relatives are the most commonly used information source for travellers before they make a travel decision (Beiger and Laesser, 2004), and are the major information source for en-route decisions. Therefore, looking at the type and content of the information that is spread through word-of-mouth is of pivotal importance to understand people's decisions.

### 2.3 Mountain tourism destinations

Mountains are a desired destination for many tourists. Reasons are the scenic beauty of the mountain landscape, the richness in natural resources, the remoteness of mountains offering a place of rest and recreation, and a great number of options for adventure (Godde, 1999). The term 'mountain tourism' is, indeed, very broad, and consists of a high variety of activities tourists can do in a mountain area; it "is comprised of mass tourism to popular sites, the ski industry, adventure tourism (trekking, climbing, rafting), cultural tourism, ecotourism, and pilgrimage." (Godde, 1999: 12). Event tourism, as winter Olympic games, is also an important part of mountain tourism (May, 1995). Cable car companies are the leading player within the industry of mountain tourism and their economic activity mostly depends on the natural environment; crucial factors are: the suitability of the territory for sports on snow and hiking, climate, ecological fragility, as safety is crucial for mountain tourists and, finally, the scenery (Keller, 2011). Since the years of its biggest development in the '60s, the industry of mountain tourism, several trends have led to a change in its structures, and nowadays, because of the evolution of low cost airlines, new information technologies and travel-experienced customers, the tourism demand has been globalized. Tourists are travelling all over the world, and they are more critical about quality and prices as they have better access to information about destinations. Also, new tourism destinations enter the market. For these reasons, there

is a decrease in customer loyalty, and mature markets in Alpine countries have difficulties to maintain their customer base (Bieger, 1998). Historically, they have a long ski tradition, but their attendance is flattening.

Bieger (1998) holds that while in the past there was a demand for single purpose vacations, such as a ski vacation or a hiking vacation, customers now demand new forms of holiday experience, that implies an integrated service chain. The service chain of a mountain destination includes information before the trip and reservation, the journey to the destination, local information, catering, lodging, transport, activities and animation, entertainment at the destination, and the departure from the destination as well as the care after the departure.

According to Vanat (2011), Switzerland used to be the most famous ski destination worldwide, but since the 1980's, it has lost its leading position because of fragmented operators, the high costs if compared to other resorts, and a mostly unmanaged change in the demographics of the clients. The Swiss industry network of mountain tourism destinations, then, used to be a cluster of small and medium sized enterprises offering innovative products and services in the past, but nowadays many small companies have disappeared during a concentration process (Bieger, 1998). It is important for mountain tourism destinations in Switzerland to assure its competitiveness in order to survive in the market; strategies have to be changed completely or have to be adapted (Keller, 2011).

# 3 Methodology

## 3.1 Data Collection

Switzerland counts a considerable number of mountain destinations, which are, in the most of the cases, very small. In order to build a representative corpus, they were considered the top five mountain destinations, identified according to different official reports: the season statement 2010/2011 by Laurent Vanat (2011), which includes a ranking list of the most important mountain destinations measured by number of Skier Days; the report of the cable car association of Switzerland (Seilbahnen Schweiz, 2010), presenting a ranking of cable car companies' revenues in winter 2009/2010; the Credit Suisse Economic Research (2011), which measures the most successful winter sport destinations by variety of product offers/attractions, demand and overnight stays; the International Benchmark Report of the most successful destinations in the Swiss Alps by BakBasel (BAK Basel Economics AG, 2011), measured by market share, capacity utilisation and profitability; and finally, it was looked at the number of arrivals in municipalities located in mountain regions (over 1000m above sea level) gathered by the Swiss Federal Office of Statistics (2012). The top five mountain resorts in Switzerland resulted to be: Zermatt, St. Moritz, Davos, Verbier and Grindelwald. They all are global players, having visitors from Switzerland but also from Europe and overseas.

Among the different online platforms allowing the publication of tourism-related UGC, TripAdvisor was chosen as source of data, because of its popularity and amount of data available. It is, in fact, the biggest travel website worldwide and supports the largest travel community in the world (TripAdvisor.com, 2012). For each one of the

top five destinations there were between 500 and 6800 forum threads in English; given that each thread usually consists of several posts, the amount of forum posts available was incredibly high for a qualitative analysis. They were, therefore, considered all the threads published between 18th June 2011 and 17th June 2012, in order to gather fresh data and to include all the possible events taking place at different periods along the year. Hence, only threads with the date of the last post being in the time frame of one year were documented and analyzed.

A first analysis of the data aimed at selecting only argumentatively relevant posts, that is posts were at least one explicit argument for recommending/not-recommending the destination was put forward. The unit of analysis was the *argument*, defined as an opinionated statement supporting or criticizing the general claim "destination X is worth a visit". The sample of data was limited to the first (in chronologic order) 100 argumentatively relevant posts for each destination, because it corresponded to the saturation level: no new arguments for recommending/not recommending the destination would have been found if going on with the classification. The time frame for data collection was extended to four years for Davos (18th June 2008 – 17th June 2012), as only in the fourth year 100 relevant posts were retrieved. In the end, the corpus of data comprised: 258 arguments within the 100 posts for Zermatt and, among them, 24 conditional statements; 163 arguments within the 100 posts for Davos and, among them, 15 conditional statements; 313 arguments within the 100 posts for St. Moritz and, among them, 33 conditional statements; 188 arguments within the 100 posts for Verbier and, among them, 35 conditional statements; 206 arguments within the 100 posts for Grindelwald and, among them, 19 conditional statements. In Total, 1128 arguments were classified and analyzed; out of them, 950 (84,2%) were positive and 178 (15,8%) negative.

### 3.2 Coding Procedure and Analysis

The method used for the identification and classification of arguments in the posts has similarities with content analysis (CA). CA is a technique of measurement applied to texts (Franzosi 2008), aiming at describing the presence and frequency of certain characteristics. The main differences between CA and the technique employed in the study discussed here, concern the unit of analysis and the goal of the classification procedure. While for CA the unit of analysis is usually defined at the textual level (e.g. words, sentences, combination of words), here the unit of analysis was defined at the pragmatic level, that is according to the pragmatic effect (i.e. the change in social reality) the post had toward its reader. The pragmatic effect of a post providing precise information about a destination is different, in fact, from the effect of an argumentative post: if the effect of the first one is not much more than an enrichment of the reader's knowledge, the second one includes also a critical commitment, a suggestion/recommendation for action, a claim for reliability. The classification procedure of CA, then, mostly aims at answering *how* questions (Franzosi 2008), that is descriptive questions about the presence of certain characteristics in a corpus of texts. Here, the identification and classification of arguments had also an explicative goal, that was to point out elements considered particularly influent in the construction of the destination image. Besides that, here, only the argumentative parts of forum posts were taken into account and measured, *ad hoc* categories were created

for classifying arguments, and arguments were later individually reconstructed and analyzed with the tools of argumentation theory.

Five main categories were created to classify positive and negative arguments: 'scenery/views', 'mountain activities', 'other activities', 'atmosphere' and 'other'. Sub-categories were created to further differentiate among argument types, such as 'skiing' for the main category 'mountain activities'. Since each destination has its own characteristics and, therefore, different arguments are used to comment about it, they were created different sub-categories for each destination. Two aspects of the research have to be noted: first, the fact that the aim was not to compare destinations, but to analyze tourists' opinions in order to catch the image they have of Switzerland as a place for mountain tourism. Second, the fact that categories for the classification of arguments were not created beforehand, but through an iterative process of text codification and categories refinement, until the saturation level.

### 3.3 Identification and reconstruction of arguments

Each post of the sample was analyzed in order to identify, classify and reconstruct the logical inference underlying every argument. Below are two examples of analysis.

1) Example of a positive argument belonging to the category 'scenery/views':

"Re: Zermatt in May - Feb 09, 2012, 3:11 PM

For sure there are other options to experience snow. (…) But if your question is which is the best place for scenic views and high up mountain experience then Zermatt is the place you want to go. (…)"

The author gives reasons why Zermatt is worth a visit. Besides of the scenic views, she mentions the high up mountain experience (classified within the category 'mountain activities'). She acknowledges the fact that there are other options to experience snow, but this is not her main argument. The logical inference of the argument can be reconstructed as follows:

| | |
|---|---|
| Standpoint: | *Zermatt is worth a visit.* |
| Argument: | *It is the best place for scenic views.* |
| Major Premise: | *Places that offer scenic views are worth a visit.* |
| Minor Premise: | *Zermatt offers the best scenic views.* |
| Conclusion: | *Zermatt is worth a visit.* |

2) Example of a *negative* argument belonging to the category 'scenery/views':

"6. Re: Zermatt or Interlaken??? - Mar 20, 2012, 6:04 PM

Has your husband seen pictures of the Jungfrau massif in the Bernese Oberland (Eiger, Mnch, Jungfrau peaks)? IMO, far more picturesque than Matterhorn and the BO is more scenic than the area around Zermatt. And the view of the Lauterbrunnen Valley from Wengen is simply beyond belief. (…)"

The author makes a comparison between Zermatt and the Jungfrau Region. Hence, she does not only give negative arguments related to the scenery of Zermatt, but also

positive arguments for recommending another destination. As Lauterbrunnen does not belong to the sample of destinations analyzed, only the arguments regarding Zermatt were taken into account. The reconstruction of the argument is the following:

| | |
|---|---|
| Standpoint: | *Zermatt is not worth a visit.* |
| Argument: | *It is less scenic than other regions.* |
| Major Premise 1: | *Scenic places are worth a visit.* |
| Major Premise 2: | *The more a place is scenic, the more it is worth a visit.* |
| Minor Premise: | *Zermatt is not as scenic as the Jungfrau Region.* |
| Conclusion: | *Zermatt is not worth a visit.* |

### 3.4 Conditional statements

Arguments put forward in forum posts are often connected to a condition, for instance to a specific period of time or the weather. These arguments are only valid if the condition applies. The following example illustrates the occurrence of conditional statements in a forum post:

3) "5. Re: Zermatt in November

It may well be that the restaurants up on the mountain and the museum in the village will be closed in November – especially if you are there in early to mid Nov. The later in Nov you are there, the more chance of finding more things open. Quite honestly – and this is coming from someone who has loved Zermatt for over 45 years now! – I would not spend 4 whole days there in November unless it was so late in the month that everything had started to open up again. Cut your stay to two nights and take the Gornergratbahn up to the top IF you have a nice day. (If it is snowing then forget both the train and the Klein Matterhorn cable car as you will not see any views.)"

Two different conditions can be found in the example above. First, it depends on the *season* if the author recommends the destination for a visit or not. She states that she loves Zermatt since a long time, but in November, and in particular in early to mid November, businesses such as restaurants and the museum are closed, so she recommends to cut the length of stay to two nights instead of staying four full days. However, if one stays in Zermatt at the end of November, the author would recommend staying for four days. It can be assumed that she would also recommend a stay in December and other months, but as this was not the poster's question, she does not give any recommendation for other months. Second, the author talks about the *weather* conditions. She states that Zermatt is worth visiting, even just for two days in early to mid November, because of the views when going up to the mountain by train or cable car. However, the condition is that there is good weather. Besides of *'season'* and *'weather'*, further categories for classifying conditional statements in forum posts were *'time'* and *'length of stay'*.

## 4 Results

Data were analyzed through UAM Corpus Tool, a software for text annotation and analysis which provided quantitative measures for the evaluation of the analyzed data.

The tool allows, in fact, to search for a specific feature in the corpus of data, to report about statistical occurrences and to compare different features.

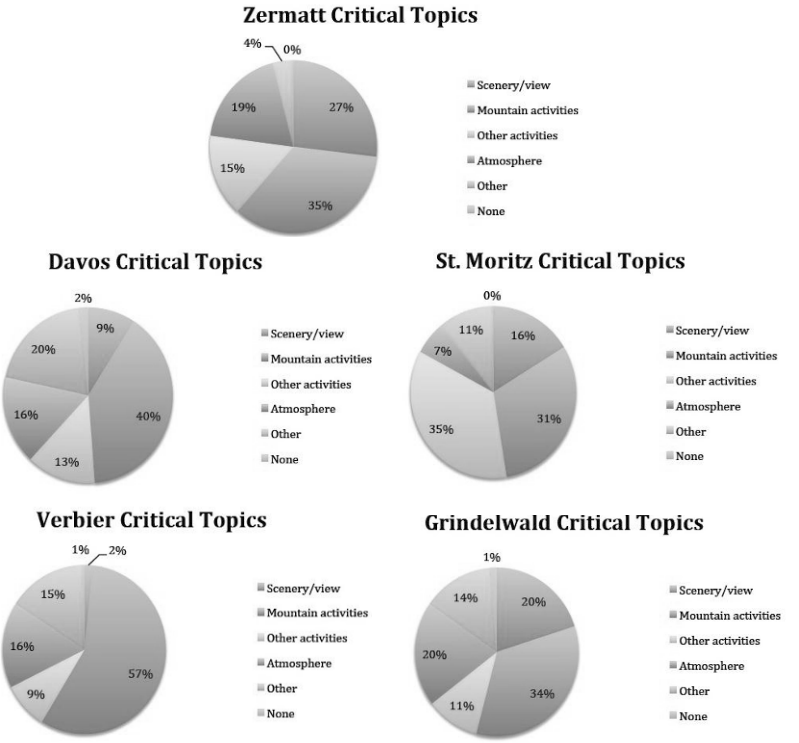


**Figure 1.** Critical topics for the top five Swiss mountain destinations.

### 4.1 Arguments

For Zermatt, the most discussed topic is *'mountain activities'*, followed by *'scenery/view'* and *'atmosphere'*. For Davos, the most argued topic is *'mountain activities'*; the second position held by *other'* topics, followed by *'atmosphere'*. For St. Moritz, slightly more argued than *'mountain activities'* is the topic *'other activities'*; on third position is *'scenery/view'*. For Verbier, it is noticeable that most of the discussions are about *'mountain activities'*, and the second most argued topic is *'atmosphere'*, followed by *'other'*. Also for Grindelwald, the most discussed topic is *'mountain activities'*, while at the second and third positions are *'scenery/view'* and *'atmosphere'*. Figure 1 shows the results of the most argued topics per destination.

The '*scenery and view'* at a mountain destination is a key element when deciding if a destination is worth a visit. However, the results of this research show that for some mountain destinations, this topic is much more often discussed than for other mountain destinations; it seems that for some of them, the *'scenery/view'* is very central and decisive for a tourist visit and for others it is rather secondary if not totally

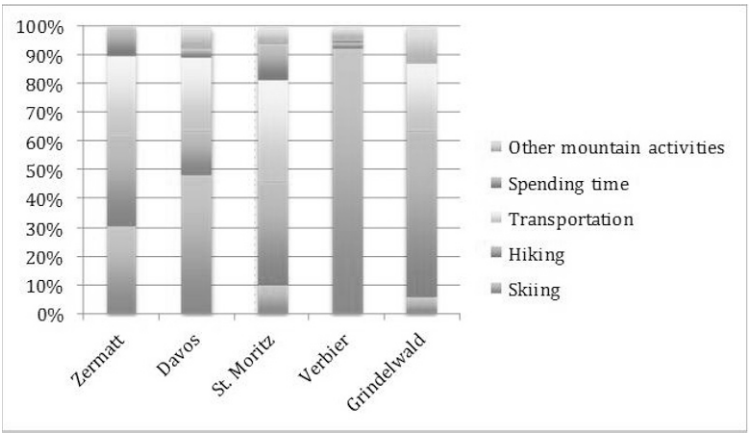


**Figure 2.** Critical sub-topics of 'mountain activities' arguments.

unimportant. '*Mountain activities*' is the most argued topic across all the destinations, except for St. Moritz. This does not mean that all mountain activities are popular in discussions. Figure 2 shows the differences in the frequency of critical topics related to mountain activities. The frequency of positive arguments was much higher than the frequency of negative arguments, except for the categories 'atmosphere' and 'other', comprising different types of arguments as location, accessibility and service at place. Positive arguments (46,2%)concerning the atmosphere of Swiss mountain destinations reported the 'family-friendly' attitude of locals and tourism providers, and the 'lively' or 'cosy' or 'quiet/not so crowded' appearance of the place. Negative arguments (53,8%), on the other side, criticized the 'not charming' or 'too touristy' atmosphere. 'Other' reasons for not recommending (33,6% negative arguments) a stay at a Swiss mountain destination is that they are 'very expensive', even if 'location' is usually good.

### 4.2 Conditional statements

Figure 3 provides an overview of conditional statements expressed in the arguments.

It is noticeable that many arguments are not connected with conditional statements, however implicit conditions were not considered. Season is the condition most frequently put when recommending a visit, followed by the weather, whereas the time and length of stay are mentioned only a few times. The reason is probably that the activities one can do at a mountain destination highly depend on the season, in particular mountain activities as skiing, which depends on the presence of snow, or hiking, which requires, instead, clean paths free from snow. Besides, when recommending a destination for the 'scenery/view', one might say that the season when a tourist visits the destination does not matter a lot, but the weather is crucial, as the view is not very good when it is not sunny.

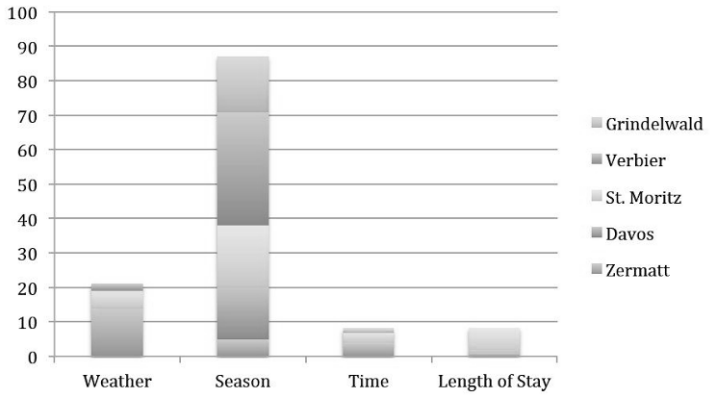


**Figure 3.** Overview of conditions expressed.

## 5 Conclusion

Building on the logic-pragmatic concept of argument, defined as the logical basis for practical reasoning, that is for decision-making, a corpus of forum posts collected from TripAdvisor concerning the top five Swiss mountain destinations has been analyzed. They were first selected argumentatively relevant posts, that are posts presenting at least one argument for recommending/not recommending a visit to the destination; then, arguments were identified, classified and reconstructed according to the classical syllogism structure. In this way, the image of the destinations in the opinions of actual tourists came out. Arguments, in fact, represent opinionated information, whose communicative significance goes beyond the informative content about an object: they express, in fact, a value judgment based on personal experience, which influence the reader's perception of the object and gives a base for pondering about it. Even though the analysis of destination image through the identification and reconstruction of arguments requires an intense effort for the researcher, because it cannot be automated – at least not completely –, results which may arise go far beyond a plain content analysis, and can be seen as the 'heart of the matter'.

What is, then, the heart of the matter about Swiss mountain destinations? The most argued topics across all the destinations are the activities which can be performed at place. Contrary to expectations, the scenic aspects are not the main criteria for deciding if visiting or not; they become particularly relevant if the destination cannot offer a variety of mountain activities. Each destination, then, because of morphologic and business reasons, counts on specific activities, that do not always correspond to skiing or hiking, but comprise also shopping and the possibility to visit cultural attractions as museums. Such diversity should be respected and, even more, stressed, when promoting the destination. Results show also that the frequency of positive arguments is much higher than the frequency of negative arguments, except for discussions about the atmosphere and some specific aspects of the destination, as

location, accessibility and service at place. The atmosphere of a place is regarded as an important element for enjoying the travel experience, but 'which' atmosphere is the best depend on personal preferences: for some people, to be attractive a mountain destination should be lively and cosy, for others, the less a place is crowded and touristy the more it is enjoyable. In order to segment the market, tourists' characteristics should be further investigated and crossed with characteristics of the destination. Argumentation analysis allows, actually, to deeper investigate people's opinions, letting emerge the cultural and contextual premises backing their reasoning; this might be the object of future studies. When planning a visit to a mountain destination, in the end, factors which have to be taken into account refer to the season and the weather; according to the reason a destination is mainly recommended for, then, each factor becomes more or less important.

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# Drivers and Benefits of Analysing DMOs' eWOM Activities

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## Abstract

The purpose of this study was to identify and evaluate the effect of the use of electronic Word-of-Mouth (eWOM) results on the perceived marketing success of both eWOM in particular, and web marketing in general. Data was collected from Swiss and U.S. destination marketing organizations (DMOs) and analysed using structural equation modelling. It was found that the use of results from analysing eWOM engagement is influenced by top management and more importantly by the extent of partner collaboration. Furthermore it was found that the use of eWOM analysis results drives both eWOM and web marketing success at American DMOs, but only web marketing at Swiss DMOs. In other words, Swiss DMOs are not fully convinced about the importance of eWOM. This study contributes to our understanding that the use of eWOM analysis results is a critical driver of web marketing success and that a purposeful collaboration with other organizations is a key step stone to aim to interpret and adjust DMOs' eWOM activities.

**Keywords:** eWOM, web marketing, destination marketing organization, partner collaboration

## 1 Introduction

Destination marketing organizations (DMOs) are tourism organizations responsible for managing the promotion of a destination. Increasingly, DMOs, are challenged to respond to the electronic Word-of-Mouth (eWOM) phenomenon; that is, the potential for Internet users to easily share and participate in online conversations (Xiang and Gretzel, 2010). Indeed, Internet users are likely to replace a tourism organization's voice, through the creation of knowledge (in the form of online conversations via social media platforms) about the destination. As the use of social media continues to increase tourism organizations, in order to continue their promotion of the destinations, not only have to respond by adopting new technologies, but also by interpreting and using the knowledge created by Internet users.

Typically the use and implementation of new technologies is not a straight forward road to success, but rather a back and forward exercise (Gretzel, Yuan and

L. Cantoni and Z. Xiang (eds.), *Information and Communication Technologies in Tourism 2013*, DOI: 10.1007/978-3-642-36309-2_10,

Fesenmaier, 2000; Rogers, 2003). Tourism research mainly focused on internal organizational settings that drive web marketing adoption, such as continuity of innovation and perceived contribution of this investment to the overall success of DMOs' web marketing programs (e.g. Zach, Gretzel and Xiang, 2010). Similarly, past literature identified the importance of DMO top management's understanding of new challenges and the meaningful use of new technologies to seek excellence in destination marketing (Gretzel, Yuan and Fesenmaier, 2000). Also collaboration between DMOs and other destination organizations is a critical driver of destination success as it enables DMOs to better understand its environment (Zach, 2012). Research, however, yet has to fully understand the drivers and the benefits of the common practice of outsourcing development and/or management of eWOM activities to partner firm. Another aspect under-researched in tourism is the effect of using social media analysis tools on web marketing. Due to an increased pressure to tightly household their resources DMOs are forced to invest their web marketing investments. The analysis of web activities enables organizations to improve their web marketing strategies to better reach their target audiences (Xiang and Gretzel, 2010; Sigala and Marinidis, 2010).

Therefore, the goals of this study were twofold: first to understand which organizational settings drive the use of eWOM analysis results and how these results affect success in both eWOM implementation and web marketing overall. Next, to investigate if the use of analysis results of eWOM drive the success in eWOM activities and also in web marketing overall.

## 2 Literature Review

### 2.1 Destination Marketing Organizations and eWOM

The continuous development of information communication technologies during the last decade has had profound implications for the tourism industry as a growing number of travellers began to seek for tourism information online (Steinbauer and Werthner, 2007). Indeed, DMOs use their official website to interact with tourists in order to promote the destination image and provide information about the destination (Choi et al. 2007). Scholars underlined that the Internet represents the primary source of information in the tourism domain (Gretzel, Yuan and Fesenmaier, 2000). A new perspective in DMOs' efforts of reaching the target audience, involves online conversations that bring with them a change in communication as it requires a consistent online place branding presence and an active participation in online conversations (Go and Govers, 2009). Examples are recommendation websites such as Tripadvisor, Booking, and Venere, which allow social media communications that challenge the official DMO websites. Users' interaction with information sources outside of the official DMO sources can potentially influence the intention to visit a destination. Especially electronic Word-of-Mouth through social media enables users to easily share their experiences online (O'Connor, 2008). eWOM offers opportunities for a DMO to understand what past travellers experienced at the destination and/or prospective travellers expect of their future trips (Hofbauer et al. 2010). eWOM summarizes on-going social discussion and reported experiences about tourism destinations which are the key drivers for travel decision making. In a recent study by Zach et al. (2010), the adoption of web promotion features is a driver of web

marketing success of tourism organizations. According to Sigala and Marinidis (2010), DMOs should start to use social media opportunities for collaborative destination management to continually enhance visitor experiences. In this context, DMOs usually are users and not developers of technologies to present information about their destination on the Internet; i.e. DMOs purchase outside help to implement information technologies to keep up with current trends in web marketing.

### 2.2 Collaboration and Top Management Support for Web Marketing Success

It is generally understood that an organizational understanding of openness towards new ideas promotes behaviour to adopt new processes and technologies. In DMOs, given the small number of employees (mostly less than 10 according to Zach, 2012), openness is guided mostly by DMO leaders (Lefebvre, Mason, & Lefebvre, 1997). Similarly, collaboration with partners provides access not only to resources, but also to new ideas on how to use them (Eisingerich, Rubera & Seifert, 2009). Critical driver for organizational and destination success are the internal support for new products and services as well as new processes through allocation of resources, top management support and an understanding of Internet technologies (Zach et al. 2010) as well as external knowledge (Yang, 2007). Organizational support to develop and maintain business relationships is mostly formed by organizational leaders. Top management, thus, sets the foundation for their organization and, more importantly, for their employees to engage in business relationships with other organizations. Employees could understand a lack of this support as top management's negative perception and distrust towards other organizations (Das and Teng, 1998). Thus, top management support is critical for DMOs to adopt new technologies and processes.

H1: *Top management support has a positive effect on use of eWOM results.*

Second, to stay up to date to communicate with potential destination visitors DMOs need to understand new technologies and their potential. Typically, this process includes the collaboration with experts and consultants to best use these new technologies. Working with partners enables DMOs to share risk, access otherwise unattainable resources and develop new services that could not be created if working by themselves (Stuart, 2000). Similarly, research furthermore suggests that collaborations enable mutual learning and the adoption of new technologies (Powell, Koput and Smith-Doerr, 1996). Indeed, recent tourism studies identified that the inclusion of external partners leads to a successful adoption of new services (Zach, 20112). Partner collaboration thus enables the adoption of new technologies. Moreover, in the web marketing context, DMOs oftentimes rely on outside providers such as web or technology support agencies in order to balance a DMO's lack of knowledge and resources for the management of web marketing activities in terms of man power and expertise (Marchiori et al., 2012), leading to a more successful web marketing presence.

H2: *Partnership with external firms has a positive effect on use of eWOM results.*

### 2.3 eWOM Adoption and Organizational Learning

From an organizational learning theory viewpoint, organizations that transform knowledge into guidelines and policies better nurture the intended use of new technologies and knowledge. Knowledge transformation involves an organization's

ability to develop and refine the internal routines that facilitate the integration of new knowledge with existing knowledge (Camison and Fores, 2010). Hence, for a tourism organization dealing with various online communication dynamics, the integration of results from the analysis of online activities such as eWOM activities, into strategic business decisions might drive the evaluation of web marketing performance (Marchiori et al., 2012).

The Online Communication Model developed by Cantoni and Tardini (2010) interprets online communication as a business communication activity whereby the information learned from online communication needs to be used to enhance communication success. Routines to integrate this knowledge enhance organizational learning and ultimately the success of the activities sought after (van Winkelen, 2010).

H3a: *The use of eWOM results has a positive effect on social media success.*

H3b: *The use of eWOM results has a positive effect on web marketing success.*

A recent study done by Xiang and Gretzel (2010), confirmed that eWOM is playing an increasingly relevant role as an information sources for travellers, underlining the tension between the management of DMOs' website online presence versus the information shaped on social media. Besides a need for search engine optimization efforts in order to ensure that a tourism website is represented and can compete with the rankings of social media sites, the study authors indicate possible strategies for an online presence using eWOM activities: embracing social media and advertise or provide contents on those sites, and/or integrating social media components on the tourism destination or supplier website. Therefore, following this study it is posited that the web success as perceived by DMOs managers is determined by the integration of results from the eWOM analysis on marketing strategies, and more directly by the successful adoption of eWOM activities.

H4: *eWOM success has a positive effect on web marketing success.*

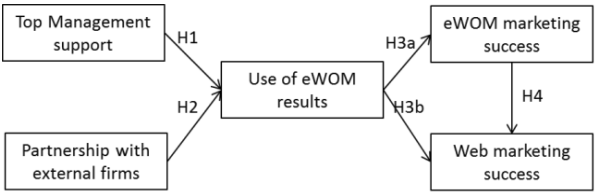


**Fig. 1.** Theoretical Model

## 3 Methodology

Study constructs were adopted from previous studies: top management support for openness towards new ideas was adopted from de Brentani's (2004) and the partner collaboration constructs was adopted from McGinnis and Vallopra (2001). To measure the use of processes and results of social media analysis the authors adopted items from the Online Communication Model developed by Marchiori et al. (2012): respondents were asked to indicate when the following eWOM activities were adopted: a) listening and analysis of the electronic Word-of-Mouth about the

destination, b) interaction with virtual friends through social media websites, c) monitoring of online conversations about the destination that takes place through social media; d) participation in conversations about the destination. Use of eWOM analysis results was measured on a three item scale adopted from literature on Information Communication Technology and organization's maturity (Earthy, 1998). The items were then later adapted to the tourism context and tested via semi-structured interviews with DMOs directors (Marchiori et al., 2012). Items were used to investigate if results from eWOM analysis are a) used by a tourism organization to assess web marketing performance; b) integrated into web marketing processes; c) used for strategic business decisions. The perceived success of both social media adoption and the overall success of the web marketing efforts were evaluated using one item each, following research by Zach, Gretzel and Xiang (2010), and Drole and Morrison (2001). All study items were measured on 7-point Likert scales ranging from 1=Strongly Disagree to 7=Strongly Agree.

Data for this study was collected from U.S. and Swiss destination marketing organizations. The English language version was developed first and translated into German, French and Italian and back into English to assure item reliability. In both countries a pilot study was conducted with 30 bureaus and improvements were incorporated. In Spring 2012 the surveys were distributed via email to the CEOs/directors of 2.000 U.S. and 483 Swiss DMOs. To the authors' knowledge this represents the population of DMOs in both countries, in particular for the Swiss case a list of DMOs contacts has been provided by the Swiss Tourism Federation. In the case of the U.S., DMOs were identified through an extensive search in directories, the Internet and publicly available tourism association lists. Following the initial invitation two reminders and one last call were distributed each 6 days apart. Differences in distribution were that the Swiss survey was endorsed by the Swiss national tourism board and U.S. DMOs were entered into a lottery drawing of 1 $100 and 2 $50 gift cards as well as instant access to a previous study report. The incentive for the U.S. was provided as no endorsement for the study could be secured by suitable organizations. Distribution efforts resulted in 72 (Swiss) and 103 (U.S.) usable responses, representing response rates of 14.9% and 5%, or 7% of the total sample.

To fully understand the drivers of adoption and success of social media and web marketing it was necessary to simultaneously investigate the effects of internal and external sources. As such, a path analysis with a multiple group comparison for the U.S. versus Switzerland was conducted. Structural equation modelling (SEM) was used to analyse the mode. SEM was found appropriate for this study, given the causal relationships between the constructs.

# 4 Results

## 4.1 Characteristics of U.S. and Swiss Destination Marketing Organizations

Essentially all respondents indicated that their bureaus are either DMOs (Switzerland 90%, U.S. 56%) or Convention and Visitor Bureaus, a popular alternative title in the U.S. (U.S. 41%). The reminders were other categories such as "part of chamber of commerce" etc.

**Table 1.** Characteristics of U.S. and Swiss Destination Marketing Organizations

| | U.S. | Swiss | | U.S. Dollar | Swiss Frank |
|---|---|---|---|---|---|
| **Area represented** | **%** | **%** | **Annual budget** | **%** | **%** |
| City | 29.1 | 42.6 | 100,000 or less | 11.7 | 82.9 |
| Multiple cities | 15.0 | 42.6 | 100,001 - 250,000 | 17.0 | 2.4 |
| County | 35.4 | n/a | 250,001 - 500,000 | 9.6 | 2.4 |
| Multi-county | 13.4 | n/a | 500,001 - 750,000 | 12.8 | 2.4 |
| State/canton | 6.3 | 12.8 | 750,001 - 1,000,000 | 10.6 | 2.4 |
| Multi-states/cantons | 0.1 | 2.1 | 1,000,001 - 2,000,000 | 11.7 | 2.4 |
| | | | 2,000,001 - 3,000,000 | 8.5 | 4.9 |
| **Full-time employees** | **%** | **%** | 3,000,001 - 5,000,000 | 5.3 | 0.0 |
| None | 2.2 | 2.6 | 5,000,001 - 10,000,000 | 6.4 | 0.0 |
| 1 – 2 | 27.8 | 26.3 | 10,000,001 - 15,000,000 | 2.1 | 0.0 |
| 3 – 4 | 24.4 | 15.8 | 15,000,001 - 20,000,000 | 1.1 | 0.0 |
| 5 – 6 | 12.2 | 7.9 | 20,000,001 or more | 3.2 | 0.0 |
| 7 – 9 | 7.8 | 7.9 | | | |
| 10 – 19 | 12.2 | 18.4 | | | |
| 20 – 49 | 11.1 | 15.8 | | | |
| 50 – 99 | 1.1 | 5.3 | | | |
| 200 and above | 1.1 | 0.0 | | | |

As can be seen in Table 1 most respondents represent cities (particularly Swiss respondents) and counties (US). Not all Swiss states (called canton) have an internal structure with counties. With Switzerland being smaller in size than the U.S., DMOs are typically located at the level of cities, cantons or regions (within and across cantons).

No DMO is located at the county level, but rather at the level of cantons. Furthermore, most organizations are small with up to 9 employees. Most Swiss DMOs also have small budgets of up to 100,000 Swiss Francs, whereas U.S. DMO budgets are more evenly distributed. Previous studies found that U.S. DMOs typically work with external agencies to develop and implement new web marketing features and subsequently run the features themselves. Swiss DMOs, on the other oftentimes outsource the whole process from development to management. For the Swiss portion of the dataset it was found that 48% outsource more than 50% of their eWOM activities.

### 4.2 eWOM adoption

Table 2 displays the adoption of eWOM activities by American and Swiss tourism organizations. eWOM activities are not fully implemented by Swiss tourism organizations (81.8%), however, several plan to implement these activities, in particular monitoring of what others post about the destination (11.4%), and participating in conversations about their destination (11.4%). Last, an average of 9.1% of Swiss DMOs indicated to do not have any plan of implementation for the eWOM activities.

**Table 2.** Adoption of eWOM Activities by U.S. and Swiss DMOs

| Adoption of eWOM Activities | Adopted [a] U.S. % | Adopted [a] CH % | Will Adopt [b] U.S. % | Will Adopt [b] CH % | No Plan [c] U.S. % | No Plan [c] CH % |
|---|---|---|---|---|---|---|
| We interact with our virtual friends through social media websites. | 96.8 | 77.3 | 1.1 | 13.6 | 2.1 | 9.1 |
| We participate in conversations about our destination. | 95.7 | 81.8 | 1.1 | 6.8 | 3.2 | 11.4 |
| We monitor social media for conversations about our destination. | 94.7 | 86.4 | 0.0 | 9.1 | 5.3 | 4.5 |
| We monitor what others post about our destination. | 94.7 | 81.8 | 0.0 | 6.8 | 5.3 | 11.4 |

Notes: [a.] Adopted within the past 12 months or more . [b] Will plan to adopt within 12 months or beyond. [c.] No plans to adopt social media

### 4.3 A model of Innovation Adoption and eWOM Marketing

The analysis required several steps. Firstly, confirmatory factor analysis was used to evaluate unidimensionality of the suggested latent constructs (see Table 3). Cronbach's alpha was found to be satisfactory, with an overall average of higher than 0.8. Next, following Fornell and Larcker (1981), AVE (average variance extracted) was calculated and was found to be above 0.5 and to be higher than the inter-construct correlation confirming convergent and discriminant validity. Last, goodness-of-fit measures for the model were calculated and were found to be within or close to acceptable cutoff measures (CFI=0.928, TLI=0.914, $\chi 2/df \leq 2.5$ and RMSEA=.085) (Kline 1998). Next, a group comparison was conducted to compare U.S. with Swiss DMOs.

**Table 3.** Latent Construct Items

| Items and Item Source | Coeff. Alpha | Factor Loadings |
|---|---|---|
| **Partner with External Firms** | 0.877 | |
| For the development of new tourism services key partners … | | |
| … are frequently used | | 0.882 |
| … play an important role in the development process. | | 0.901 |
| … usually become involved in the concept stage of the development process. | | 0.885 |
| **Top Management Support** | 0.864 | |
| Organizational leadership is involved personally in new service development … | | |
| … by playing a central role in project review—i.e., make key go/no-go and spending decisions. | | 0.741 |

| | |
|---|---|
| … as visionaries and/or champions of new services. | 0.853 |
| … to enhance the reputation of our tourism office and new services. | 0.879 |
| … by encouraging strategic partners to adopt our new services. | 0.798 |
| Top managers do not play an active role in the day-to-day activities of new tourism service tasks; (i.e., usually leave things up to project leader and team). | (0.485) |
| **Use of eWOM Results** | 0.892 |
| Results of eWOM analysis are … | |
| … used to assess web marketing performance. | 0.859 |
| … integrated in our web marketing processes. | 0.917 |
| … used for strategic business decisions. | 0.892 |

Note: Values in parentheses did not meet cut-off values and the item was dropped from further analysis.

It was found that partnership with external firms has a significant positive effect on the use of eWOM results on web marketing strategies for both U.S. and Swiss DMOs (.246 and 0.339 respectively). Top management support has significant positive effect on use of eWOM results only for U.S. DMOs (path estimates 0.237). eWOM success has a significant relationship with the use of eWOM only for U.S. DMOs (0.256). Last, the overall web success for both countries is driven by the use of eWOM results within web marketing strategies (U.S. DMOs: 0.293, Swiss DMOs: 0.455). However the perceived eWOM success drives the overall web success only for the U.S. sample (0.304).

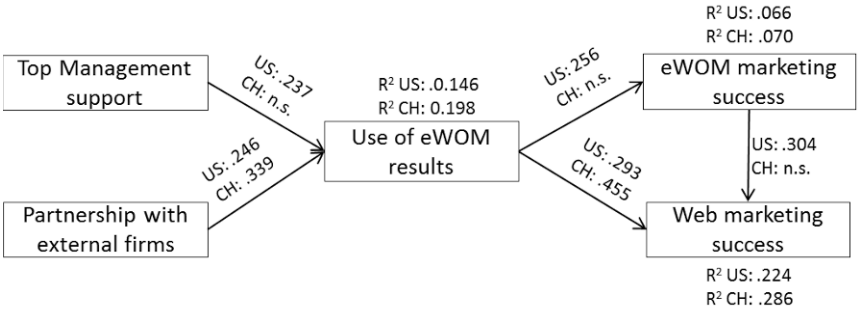


**Fig. 2.** Research Model

## 5 Conclusions and implications

Several important findings for destination marketers were found. First, U.S. and Swiss DMOs that adopt eWOM activities are used to communicate with target audiences. Furthermore, most of those DMOs, both from U.S. and C.H. that yet did not adopt

eWOM activities plan to do so within the next 12 months. This is especially true regarding the eWOM activity related to a communication with virtual friends. The monitoring and participation in other communication on the web is both less adopted and few DMOs plan to do so in the near future. Second, DMOs that integrate the results of their eWOM analysis in their web marketing strategies consider this approach successful. However, only the U.S. tourism organizations demonstrate a direct, positive relationship of eWOM success with web marketing success. This result can be explained by the almost full adoption of eWOM activities by American DMOs, which suggests an established knowledge on the online conversations phenomenon. Swiss tourism organizations' web success seems not to be driven by eWOM, confirming the tendency of Swiss DMOs to be less likely adopters of eWOM activities.

Third, an interesting finding is the difference of the role played by top management and partnerships between the two countries. For U.S. DMOs both top management support and partner collaboration drive the use of eWOM analysis results for web marketing development. In the case of Swiss DMOs, however, it was found that only collaboration has a significant effect. This suggests a harmonious support within U.S. DMOs whereas Swiss DMO leadership seems to struggle with going the next step in eWOM integration. Rather external partners are the sole drivers, indicating that there is a significant lack of support for eWOM or a lack of knowledge on the use of eWOM among Swiss DMO leadership. This suggests that partners are critical for Swiss DMOs web marketing success as these external specialists provide Swiss DMOs with the expertise to exploit online conversations.

A previous study done at the regional level of Swiss tourism organizations (Marchiori et al, 2012), might help interpret this result: In Switzerland regional centres (e.g. technical support agency) provide strategic and operational support services to the DMOs on online communication through new technologies. Marchiori, Pavese and Cantoni (2012) identified that given the existence of these centres outsourcing of web marketing activities (not only development and implementation, but also the continued communication with customers) is popular among Swiss DMOs.

The use of eWOM analysis results drives eWOM success and subsequently the overall web marketing success for U.S. DMOs, but not for Swiss ones. This suggests that U.S. DMOs value the use of results obtained from eWOM analysis to best exploit eWOM applications. Swiss DMOs, on the other hand seem to be more hands-on by quickly using findings from their online conversations experience to enhance the overall success of their web marketing efforts.

Findings about the different roles of top management and partnership played in the two countries might help to interpret this result: the non-significant relationship between the eWOM success and the web marketing success for Swiss DMOs suggests that Swiss DMOs yet do not fully perceive the value of eWOM for online success. An interpretation of this result can be found on the use of partnership in Swiss tourism organizations. Third parties/centres of expertise devoted to improve DMOs online performances might represent a) an opportunity for cost reduction and optimization of the resources available, and, b) a joining force for a consistent online place branding communication among local, regional and national DMOs. However, third

parties/centres of expertise are not only holding the technical knowledge (e.g. process/guidelines) on monitoring the online presence, but also knowledge on branding knowledge (e.g. participation and communication with costumers). Thus, outsourcing of the management of eWOM activities gives away the rule ship of branding, and may thus create the risk to not fully understand the value of the online conversations. In fact, as in the U.S. DMOs case, managing eWOM activities in-house improves DMOs' understanding of the resulting web marketing success. As confirmed in a previous study done by Zach et al. (2012), this indicates that, despite the increasing importance of the electronic Word-of-Mouth, especially in a globalized social media-oriented market as in the case of U.S., Swiss DMOs do not yet fully exploit the potential of Web 2.0. However, a substantial future investment by Swiss DMOs in eWOM adoption confirms how those new communication channels are taken into account for the next years.

While this study contributes to our understanding of eWOM analysis results at DMOs this study has some limitations. The relationship between external partners and DMOs to outsource website activities needs to be investigated in detail. In particular future research should seek to understand which partner takes charge at what point in the development/implementation process and how the relationship is managed. Future research should also consider a further investigation on the tools, procedures, and methods used for the monitoring of online conversations, and strategies for a successful interaction with online consumers. Moreover, an investigation of other web marketing operational areas (such as search engine positioning, websites usages) should be considered to evaluate the role of eWOM activities within web marketing strategies. Last, an analysis of the current types of reports provided by tourism related-agencies seems promising in order to understand if DMOs are receiving biased information from partners as they might use in-house solutions for a so-called "online presence analysis".

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# E-destinations: Global Best Practice in Tourism Technologies and Applications

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## Abstract

The emergence of ICT enables consumers to search for destinations worldwide more easily, making it necessary to constantly improve the web presence and social media used by destinations. This study firstly aims to benchmark global destinations with regards to their level of implementation of technologies and applications. Secondly, global best practices for e-destinations will be identified with the help of a detailed content analysis of destinations' website presence and social media applications. At the same time, the industry perspective about e-destinations will be taken into consideration in order to get an insight into the future and vision for destination management systems and website presence. By this means, a variety of factors will be analysed that can facilitate the consumers´ search on the destination's websites before, during and after a holiday. The study contains best practice recommendations for destinations' web presence that should be implemented in order to sustain their future online success and competitiveness.

**Keywords:** Tourism technologies and applications, DMO, destination marketing, best practice, benchmark and e-destinations

## 1 Introduction

The tourism industry experiences a shift from offline to online travellers. An increasing number of consumers worldwide are not dependent on travel agencies anymore to look for information and inspiration for their next holiday. Instead, consumers make use of the Internet, Web1 and Web2 and browse online for inspiration about their potential next holiday destination (ETC 2012). This in turn leads to tourism destinations worldwide becoming the focal point of attention for consumers' decision making process. However, many destinations worldwide struggle with this process as their Internet and online presence might still be quite basic (Buhalis 2000). Extensive research has been made regarding emerging technologies and social media. Gradually the tourism industry is making use of the knowledge available is implementing these new and innovative technologies and applications (Mintel 2011). Destination Management Organisations (DMO) worldwide are increasingly investing into their online presence and refer to destination management systems (DMS) in terms of assisting destinations with these functions due to their lack of technological understanding. DMS therefore help DMOs by providing a variety of products such as content management systems and databases to support their web and social media presence. Throughout the years, DMS systems became increasingly complex and are based on emerging technologies in order to help destinations become strong and competitive destinations of the future (Buhalis 1993; Wang 2008). Within the tourism industry, DMOs have lead to high interest by

L. Cantoni and Z. Xiang (eds.), *Information and Communication Technologies in Tourism 2013*, DOI: 10.1007/978-3-642-36309-2_11,

academics in terms of their fast developments through technology and the constant global competition to implement and improve emerging technologies and applications. However, little research has been conducted about global best practice e-destinations and limited attempts have been made to benchmark and rank global e-destinations in terms of their performance and technologies and applications used (WTO 2005 & WTO 2008). This study aims to discover global best practice examples for the use of technology and applications in e-destination marketing. There is a clear need for creating a framework to constantly benchmark e-destinations worldwide in order to identify destinations´ strengths and weaknesses in terms of their use of technologies and applications. By this means, DMOs get to know their position within the global ranking and can ensure staying competitive in the future.

## 2 Theoretical Background

The success of any DMO is highly dependent on ensuring that the different stakeholders´ interests and perceptions of a destination are harmonised in order to be able to achieve a joint goal (Manente & Minghetti 2006; NDou and Petti 2007). Through the move from offline to online travellers, the web and social media presence of destinations are crucial as e-Destinations serve as platforms where consumers can be inspired, get all the information about a potential trip to a destination and eventually book the holiday (Pan & Fesenmaier 2003). A DMS system can assist the DMO in achieving these set goals in terms of improving the destination´s web and social media presence by using computer and communication technologies (Wang 2011). Although, there are a variety of free tools available, especially through the emergence of Information and communication technologies (ICTs), a lot of DMOs are still dependent on the knowledge and expertise of DMS providers and benefit of an improved web presence after the implementation of a system (Wang and Russo 2007).

There are a number of theories in the tourism literature about measuring website effectiveness, primarily for consumer-oriented websites in the tourism industry. For DMO websites only limited research is available which makes it necessary to adapt new theories and approaches in terms of measuring and comparing tourism websites worldwide (WTO 2005). The AIDA Concept and the 2QCV3Q Meta Model are two theories recommended by the World Tourism Organisation that enable destinations worldwide to become aware important factors or categories of the future which ensure their website is being effective (WTO 2008). However, these factors or concepts primarily focus on assessing broad technical issues such as navigation, accessibility, findability or technical performance but do not try and identify or compare differences in the use of technologies and applications. For destination managers worldwide, finding out about their performance within a global ranking can be seen as the main area of interest. Augmented reality, gamification, location based services and virtual realities are only a few of these technologies that will gradually be implemented by destinations (Buhalis and O´Connor 2005; Hamill et al 2011). Web-based destination marketing aims at attracting, engaging and retaining users in order to trigger repeat visitation of the destination´s web presence. Although benchmarks have been made aiming at evaluating the effectiveness of websites, most of these studies focused on particular areas of websites (Park & Gretzel 2007). There is a need to analyse the effectiveness of the whole tourism product relating to destination´s

integrated technologies and applications supporting the consumer´s experience before, during and after a holiday.

# 3 Methods

The primary purpose of the study was to benchmark global e-destinations according to critical success factors of the future in order to establish best practice examples in terms of their use of technologies and applications. This study will help to close a gap in the destination marketing research. Therefore the methods chosen were a benchmark study of 30 international tourism destinations as well as a qualitative online exploratory survey.

## 3.1 Benchmark

Qualitative data was collected in the form of a comparative benchmark analysis of the way in which international destinations implement Web 1 and Web 2.0 applications and technologies. The research was web based as the information was available online. Benchmarking can be defined as "the search for the industry best practices that will lead to superior performance" (Camp, 1989 p.68). In the tourism industry, changes through technology can evolve quite quickly which makes learning processes in the form of benchmarks crucial in order to make comparisons within the industry. These comparisons can be analysed and can help the identification of strengths and weaknesses of tourism destinations. By this means, new and innovative ideas can be found (Fuchs & Weiermair, 2001). A total of 30 destinations were chosen for the benchmark analysis. As this study is based on a project in collaboration with the ATDW (Australian Tourism Data Warehouse) 10 of the destinations were given beforehand in the form of Australian States and Cities; the remaining sample of 20 destinations was chosen on the basis of articles, industry discussion and expert opinion as global best practice (see Table 1).

**Table I.** Destinations to benchmark

| Sample selection | Destinations |
|---|---|
| Given by ATDW | Sydney, Melbourne, Adelaide, Perth, Brisbane, Victoria, Queensland, New South Wales, Western Australia, South Australia |
| Articles, industry discussion and expert opinion | Australia, Puerto Rico, NYC, California, Las Vegas, Montreal, Sweden, Germany, Vancouver, Hong Kong, British Columbia, New Zealand, Canada, Thailand, Singapore, UK, Norway, South Africa, Cape Town, Austria |

For the analysis, the official English versions of DMO websites were visited; the links and URLs of these are given in the individual benchmark tables. A benchmarking framework was developed based on characteristics that should be analysed and measured according to the findings of the literature review. Different stages were identified and subordinate criteria implemented into the benchmark table:

- before holiday: inspire, inform, engage

- during holiday: facilitate at destination
- after holiday: remember, share and engage

The benchmark analysis examined 180 factors for each individual destination. All features within the framework were defined in advance in order to guarantee an objective evaluation within the benchmark. The existence or non-existence as well as the execution of certain characteristics was observed, noted with a "yes" or "no" and rated within the framework. A 5- point scale was used in order to express the level of adoption of the characteristics by the destinations. The scale can be described as: 1- very limited, 2 – limited, 3 – average, 4 – advanced, 5 –very advanced. In addition to the rating, comments were provided within the benchmark tables in order to state observations and justification for the rating. After calculating the average score of each factor in the framework, the study compared them with the individual destination scores. A colour scheme was then implemented in order to depict the results more visually.

### 3.2 Exploratory online survey

The second part of the method consisted of an online exploratory questionnaire that aimed at getting an insight into what industry considers the destination management systems of the future, global best practice e-destinations, technologies and applications. An exploratory design was seen as the appropriate method as it helps develop new ideas and is particularly useful when investigating a new field or area in which the research conducted is limited (Cooper & Schindler, 2011; Creswell & Clark, 2011). To obtain qualitative data and not solely give respondents a choice of answers, the questionnaire consisted of 8 open-ended questions and information about the participant. The sample consisted of 50 international respondents by using snowball and purposeful sampling. Links to the online survey were distributed to a wide range of industry experts and tourism professionals through the authors´ Facebook, Twitter, Linkedin and Xing accounts, blogs, and announcements via e-mail to colleagues, the IFITT Board and TRINET Board. In addition to that discussion and announcements were started in 47 Linkedin groups and in the traveldailynews.asia.com. All answers of the survey were kept anonymous and were analysed by using content analysis. During the content analysis, the transcript of answers was coded and reoccurring themes and topics were being identified and analysed.

## 4 Results and Discussion

### 4.1 Results of the benchmark analysis

**Before Holiday -*Inspire***

Within the inspire phase, most international destinations scored above average. Within the benchmark, a few observations can be easily made when looking at the overall level of implementation of technologies and applications for the purpose of inspiring consumers. There is a general gap considering the implementation of interactive technologies within the destinations´ web presence. Only Montreal has integrated a virtual tour around the city in a highly creative way. Webcams can be a

good way for travellers to have a look at different places or attractions within a destination in real time.

| Key evaluation factors | Average scores | AU | ME | SY | PE | BR | AD | NYC | PR | CF | LV |
|---|---|---|---|---|---|---|---|---|---|---|---|
| ***Web 1.0 / Destination website*** | | | | | | | | | | | |
| Visability of website on search engines | 4,33 | 0,67 | -0,33 | -0,33 | -2,33 | 0,67 | -1,33 | -0,33 | 0,67 | 0,67 | 0,67 |
| Findability of website | 4,57 | 0,43 | 0,43 | 0,43 | -2,57 | 0,43 | -2,57 | 0,43 | 0,43 | 0,43 | 0,43 |
| SEO effective | 4,07 | -0,07 | -0,07 | -0,07 | -3,07 | -0,07 | -2,07 | -0,07 | 0,93 | -0,07 | -0,07 |
| organic or sponsored links | 3,87 | 0,13 | -0,87 | 0,13 | -1,87 | -0,87 | -0,87 | 0,13 | 0,13 | 0,13 | -0,87 |
| language switch | 3,10 | 1,90 | 1,90 | 0,90 | -2,10 | -2,10 | -2,10 | -2,10 | 0,90 | 0,90 | 0,90 |
| how many languages? | 3,10 | 1,90 | 0,90 | -0,10 | -2,10 | -2,10 | -2,10 | -2,10 | -0,10 | -0,10 | 1,90 |
| eye catchers on website | 3,90 | 1,10 | -0,90 | -0,90 | 0,10 | 0,10 | -0,90 | 1,10 | 1,10 | 0,10 | 0,10 |
| videos | 3,30 | 0,70 | 1,70 | -2,30 | -2,30 | -0,30 | -2,30 | -2,30 | -0,30 | -0,30 | 0,70 |
| interactive videos | 1,13 | -0,13 | -0,13 | -0,13 | -0,13 | -0,13 | -0,13 | -0,13 | -0,13 | -0,13 | -0,13 |
| images | 3,77 | 0,23 | -0,77 | -0,77 | 0,23 | 0,23 | -0,77 | 1,23 | 0,23 | 0,23 | 1,23 |
| diversity of images | 3,73 | 0,27 | 0,27 | -0,73 | -0,73 | 1,27 | -1,73 | 0,27 | 1,27 | -0,73 | 1,27 |
| interactivity on website | 2,13 | 0,87 | -1,13 | -1,13 | -1,13 | -1,13 | -0,13 | -1,13 | 0,87 | 0,87 | 0,87 |
| links to social media? | 3,47 | 0,53 | -0,47 | 0,53 | 0,53 | 1,53 | 0,53 | 1,53 | -0,47 | -1,47 | -0,47 |
| which social media applications? | 3,83 | -0,83 | 0,17 | 0,17 | 0,17 | 0,17 | 0,17 | 0,17 | 1,17 | 0,17 | 0,17 |
| destination blog linked to website | 2,00 | -1,00 | -1,00 | -1,00 | -1,00 | -1,00 | -1,00 | -1,00 | 3,00 | -1,00 | 3,00 |
| live webcam | 1,13 | -0,13 | -0,13 | -0,13 | -0,13 | -0,13 | 3,87 | -0,13 | -0,13 | -0,13 | -0,13 |
| strong first impression | 3,53 | 1,47 | -0,53 | -0,53 | -0,53 | -0,53 | -1,53 | 0,47 | 1,47 | -0,53 | 0,47 |
| audio sounds | 1,00 | 0,00 | 0,00 | 0,00 | 0,00 | 0,00 | 0,00 | 0,00 | 0,00 | 0,00 | 0,00 |
| general impression of visual appearance | 3,53 | 1,47 | -0,53 | -0,53 | 0,47 | -0,53 | -1,53 | 0,47 | 1,47 | -0,53 | 0,47 |
| information available for different themes (activities, geography, interests…) | 3,37 | 0,63 | -0,37 | -0,37 | -0,37 | -0,37 | -0,37 | 0,63 | 1,63 | -0,37 | 0,63 |
| Can consumers get an understanding of the types of holidays that are possible in the destination? | 3,23 | 0,77 | -0,23 | -0,23 | -0,23 | -0,23 | -1,23 | -0,23 | 1,77 | -0,23 | 0,77 |
| virtual reality application | 1,10 | -0,10 | -0,10 | -0,10 | -0,10 | -0,10 | -0,10 | -0,10 | -0,10 | -0,10 | -0,10 |
| accessibility of website by using smartphones | 3,73 | 0,27 | 0,27 | 0,27 | 0,27 | 0,27 | 0,27 | 0,27 | 0,27 | 0,27 | 1,27 |
| features for people with audio impairment | 1,00 | 0,00 | 0,00 | 0,00 | 0,00 | 0,00 | 0,00 | 0,00 | 0,00 | 0,00 | 0,00 |
| features for people with visual impairment | 1,43 | -0,43 | -0,43 | -0,43 | -0,43 | -0,43 | -0,43 | -0,43 | -0,43 | 1,57 | -0,43 |
| ***Web 2.0*** | | | | | | | | | | | |
| real time social network feed from Facebook | 2,00 | -1,00 | 2,00 | -1,00 | -1,00 | 2,00 | -1,00 | -1,00 | 2,00 | -1,00 | -1,00 |
| real time social network feed from Twitter | 2,03 | -1,03 | -1,03 | 0,97 | -1,03 | 1,97 | 1,97 | -1,03 | 1,97 | -1,03 | -1,03 |
| are consumers sharing their vidoes to inspire other travellers? | 2,43 | 0,57 | 1,57 | -1,43 | -1,43 | 1,57 | -1,43 | -1,43 | 0,57 | -1,43 | 1,57 |
| regular C2C input | 2,90 | 0,10 | 0,10 | 0,10 | -1,90 | -1,90 | -1,90 | 1,10 | 0,10 | 0,10 | 1,10 |
| are other travellers recommending the destination | 3,03 | -0,03 | -2,03 | -0,03 | -2,03 | 0,97 | -0,03 | 0,97 | -0,03 | -0,03 | 0,97 |

Only one destination out of 30 is currently making use of that. Interactivity is another factor in the benchmark that the majority of destinations have neglected. New Zealand is an excellent example for that as users can scroll down and interactively move through different landscapes and situations. Travellers can click and read additional information and experience what kind of holidays they could have in the destination. All destinations should also reassess their current use of social media channels and might want to consider new and upcoming channels such as Pinterest that experience enormous growth and might be of growing importance. In general, destinations´ social media sites need to be integrated into the web presence in order to improve the level of interactivity and connectivity. Virtual reality applications are another inspirational tool that should be considered by successful destinations of the future. So far, most destinations in the benchmark are underutilising the emerging technologies.

### *-Inform*

| Key evaluation factors | Average scores | AU | ME | SY | PE | BR | AD | NYC | PR | CF | LV |
|---|---|---|---|---|---|---|---|---|---|---|---|
| ***Web 1.0 / Destination website*** | | | | | | | | | | | |
| Range of information services | 3,50 | 1,50 | -0,50 | -0,50 | -0,50 | -0,50 | -0,50 | 0,50 | 0,50 | 0,50 | -0,50 |
| descriptive information | 3,47 | 1,53 | -0,47 | -0,47 | -0,47 | -0,47 | -0,47 | 0,53 | 0,53 | 0,53 | -0,47 |
| interactive information | 1,40 | 1,60 | -0,40 | -0,40 | -0,40 | -0,40 | -0,40 | -0,40 | -0,40 | 1,60 | -0,40 |
| news feed about destination | 1,77 | -0,77 | -0,77 | -0,77 | -0,77 | 1,23 | -0,77 | 2,23 | 1,23 | -0,77 | -0,77 |
| are special events pointed out to travellers | 3,23 | 0,77 | 0,77 | 0,77 | 0,77 | 0,77 | -0,23 | -0,23 | -0,23 | -0,23 | 0,77 |
| events calendar | 3,20 | 1,80 | -0,20 | 0,80 | -0,20 | 0,80 | -0,20 | 0,80 | -0,20 | 0,80 | 0,80 |
| Maps about destination | 3,23 | -0,23 | -0,23 | -1,23 | -0,23 | -0,23 | -0,23 | -0,23 | -2,23 | -0,23 | -0,23 |
| level of interactivity of maps | 2,57 | 0,43 | -1,57 | -1,57 | -1,57 | 0,43 | 0,43 | -1,57 | -1,57 | 0,43 | 1,43 |
| topic related images | 3,57 | 0,43 | -0,57 | -0,57 | -0,57 | 0,43 | -0,57 | 0,43 | 0,43 | -0,57 | 0,43 |
| photo gallery | 2,90 | 2,10 | -1,90 | 1,10 | -1,90 | 2,10 | -1,90 | -1,90 | 1,10 | 0,10 | 2,10 |
| videos about specific information | 3,30 | 0,70 | -0,30 | -2,30 | -2,30 | 1,70 | -2,30 | -2,30 | 0,70 | -2,30 | 0,70 |
| different topics | 3,30 | 0,70 | -0,30 | -0,30 | -0,30 | -0,30 | -0,30 | -0,30 | 0,70 | -0,30 | 0,70 |
| online guide about destination | 1,97 | -0,97 | -0,97 | 2,03 | -0,97 | 2,03 | -0,97 | -0,97 | -0,97 | 2,03 | 2,03 |
| accessibility information | 2,30 | -1,30 | 1,70 | 1,70 | -1,30 | -1,30 | 1,70 | 1,70 | 0,70 | 0,70 | -1,30 |
| accessibility guides | 2,17 | -1,17 | 1,83 | 0,83 | -1,17 | -1,17 | 1,83 | 1,83 | -0,17 | -0,17 | -1,17 |
| usability of website | 3,93 | 1,07 | 1,07 | 0,07 | -0,93 | 1,07 | 0,07 | 1,07 | 0,07 | 0,07 | 1,07 |
| are all links working | 3,87 | 1,13 | 1,13 | 1,13 | -2,87 | 1,13 | 1,13 | 1,13 | -2,87 | -1,87 | 1,13 |
| easy navigation within the website | 3,97 | 0,03 | 1,03 | 1,03 | -0,97 | 0,03 | 0,03 | 0,03 | 0,03 | 0,03 | 1,03 |
| clear structure | 3,97 | 0,03 | 0,03 | 1,03 | -0,97 | 0,03 | 0,03 | 1,03 | 1,03 | 0,03 | 1,03 |
| personalisation of website possible | 1,13 | -0,13 | -0,13 | -0,13 | -0,13 | -0,13 | -0,13 | -0,13 | -0,13 | -0,13 | -0,13 |
| interaction with destination possible | 3,17 | -0,17 | 0,83 | -0,17 | -0,17 | 0,83 | -0,17 | -0,17 | -0,17 | -0,17 | 0,83 |
| virtual tours | 1,80 | -0,80 | -0,80 | -0,80 | -0,80 | -0,80 | -0,80 | -0,80 | -0,80 | -0,80 | -0,80 |
| customisation possible | 1,17 | -0,17 | -0,17 | -0,17 | -0,17 | -0,17 | -0,17 | -0,17 | -0,17 | -0,17 | -0,17 |
| such as families, couples, groups… | 2,13 | 0,87 | 0,87 | 0,87 | 0,87 | -1,13 | -1,13 | 0,87 | 0,87 | -1,13 | -1,13 |
| does the destination have a blog | 2,4 | -1,40 | 1,60 | 0,60 | -1,40 | -1,40 | -1,40 | -1,40 | 2,60 | -1,40 | 1,60 |
| route planner | 1,80 | 2,20 | 1,20 | 0,20 | -0,80 | -0,80 | -0,80 | -0,80 | -0,80 | -0,80 | -0,80 |
| public transport tool | 1,17 | -0,17 | 1,83 | -0,17 | -0,17 | -0,17 | -0,17 | -0,17 | -0,17 | -0,17 | -0,17 |
| itinerary planning tool | 2,03 | 1,97 | -1,03 | -1,03 | 0,97 | -1,03 | -1,03 | 0,97 | -1,03 | -1,03 | 2,97 |
| interactive idea generator | 1,40 | 2,60 | -0,40 | -0,40 | -0,40 | -0,40 | -0,40 | -0,40 | -0,40 | -0,40 | 3,60 |
| recommendations by other travellers | 1,27 | 2,73 | -0,27 | -0,27 | -0,27 | -0,27 | -0,27 | -0,27 | -0,27 | -0,27 | -0,27 |
| online audio guide about attractions | 1,20 | -0,20 | -0,20 | -0,20 | -0,20 | -0,20 | -0,20 | -0,20 | -0,20 | -0,20 | -0,20 |
| links to industry | 1,97 | 1,03 | 1,03 | 1,03 | 1,03 | -0,97 | -0,97 | 1,03 | -0,97 | -0,97 | -0,97 |
| links to hotels | 3,27 | 0,73 | -0,27 | 0,73 | 0,73 | -0,27 | -1,27 | -0,27 | -2,27 | -1,27 | 0,73 |
| links to airlines | 2,77 | 0,23 | 0,23 | 0,23 | -1,77 | 0,23 | -1,77 | -1,77 | 1,23 | -0,77 | 0,23 |
| links to transport providers | 2,97 | 1,03 | 1,03 | 0,03 | -1,97 | 0,03 | -0,97 | 0,03 | 0,03 | 0,03 | -0,97 |
| plug in of other applications on website | 1,47 | -0,47 | -0,47 | -0,47 | -0,47 | -0,47 | -0,47 | 2,53 | -0,47 | -0,47 | -0,47 |
| plug in weather application | 2,67 | -1,67 | 1,33 | -1,67 | 1,33 | -1,67 | 1,33 | 0,33 | 1,33 | 1,33 | 1,33 |
| plug in transport application | 1,17 | 1,83 | -0,17 | -0,17 | -0,17 | -0,17 | -0,17 | -0,17 | -0,17 | -0,17 | -0,17 |
| ***Web 2.0*** | | | | | | | | | | | |
| do travellers share information on social media sites? | 2,83 | 0,17 | 0,17 | 0,17 | -1,83 | 0,17 | -1,83 | 0,17 | 0,17 | 0,17 | 0,17 |
| photo gallery on social networking sites | 3,33 | -0,33 | 0,67 | -0,33 | -0,33 | -0,33 | -0,33 | -0,33 | 1,67 | -0,33 | 0,67 |
| approachability of destination in social media | 3,23 | -0,23 | -0,23 | 0,77 | -0,23 | -0,23 | -0,23 | -0,23 | -0,23 | -0,23 | 0,77 |
| problem solving | 1,00 | 0,00 | 0,00 | 0,00 | 0,00 | 0,00 | 0,00 | 0,00 | 0,00 | 0,00 | 0,00 |
| do travellers share experiences with other users? | 2,63 | 1,37 | -1,63 | 0,37 | -1,63 | -0,63 | -1,63 | 0,37 | 0,37 | 0,37 | 1,37 |

Within the inform-phase, most international destinations are not using the technologies and applications available to their full potential. This entails that most global destinations are still behind what would be possible for them to achieve. It is crucial for these destinations to improve their general level of interactivity. Creative and new ways need to be found in which virtual tours, recommendations and planning tools such as route planners can be implemented in order to deliver adequate help in the planning stage of potential travellers. With the help of new technologies, the more advanced online destinations within the benchmark can become efficient one-stop shops whereas all other destinations can catch up on technologies in order to stay competitive.

### *-Engage*

| Key evaluation factors | Average scores | AU | ME | SY | PE | BR | AD | NYC | PR | CF | LV |
|---|---|---|---|---|---|---|---|---|---|---|---|
| ***Web 1.0 / Destination website*** | | | | | | | | | | | |
| communities for potential travellers on website? | 1,30 | -0,30 | -0,30 | -0,30 | -0,30 | -0,30 | -0,30 | -0,30 | 1,70 | -0,30 | -0,30 |
| live chat for questions | 1,10 | -0,10 | -0,10 | -0,10 | -0,10 | -0,10 | -0,10 | -0,10 | 2,90 | -0,10 | 1 |
| Can travellers read and write reviews on website | 1,53 | 2,47 | -0,53 | -0,53 | -0,53 | -0,53 | -0,53 | -0,53 | 1,47 | -0,53 | 1 |
| Accessibility of destination representatives | 2,93 | 0,07 | -0,93 | 0,07 | 0,07 | 0,07 | 0,07 | 0,07 | 0,07 | 0,07 | 0,07 |
| Are there security and privacy policies | 4,57 | 0,43 | -1,57 | 0,43 | 0,43 | 0,43 | 0,43 | 0,43 | 0,43 | 0,43 | 0,43 |

All destinations within the benchmark should improve their implementation of technologies and applications in order to engage consumers prior to their visit. Destinations could improve their efforts by implementing communities for their users and provide them with virtual spaces in which they can discuss, engage and share. Sweden is an excellent example for a destination that has created a community website for travellers and fans of the destination. Community members can upload videos, images and stories and share them with other travellers who "love" Sweden or discuss different topics in a variety of forums and groups. This is an excellent opportunity for destinations to encourage travellers to become ambassadors for the destination. Another example for consumer engagement is the provision of spaces where users can read and write reviews within the destination web presence. Thailand has the section "Real Experiences" within their website dedicated to travellers where videos, images, travel stories and insider tips can be uploaded for other travellers to read and be inspired.

### During Holiday -*Facilitate at destination*

| Key evaluation factors | Average scores | AU | ME | SY | PE | BR | AD | NYC | PR | CF | LV |
|---|---|---|---|---|---|---|---|---|---|---|---|
| ***Web 1.0 / Destination website*** | | | | | | | | | | | |
| Downloadable information | 2,07 | 0,93 | -1,07 | -1,07 | -1,07 | 1,93 | -1,07 | -1,07 | -1,07 | 0,93 | -1,07 |
| Brochures | 2,63 | 0,37 | -1,63 | -1,63 | 1,37 | 1,37 | -1,63 | -1,63 | 0,37 | 0,37 | 1,37 |
| Printable version of websites | 2,50 | 1,50 | 0,50 | 0,50 | 0,50 | -1,50 | -1,50 | 1,50 | -1,50 | -1,50 | -1,50 |
| Guides for smartphones | 1,87 | -0,87 | 3,13 | -0,87 | -0,87 | -0,87 | -0,87 | 2,13 | 2,13 | -0,87 | -0,87 |
| Downloadable apps for iPad, iPhone, Blackberry, Android | 2,97 | 1,03 | 2,03 | 0,03 | -1,97 | 0,03 | -1,97 | 0,03 | 1,03 | 0,03 | -1,97 |
| events calendar | 3,37 | 0,63 | 1,63 | 0,63 | 0,63 | 0,63 | -0,37 | 0,63 | -0,37 | 0,63 | 0,63 |
| Booking/ reservation tools available for accommodation | 2,43 | -1,43 | 1,57 | 1,57 | 1,57 | -1,43 | -1,43 | -1,43 | -0,43 | -1,43 | 1,57 |
| Reservation tools for attraction tickets | 1,27 | -0,27 | -0,27 | -0,27 | -0,27 | -0,27 | -0,27 | -0,27 | -0,27 | -0,27 | 2,73 |
| Reservation tools for events tickets | 1,17 | -0,17 | -0,17 | -0,17 | -0,17 | -0,17 | -0,17 | -0,17 | -0,17 | -0,17 | -0,17 |
| personalisation of website possible | 1,00 | 0,00 | 0,00 | 0,00 | 0,00 | 0,00 | 0,00 | 0,00 | 0,00 | 0,00 | 0,00 |
| help line in destination (phone or Skype) | 1,00 | 0,00 | 0,00 | 0,00 | 0,00 | 0,00 | 0,00 | 0,00 | 0,00 | 0,00 | 0,00 |
| last minute or special offers | 2,87 | 0,13 | 1,13 | 0,13 | 1,13 | -1,87 | -1,87 | 0,13 | 0,13 | 1,13 | 1,13 |
| RSS feed | 1,67 | -0,67 | -0,67 | 1,33 | 1,33 | -0,67 | -0,67 | -0,67 | -0,67 | -0,67 | -0,67 |
| context based services | 1,00 | 0,00 | 0,00 | 0,00 | 0,00 | 0,00 | 0,00 | 0,00 | 0,00 | 0,00 | 0,00 |
| location based services | 1,33 | -0,33 | -0,33 | -0,33 | -0,33 | -0,33 | -0,33 | -0,33 | -0,33 | -0,33 | 2,67 |
| gamification | 1,13 | -0,13 | -0,13 | -0,13 | -0,13 | -0,13 | -0,13 | -0,13 | -0,13 | -0,13 | -0,13 |
| treasure hunt | 1,00 | 0,00 | 0,00 | 0,00 | 0,00 | 0,00 | 0,00 | 0,00 | 0,00 | 0,00 | 0,00 |
| augmented reality app | 1,13 | -0,13 | 3,87 | -0,13 | -0,13 | -0,13 | -0,13 | -0,13 | -0,13 | -0,13 | -0,13 |
| map app | 1,37 | 1,63 | 1,63 | -0,37 | -0,37 | -0,37 | -0,37 | 1,63 | -0,37 | -0,37 | -0,37 |
| transportation finder | 1,40 | 1,60 | 1,60 | 1,60 | -0,40 | -0,40 | 1,60 | -0,40 | -0,40 | -0,40 | -0,40 |
| downloadable mp3 audio guide | 1,10 | -0,10 | -0,10 | -0,10 | -0,10 | -0,10 | -0,10 | -0,10 | -0,10 | -0,10 | -0,10 |
| personalised itinerary planner | 1,83 | 1,17 | -0,83 | -0,83 | -0,83 | -0,83 | -0,83 | 1,17 | -0,83 | 1,17 | 3,17 |
| Are personalised itineraries downloadable? | 1,30 | -0,30 | -0,30 | -0,30 | -0,30 | -0,30 | -0,30 | -0,30 | -0,30 | 1,70 | 3,70 |
| Weather forecast on website | 2,60 | -1,60 | 0,40 | -1,60 | 1,40 | -1,60 | 2,40 | 1,40 | 0,40 | 0,40 | 1,40 |
| Experience finder by traveller types? | 1,30 | -0,30 | -0,30 | -0,30 | -0,30 | -0,30 | -0,30 | -0,30 | -0,30 | -0,30 | -0,30 |
| Search by type of experiences possible? | 1,97 | -0,97 | -0,97 | -0,97 | -0,97 | -0,97 | -0,97 | -0,97 | 2,03 | 3,03 | -0,97 |
| Search for keywords on website | 4,13 | -0,13 | -0,13 | 0,87 | 0,87 | 0,87 | -3,13 | -0,13 | 0,87 | 0,87 | 0,87 |

This is an important stage in which destinations can implement tools and technologies in order to facilitate the travellers´ stay in the destination. These tools can be in the form of online maps, downloadable information or applications for travellers to download during or prior to their visit. Some destinations have maps and tools already implemented into their website; however the majority of destinations are still in an early phase. Most benchmark scores within the "facilitate at destination"-phase were fairly low, indicating the fact that destinations fail to take advantage of the emerging technologies. This is therefore an area of interest for destinations aiming to become more competitive by implementing booking tools for accommodation. Most destinations have not integrated booking and reservation tools for events and restaurants yet. Best practice examples for that are Las Vegas, Sweden and Vancouver. Mobile technologies in the form of destination applications and location based services are another area destinations should look into. All destinations worldwide should invest in and improve the personalisation of the content of the website as well as the integration of personalised itinerary planners. The tourism industry experiences a trend towards the search for more unique and personalised experiences within a destination. Thailand is an excellent example for that as the web presence contains a number of user generated videos, images and stories regarding unique experiences that travellers can experience in the destination. Offering separate sections within the website for different special interest groups such as families and business travellers or different experiences depending on the traveller types are two other opportunities already executed by Germany and Canada. There is a need for new and creative ways in which destinations make use of the existent technologies.

**After Holiday -*Remember***

| ***Web 1.0 / Destination website*** | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Loyalty programme | 1,00 | 0,00 | 0,00 | 0,00 | 0,00 | 0,00 | 0,00 | 0,00 | 0,00 | 0,00 | 0,00 |
| Sign-up for a destination newsletter | 3,00 | -2,00 | 0,00 | 0,00 | 0,00 | 0,00 | -2,00 | 1,00 | -2,00 | 0,00 | 1,00 |
| Podcasts | 1,23 | -0,23 | -0,23 | -0,23 | -0,23 | -0,23 | -0,23 | -0,23 | -0,23 | -0,23 | -0,23 |
| Personal trip basket for information | 1,70 | -0,70 | -0,70 | -0,70 | -0,70 | -0,70 | -0,70 | 2,30 | -0,70 | 2,30 | 2,30 |
| Storage of personal itineraries | 1,57 | -0,57 | -0,57 | -0,57 | -0,57 | -0,57 | -0,57 | 2,43 | -0,57 | 2,43 | 3,43 |
| Online shop available | 1,30 | -0,30 | -0,30 | -0,30 | -0,30 | -0,30 | -0,30 | 3,70 | -0,30 | -0,30 | -0,30 |
| Online competitions on website | 1,27 | -0,27 | -0,27 | -0,27 | 1,73 | -0,27 | -0,27 | -0,27 | -0,27 | -0,27 | -0,27 |
| Sign-up for personal account on website | 1,90 | -0,90 | -0,90 | -0,90 | 1,10 | -0,90 | -0,90 | 1,10 | 2,10 | 3,10 | -0,90 |
| Storage of itineraries and information possible on account? | 1,30 | -0,30 | -0,30 | -0,30 | -0,30 | -0,30 | -0,30 | -0,30 | -1,30 | 3,70 | -0,30 |
| Online campaigns | 1,23 | 2,77 | -0,23 | -0,23 | -0,23 | -0,23 | -0,23 | -0,23 | 1,77 | -0,23 | 1,77 |

The benchmark demonstrates that all destinations fail to take full advantage of the technologies and applications available in tourism. For travellers to remember their stay in the destinations and encourage repeat visits, a newsletter with the latest information, events and offers is necessary to further build on the destination-traveller relationship. Personal accounts available for travellers within the website are another crucial tool for destinations. Users of these accounts can store information and personal itineraries which can serve as triggers for repeat visitation of the destinations´ web presence by users and their friends and ultimately of the destination itself. Thailand is an excellent example as the destination has implemented a variety of podcasts for users to download with a wide range of information. New York City has integrated an online shop selling clothes and other merchandise for travellers to remember the destination.

### *-Share and engage*

Most destinations are underperforming in the share and engage phase. All destinations within the benchmark need to be made aware of the importance of constantly sharing and engaging with users worldwide in order to build up and retain relationships and engagement. Destinations of the future that aim at staying competitive on the market need to constantly encourage consumers to upload videos, images or stories that can then be read by other travellers. Trust between consumer and destination can be built through the integration of special social media platforms, user generated content or communities for travellers within the web presence. For destinations it is crucial to understand the importance of trustworthiness and the opportunities provided by reviewing websites such as Tripadvisor in terms of implementing user reviews and suggestions of the destination into the website. By this means, destinations can increase their transparency and sustain their future success. Most destinations within the benchmark are missing out on such major opportunities although user generated content is an excellent free way of marketing a destination.

| Key evaluation factors | Average scores | AU | ME | SY | PE | BR | AD | NYC | PR | CF | LV |
|---|---|---|---|---|---|---|---|---|---|---|---|
| ***Web 1.0 / Destination website*** | | | | | | | | | | | |
| Can pictures be uploaded on website by travellers | 1,30 | -0,30 | -0,30 | -0,30 | -0,30 | -0,30 | -0,30 | -0,30 | -0,30 | -0,30 | -0,30 |
| Can videos be uploaded on website by travellers | 1,30 | -0,30 | -0,30 | -0,30 | -0,30 | -0,30 | -0,30 | -0,30 | -0,30 | -0,30 | -0,30 |
| Can travellers upload personal reviews of experiences | 1,47 | -0,47 | -0,47 | -0,47 | -0,47 | 2,53 | -0,47 | -0,47 | -0,47 | -0,47 | -0,47 |
| Is the destination integrating Tripadvisor in the website | 1,60 | -0,60 | -0,60 | -0,60 | -0,60 | -0,60 | -0,60 | -0,60 | -0,60 | -0,60 | -0,60 |
| Can travellers write personal recommendations for accommodation? | 1,30 | -0,30 | -0,30 | -0,30 | -0,30 | -0,30 | -0,30 | -0,30 | -0,30 | -0,30 | -0,30 |
| Can travellers write personal recommendations for attractions? | 1,50 | -0,50 | -0,50 | -0,50 | -0,50 | 2,50 | -0,50 | -0,50 | 2,50 | -0,50 | -0,50 |
| Are there communities on website where users can join and discuss with other users? | 1,10 | -0,10 | -0,10 | -0,10 | -0,10 | -0,10 | -0,10 | -0,10 | -0,10 | -0,10 | -0,10 |
| Competitions on website? | 1,17 | -0,17 | -0,17 | -0,17 | 1,83 | -0,17 | -0,17 | -0,17 | -0,17 | -0,17 | -0,17 |
| ***Web 2.0*** | | | | | | | | | | | |
| ***Facebook*** | | | | | | | | | | | |
| number of followers | 3,40 | 0,60 | 0,60 | 0,60 | -0,40 | -0,40 | -0,40 | 0,60 | 0,60 | -0,40 | 0,60 |
| number of pages and groups | 3,10 | -0,10 | -0,10 | -0,10 | -0,10 | -0,10 | -0,10 | 0,90 | 0,90 | -0,10 | -0,10 |
| types of comments | 3,33 | -0,33 | 0,67 | -0,33 | -0,33 | -0,33 | -0,33 | 0,67 | 0,67 | -0,33 | -0,33 |
| level of interactivity | 2,73 | 0,27 | 0,27 | 0,27 | -0,73 | -1,73 | 0,27 | 0,27 | -1,73 | 0,27 | 0,27 |
| implementation of user generated content | 1,63 | 1,37 | 2,37 | -0,63 | -0,63 | -0,63 | -0,63 | 2,37 | -0,63 | -0,63 | -0,63 |
| ***Twitter*** | | | | | | | | | | | |
| number of followers | 3,37 | -1,37 | 0,63 | 0,63 | -0,37 | 0,63 | -0,37 | 0,63 | 0,63 | -0,37 | 0,63 |
| number of pages and groups | 3,00 | 0,00 | 1,00 | 2,00 | 0,00 | 0,00 | 0,00 | 1,00 | 0,00 | 0,00 | 0,00 |
| types of comments | 3,13 | -0,13 | 0,87 | 0,87 | -0,13 | -0,13 | -0,13 | 1,87 | -0,13 | -0,13 | 0,87 |
| level of interactivity | 2,03 | -0,03 | 1,97 | 2,97 | 0,97 | 0,97 | -1,03 | 1,97 | -1,03 | -1,03 | -1,03 |
| implementation of user generated content | 1,10 | -0,10 | -0,10 | -0,10 | -0,10 | -0,10 | -0,10 | 2,90 | -0,10 | -0,10 | -0,10 |
| ***Pinterest*** | | | | | | | | | | | |
| number of followers | 1,20 | -0,20 | -0,20 | -0,20 | -0,20 | -0,20 | -0,20 | -0,20 | 2,80 | -0,20 | -0,20 |
| number of pages and groups | 1,27 | -0,27 | -0,27 | -0,27 | -0,27 | -0,27 | -0,27 | -0,27 | 1,73 | -0,27 | -0,27 |
| types of comments | 1,07 | -0,07 | -0,07 | -0,07 | -0,07 | -0,07 | -0,07 | -0,07 | 1,93 | -0,07 | -0,07 |
| level of interactivity | 1,00 | 0,00 | 0,00 | 0,00 | 0,00 | 0,00 | 0,00 | 0,00 | 0,00 | 0,00 | 0,00 |
| implementation of user generated content | 1,00 | 0,00 | 0,00 | 0,00 | 0,00 | 0,00 | 0,00 | 0,00 | 0,00 | 0,00 | 0,00 |
| ***YouTube*** | | | | | | | | | | | |
| number of followers | 3,03 | 0,97 | -0,03 | -0,03 | -0,03 | -0,03 | -2,03 | -2,03 | -0,03 | -0,03 | -0,03 |
| number of pages and groups | 2,90 | 1,10 | 0,10 | 0,10 | 0,10 | 0,10 | -1,90 | -1,90 | 0,10 | 0,10 | 0,10 |
| types of comments | 3,13 | 0,87 | -0,13 | -0,13 | -0,13 | -0,13 | -2,13 | -2,13 | -0,13 | -0,13 | -0,13 |
| level of interactivity | 1,07 | -0,07 | -0,07 | -0,07 | -0,07 | -0,07 | -0,07 | -0,07 | -0,07 | -0,07 | -0,07 |
| implementation of user generated content | 1,00 | 0,00 | 0,00 | 0,00 | 0,00 | 0,00 | 0,00 | 0,00 | 0,00 | 0,00 | 0,00 |
| ***Flickr*** | | | | | | | | | | | |
| number of followers | 1,47 | -0,47 | -0,47 | -0,47 | -0,47 | -0,47 | -0,47 | -0,47 | -0,47 | -0,47 | -0,47 |
| number of pages and groups | 1,63 | -0,63 | -0,63 | -0,63 | -0,63 | 1,37 | 1,37 | -0,63 | 1,37 | -0,63 | -0,63 |
| types of comments | 1,77 | -0,77 | -0,77 | -0,77 | -0,77 | 1,23 | 1,23 | -0,77 | 1,23 | -0,77 | -0,77 |
| level of interactivity | 1,10 | -0,10 | -0,10 | -0,10 | -0,10 | -0,10 | -0,10 | -0,10 | -0,10 | -0,10 | -0,10 |
| implementation of user generated content | 1,20 | -0,20 | -0,20 | -0,20 | -0,20 | -0,20 | -0,20 | -0,20 | -0,20 | -0,20 | -0,20 |

| ***Blogs*** | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| number of followers | 1,23 | -0,23 | 2,77 | 1,77 | -0,23 | -0,23 | -0,23 | -0,23 | -0,23 | -0,23 | -0,23 |
| number of blogs | 2,20 | -1,20 | 1,80 | 1,80 | -1,20 | -1,20 | -1,20 | -1,20 | 1,80 | -1,20 | 1,80 |
| types of comments | 1,17 | -0,17 | 2,83 | -0,17 | -0,17 | -0,17 | -0,17 | -0,17 | -0,17 | -0,17 | -0,17 |
| level of interactivity | 1,00 | 0,00 | 0,00 | 0,00 | 0,00 | 0,00 | 0,00 | 0,00 | 0,00 | 0,00 | 0,00 |
| implementation of user generated content | 1,00 | 0,00 | 0,00 | 0,00 | 0,00 | 0,00 | 0,00 | 0,00 | 0,00 | 0,00 | 0,00 |

### 4.2 Results of the online exploratory survey

The survey was answered by 50 international respondents consisting of academics, students as well as tourism professionals. When asked about the future of online destinations, several categories could be identified: technology, mobile applications, reviewing websites, one stop shops, social media and knowledge. Although the growing importance of online destinations is recognised by the tourism industry, there are still differing opinions regarding what will be key technologies of the future. It is evident that social media, location based and mobile empowered (SoLoMo) marketing will be a critical success factor. Interactivity and implementation of mobile technologies in the form of mobile apps and sites as well as the integration of reviews, social media and booking opportunities become crucial for destinations´ web presence. Another area of interest was to find out about future developments that might impact on online destinations. Two different views on developments were distinguished; some respondents feel that there is an information overload on websites, creating the need for destinations to prioritise. Other respondents feel the need for more advanced technologies altogether by implementing augmented realities, GPS and language services. Social media, mobile and interactivity are key developments that will impact on online destinations in the future. The exploratory questionnaire also aimed to establish the industry point of view towards destination management systems (DMS) of the future and potential system features. The main findings emphasise the need for authenticity and getting a full understanding of the customers. Consequently, the DMS should integrate features that enable destinations to integrate different information, booking tools and eCRM (customer relationship management). DMS should aim to get conversions rather than click through rates and integrate new technologies in order to constantly monitor the system´s success. The best destination system of the future should support all functions from the inspiration to the after sales phase. However, the survey also identified a number of challenges that DMS need to overcome. These are trust between the system and the tourism stakeholders as destinations should monitor the impact of the online presence in order to justify the implementation of a DMS system. Although the costs of implementation of a system can be quite high and very often there is a lack of know-how within the destination, the benefits need to be demonstrated in order to justify the necessity of implementing a DMS system and emerging technologies. Some respondents however propose that many destinations are still in an early stage of adoption and basically need to "catch up" with the more technological advanced destinations. Different stages of e-destination and their development also correspondent to different approaches towards stakeholder engagement. Offline tools such as face-to-face meetings and workshops are still considered to be useful and effective but the future engagement of stakeholders will move more and more online. Social media is seen as the biggest engagement tool for destinations, especially Facbeook, Twitter and Linkedin; however it becomes evident that strategies should be in place regarding targeting different groups and the channels used to reach them. Providing dedicated

areas within the web presence for different stakeholder groups is also seen as a necessity of the future. When asked specifically about destinations use of social media in terms of engaging consumers, a three stage approach was considered best practice by the majority of respondents. These are "listen, interact and share" as destinations need to get to know the consumers they are dealing with rather than broadcast. Then destinations can interact with consumer to create a buzz and provide them with targeted information, keeping in mind that different social media channels should be used to interact for different purposes. Ultimately destinations can then share images, videos and information in social media channels but avoiding information overload.

### 4.3 Global best practice destinations

The top 10 destinations within the benchmark study were identified based on the average scores achieved. As all of these scored high average scores, the destinations´ web presence can be considered best practice in the use of technologies and applications.

**Table II.** Top 10 Global e-Destinations

| Ranking | Benchmark study | Individual destination scores (out of 5) | Variation to average destination score (2.21) |
|---|---|---|---|
| **1** | Thailand | 2.61 | +0.4 |
| **2** | Montreal | 2.52 | +0.31 |
| **3** | Las Vegas | 2.51 | +0.3 |
| **4** | Vancouver | 2.48 | +0.27 |
| **5** | Hong Kong | 2.46 | +0.25 |
| **6** | Puerto Rico | 2.42 | +0.21 |
| **7** | Australia | 2.39 | +0.18 |
| **8** | Norway | 2.38 | +0.17 |
| **9** | UK | 2.34 | +0.13 |
| **10** | Melbourne | 2.31 | +0.10 |

## 5 Conclusion

Developments of budget cuts for tourism destinations are common worldwide, making it crucial for DMOs to make well-considered investment decisions. The findings of this study demonstrate that all destinations within the benchmark still underutilize the wide range of technologies and applications available. Some destinations can be identified as best practice examples due to their use of certain technologies and applications. There are other areas in which these destinations can improve in order to sustain their future success of the web presence. No destination could be identified as fully utilising the ICT potential which implies a general need of DMOs to rethink their use of emerging technologies and set priorities in terms of which areas they can improve. This can then help destinations to become leading destinations in terms of different and interactive tools that are being implemented. In general, there is a need for additional research in this area as this study could only look at a limited amount of destinations. Additionally, there are constant changes in terms of destinations´ web presence and technologies that are implemented. Further research will be conducted and the benchmark will be updated constantly in order to

ensure its future credibility. In addition to the benchmark and exploratory survey, additional input from industry experts of different areas of the benchmark is crucial for future research. However, the technologies and applications of the future are already available. Destinations need to assess their usefulness and ultimately implement them into their web presence in order to enhance their competitiveness.

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# Integer Programming Formulation of Finding Cheapest Ticket Combination over Multiple Tourist Attractions

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## Abstract

Tourist attractions often provide multiple ticket options, such as student tickets, group tickets, inter-attraction combo tickets, free admission on a certain date, and etc. With these various ticket options, finding the cheapest but feasible ticket combination covering all tourist attractions a traveller plans to visit may not be trivial. This paper describes how we convert a cheapest ticket combination problem into a mathematically well-defined set cover problem and solves it through integer linear programming in practical amount of time. We tested our system with various admission tickets in New York City, one of the largest tourist destinations.

**Keywords:** ticket optimization; trip planner; trip optimization

## 1 Introduction

Imagine you are visiting New York City (NYC) and decided to visit six tourist attractions: Empire State Building Observatory, American Museum of Natural History, The Metropolitan Museum of Art, The Museum of Modern Art, Top of the Rock, and Circle Line Cruise. You buy admission tickets at the ticket office of each attraction, assuming this is the only possible way. However, after a little search, you will find that there are many better options.

For instance, New York City Pass (NYCP) offers a combo ticket that covers six attractions above at a discounted price by 46%. NYCP is a good option if you are visiting all six attractions, however, not if you are visiting only a few attractions among six, or if you are a student. NYCP is a fixed-price ticket regardless of how many attractions you visit, and you won't benefit much if you are not visiting all six listed attractions. Also, if you are a student, you might get more discounts by buying a student ticket at each attraction, because there is no student discount with NYCP.

Furthermore, other types of admission tickets might give you better bargain. New York Pass (NYP) provides a combo ticket to over 20 attractions at a discounted price as long as you visit these attractions within several consecutive days. Also, some tourist attractions provide 'free entry' on certain days, and some other tourist attractions offer discounted ticket for groups and families.

As you can see, finding the cheapest ticket combination covering multiple attractions, in other words, ticket optimization, is not a trivial task, especially in a city like New York with lots of tourist attractions and combo tickets. In this paper, we propose a feasible ticket optimization algorithm and show that the algorithm is not only better than a simple exhaustive search approach but also finishes in practical amount of time.

The rest of the paper is structured as follows. Section 2 describes previous works related to this paper. Section 3 describes ticket optimization model step-by-step from the most simple and general types of tickets to more complex and specific types of tickets. Section 4 describes how we convert the above abstract ticket optimization

L. Cantoni and Z. Xiang (eds.), *Information and Communication Technologies in Tourism 2013*, DOI: 10.1007/978-3-642-36309-2_12,

model into a computer-solvable equation. Section 5 describes experimental setup and results. Section 6 holds conclusion which is followed by References.

## 2 Previous Works

Upon our knowledge, there has been no previous work related to finding the cheapest ticket combination covering multiple tourist attractions. However, there are a few works on optimization problems in the information technology and tourism field including a flight ticket optimization problem (Yu [1999]).

The goal of the flight ticket optimization problem is to find the fastest and cheapest flight ticket combination from starting city to an end city. At first glance, a flight ticket optimization problem looks similar to a cheapest ticket combination problem, but they are fundamentally different. Mathematically, a flight ticket optimization problem is a shortest path finding problem from a start city to an end city where cost of the path between cities can be defined as weighted combination of price, number of transfer, and hours of flight. However, cheapest ticket combination problem is a set cover problem, which will be discussed more in Chapter 3, where the goal is to find the cheapest ticket combination covering all the attractions planning to visit. A set cover problem, a well-known non-deterministic polynomial-time (NP) problem, is a different problem from a shortest path finding problem, a polynomial-time (P) problem.

## 3 Converting ticket optimization problem into set cover problem

### 3.1 Single person optimization

**Table 1.** Single person ticket optimization example

| | Price | Attraction 1 | Attraction 2 | Attraction 3 | Attraction 4 |
|---|---|---|---|---|---|
| **Ticket 1** | $ 20 | O | | | |
| **Ticket 2** | $ 25 | | O | | |
| **Ticket 3** | $ 30 | | | O | |
| **Ticket 4** | $ 40 | | | O | O |
| **Ticket 5** | $ 35 | O | O | O | |

**Table 1.** shows a simple example of ticket optimization problem of a single traveller.

Top-most row shows the tourist attractions that a single traveller wants to visit. The left-most column shows all the tickets covering some of the attractions; for instance, with ticket 4 you can visit attraction 3 and 4. The second column shows the price of each ticket. From the table, you can see that the goal of the system is to choose a set of tickets (or rows) that has at least one circle for each attraction (or column) and cover all the attractions while keeping the price as low as possible. For instance, choosing ticket 1 and 4 fails to cover all the attractions because attraction 2 is covered neither by ticket 1 nor by ticket 4. Choosing tickets 1, 2, and 4 covers all the attractions but this is suboptimal because the cost, $85, is more expensive than choosing tickets 4 and 5, which costs $75. By choosing ticket 4 and 5, the user gets

admission to attraction 3 twice, but that does not matter as long as all the attractions are covered by selected tickets.

If you view each ticket as a set of tourist attractions to which the ticket has admission, and price as the weight of each set, cheapest ticket combination problem becomes an optimization version of a set cover problem (Balas [1972]). A set cover problem can be defined as follows: given a set N and M, where $M=\{(x,w)|x\in 2^N, w\in\mathbb{R}\}$, and a function sum(K), where $sum(K)= \Sigma_{(x,w)\in K} w$, a set cover problem tries to find a set $S\subset M$, s.t. $\cup_{s\in S} = N$, while there is no other set $S'\subset M$ s.t. $\cup_{s\in S'} = N$ and $sum(S)>sum(S')$. A set cover problem is a well-known NP-hard problem and does not have a polynomial-time solution, but we could solve a ticket optimization problem in practical amount of time, after converting it into an integer linear programming (IP) problem, faster than simple exhaustive search approach, despite that IP solution is still NP-hard. We will talk more about this in Chapter 4.

### 3.2 Multiple people ticket optimization & Semaphores

Trivial approach to multiple people ticket optimization is to run single person ticket optimization multiple times. However, some tickets, such as group tickets, make trip members to be dependent on each other and make it impossible to optimize each person independently.

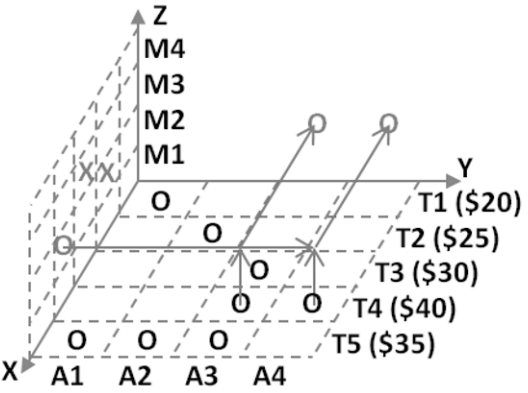



**Fig. 1.** Example of multiple people ticket optimization

Fig. 1 shows a simple example of cheapest ticket combination problem with multiple people. Compared to Table 1 above, the chart has Z-axis for trip members. X-Y planes define which attractions each ticket covers as in Table 1, while X-Z plane shows which trip member will be using which ticket. Some tickets, such as a student ticket or a senior ticket, are not available for some trip members and 'X' marks on the X-Z plane represent it. For instance, in Fig. 1, M2 cannot buy ticket T2.

The attraction coverage of each selected ticket, represented as ‘O’ mark on X-Y plane, can be understood as follows; as in Fig. 1, 'O' marks on X-Z plane will be projected onto Y+ side and each 'O' marks on X-Y plane will be projected onto Z+ side. When

these two projections meet, we can mark 'O' to the related cell on Y-Z plane, and the goal of the ticket optimization problem with multiple trip members becomes marking all cells in Y-Z plane with 'O' mark, by marking cells in X-Z plane while keeping ticket cost as low as possible. Ticket optimization of multiple people is implemented using semaphores, which works similarly to the semaphores used in operating systems. (Dijkstra [1965]).

**Table 2**. Example tickets with semaphore

| Ticket | Attractions | Price | Semaphores |
|---|---|---|---|
| T1 | {A1} | $40 | (attraction,N,1) |
| T2 | {A1} | $0 | (attraction,N,-1) |
| T3 | {A1} | $25 | |

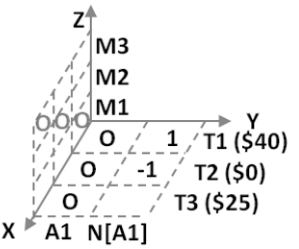



**Fig. 2.** 3-dimensional (3-D) model example of tickets with semaphore

Semaphore is a variable that can be added to each ticket in the format of (domain parameter, semaphore name, integer), as shown in the right-most column of **Table 2**. Fig. 2 shows how semaphores are processed by the system. Domain parameter 'attraction' in both ticket T1 and T2 in Table 2 is determined to domain name 'A1' as 'N[A1]' in Fig. 2, following the attraction each ticket is related to. Each domain name and semaphore name gets its own column on Y-Axis of Fig. 2. Similar to variables defined inside a function in programming languages, only semaphores with identical domain names and semaphore names are treated as identical semaphores during optimization.

When calculating optimal ticket combination, selected set of tickets is valid only if summed values of all semaphores among selected tickets become non-negative. For instance, assume two people are planning to visit A1 in Table 2. Both members choosing T2 is one possible solution, but this solution is invalid since value of semaphore 'N[A1]' becomes -2. Both trip members choosing either ticket T1 or T3 is a valid ticket combination with semaphore value of 'N[A1]' becoming 0 or 4. However, the cheapest solution is achieved when one member chooses T1 and the other member chooses T2. This way all the attractions are covered, and all semaphore values stay non-negative (N[A1]=+1-1=0), while the ticket cost is only $40, less than buying two T1 or T3 tickets.

### 3.3 Trip member dependent tickets

To process tickets with person-dependent features, system asks the user a priori whether each trip member belongs to a special group, such as student, senior, or veteran. Then, system creates semaphores to ensure that only people belonging to the group can buy group dependent ticket. For instance, by providing semaphore (member, student, $\infty$) to each student trip member, and adding semaphore (member,

student, -1) to each student ticket, system can force student tickets to be bought only by students.

Some features, such as membership to an attraction, are attraction-dependent and the user will be asked whether each trip member belongs to these attraction-dependent features when the attraction is added to user's trip.

### 3.4 Type 1 Group Tickets

For optimization with group tickets, semaphores are used to model interaction between trip members. Group ticket has two subtypes; a group ticket which requires precise number of people, ('type 1' group ticket; i.e. a couple ticket where precisely two adults are required) and a group ticket which additional participants can get discount as long as the group has more people than certain number ('type 2' group ticket; i.e. a family ticket of two adults and one children where you can purchase admission for additional children with additional cost).

**Table 3**. Generalized form of a type 1 group ticket

| Ticket | Attr. | Price | Conditions |
|---|---|---|---|
| $TIK_0$ | As | P | Not more than $k_1$ people sat($S_1$)<br>...<br>$k_q$ people sat($S_q$) |

**sat(S): satisfying condition S*

**Table 4.** Implementation of type 1 group ticket using semaphore

| Ticket | Attr. | Price | Semaphores |
|---|---|---|---|
| $T_0$ | | P | S && ($T_0$,$N_1$,$k_1$)<br>...<br>&& ($T_0$,$N_q$,$k_q$) |
| $T_1$ | As | | $S_1$ && ($T_0$,$N_1$,-1) |
| | … | | |
| $T_q$ | As | | $S_q$ && ($T_0$,$N_q$,-1) |

**Theorem 1.** Tickets in **Table 3** and **Table 4** implement identical set of tickets.

**Lemma 1.** With the assumption that external tickets (tickets not in **Table 4**) do not have domain value of $T_0$ in semaphores, tickets in **Table 4** are independent to external tickets. Proof is trivial from nature of semaphores.

**Proof)**

**Case 1**. ∀ ticket combination in **Table 3** can be simulated by tickets in **Table 4**.

Only two options exist in **Table 3**, to buy $TIK_0$ or not. Either can be simulated by buying or not buying all the tickets in **Table. 4**.

**Case2**. ∀ ticket combination in **Table 4** can be simulated by tickets in **Table 3**.

No ticket $T_1$, …, $T_q$ can be purchased without buying $T_0$ because some semaphore value become negative from Lemma 1. Once $T_0$ is purchased from **Table 4**, buying $TIK_0$ from **Table 3** can simulate any combination of tickets in **Table 4**.

Table 3 shows generalized form of a type 1 group ticket. Purchasing ticket $TIK_0$ grants admission to $k_1$ people who satisfy condition $S_1$, $k_2$ people who satisfy condition $S_2$, …, and $k_q$ people who satisfy condition $S_q$. Using semaphores, we can implement $TIK_0$ as described in Table 4. $T_1$ to $T_q$ are tickets that grants admission to each type of participants mentioned in $TIK_0$, and $T_0$ generates semaphores that allow the trip members to purchase right amount of $T_1$ to $T_q$ tickets. Proof of equality between tickets in Table 3 and 4 is in Theorem 1. Single type 1 group ticket in Table 3 expands into O(q) tickets and semaphores as in Table 4. Since q is the number types of people in the group, which is generally small, the expansion is not burdensome.

### 3.5 Type 2 group tickets

**Table 5**. General-form of a type 2 group ticket

| Ticket | Attr. | Price | Conditions |
|---|---|---|---|
| $TIK_0$ | As | $P_0$ | For $k_1$ people sat($S_1$)<br>$k_2$ people sat($S_2$)<br>…<br>$k_q$ people sat($S_q$) |
| $TIK_1$ | As | $P_1$ | sat($S_1$) after buying $TIK_0$ |
| | … | | |
| $TIK_q$ | As | $P_q$ | sat($S_q$) after buying $TIK_0$ |

**Table 6.** Implementation of type 2 group ticket using semaphore

| Tic. | Attr. | Price | Semaphores |
|---|---|---|---|
| $T_0$ | | $P_0$ | S && ($T_0$,$N_0$,∞) |
| | | - $k_1$*$P_1$ | && ($T_0$,$N_1$,-$k_1$) |
| | | … | ... |
| | | - $k_q$*$P_q$ | && ($T_0$,$N_q$,-$k_q$) |
| $T_1$ | As | $P_1$ | $S_1$ && ($T_0$,$N_0$,-1)<br>&& ($T_0$,$N_1$,1) |
| | … | | |
| $T_q$ | As | $P_q$ | $S_q$ && ($T_0$,$N_0$,-1)<br>&& ($T_0$,$N_q$,1) |

Table 5 shows generalized form of a type 2 group ticket. $TIK_0$ of Table 5 is identical to $TIK_0$ of Table 3. However, Table 5 has q more tickets that allow purchase of additional tickets for people satisfying each condition. Table 6 shows implementation of tickets in Table 5 using semaphores. Proof of equality between tickets in two tables is similar to proof in Theorem 1. Single type 2 group ticket in Table 5 expands into O(q) tickets and semaphores as in Table 6, identical to type 1 group ticket.

Some group tickets have mixed properties of both type 1 and type 2 group tickets in a single ticket. For instance, family tickets often require exactly two adults while children can be added to the family ticket as many as desired. These group tickets of mixed properties can be implemented by properly mixing semaphore structures of each type.

### 3.6 Select-N tickets

A select-N ticket lets a person visit any one attraction among multiple attractions covered by the ticket. Combination tickets often have select-N property within the ticket. For instance, you can choose to enter any single attraction between Top of the Rock and Guggenheim Museum with the purchase of NYCP.

**Table 7**. Generalized form of a select-N ticket

| Ticket | Attractions | Price | Cond. |
|---|---|---|---|
| TIK | $\{A_1, \ldots A_n\}$ | P | S |

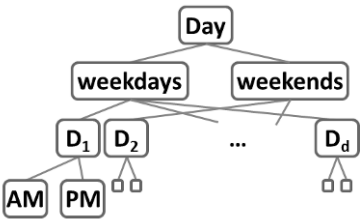
**Table 8.** Select-N ticket using semaphore

| Ticket | Attr. | Price | Semaphores |
|---|---|---|---|
| $T_0$ | | P | S && (member & $T_0$,N,1) |
| $T_1$ | $A_1$ | | (member & $T_0$,N,-1) |
| | … | | |
| $T_n$ | $A_n$ | | (member & $T_0$,N,-1) |

Table 7 shows generalized form of a select-N ticket and Table 8 shows select-N ticket implemented using semaphores. 'member' is added to semaphore's domain parameter to make semaphores of select-N tickets independent between trip members. Proof of equality between tickets in two tables is similar to the proof in Theorem 1. Single select-n ticket in Table 7 expands into O(n) tickets and semaphores as in Table 8 when n is the number of attractions covered by select-N ticket. 'n' can be the number of attractions in worst case, but practically, n is a small number less than 4 and this expansion is not burdensome.

### 3.7 Time dependent tickets

Time dependent tickets are tickets that can be used only during a certain time range. For instance, Museum of Modern Art has free tickets on Friday after 3pm. Since these tickets can appear under many different conditions, such as "after 2pm", "before 1:30pm", and etc, it is impossible to consider all these conditions as they are. Nevertheless, some algorithm is required to avoid collision among time-dependent tickets, a situation where two time-dependent tickets are trying to take the same time slot, and Pigeonhole Principle is used to solve this problem. (Grimaldi [1998])




d = number of dates in trip

**Fig. 3.** Pigeon hole tree (PHTree)

**Table 9.** Definitions of operations

| |
|---|
| ({A1, …, An}*,S,v) ≡ ({A1},S,v), …, ({An},S,v) |
| (A, π*(PH),v) ≡ (A,PH,v),(A,π(PH),v), (A,$\pi^2$(PH),v), …, (A, "Day", v)<br>where $\pi^k$(PH) is $k^{th}$ parent of pigeon hole PH from PHTree in **Fig. 3** |

**Table 10.** Algorithms to initialize global pigeon hole semaphore values

```
FindDayPH(d): return matching pigeon hole of height==1
triphours(i): returns hours available for traveling on date D_i
hours2slot(As): return ceil( (sum of expected time to visit all attractions in As) %2)

GeneratePH(trip):
  v = {}; c = hours2slot(8)
  foreach i in trip.days:
    D_i = FindDayPH(i)
    for(p=D_i.AM;   p!=null;   p= π(p)){ v[p] += (AM ⊂ triphours(i))?c:0; }
    for(p=D_i.PM;    p!=null;   p= π(p)){ v[p] += (PM ⊂ triphours(i))?c:0; }
  foreach ph in v.keys():
    yield (,ph,v[ph])
```

**Table 11.** Definition of algorithms for time dependent tickets

```
FindPH(C):
  nodes = PHTree.leaves
  while(|nodes|)>0:
    n = dequeue(nodes)
    if n covers C: return n
    if n.parent ∉ nodes:
      enqueue(nodes, n.parent)
  return ∅
```

**Table 12**. Generalized form of a time dependent ticket

| Ticket | Attr. | Price | Cond. |
|---|---|---|---|
| TIK | As | P | S && $C_{TD}$ |

**Table 13.** Time dependent ticket using semaphore

| Ticket | Attr. | Price | Semaphores |
|---|---|---|---|
| for D in trip.days: | | | |
| continue if D ∩ $C_{TD}$ = ø | | | |
| $T_{D1}$ | As | P | S && (As*, π*(FindPH($C_{TD}$)), -1) |
| $T_{D2}$ | | | (As*, π*(FindPH($C_{TD}$)), ∞) |
| | | | (,π*(FindPH($C_{TD}$)), -hours2slot(As)) |

**Theorem 2.** Tickets in **Table 12** and **Table 13** implement identical set of tickets.

Assumptions:
1. "As" in **Table 12** and **13** is always a singleton set.
2. If pigeon hole n covers $C_{TD}$, attractions can be visited any time during n.
3. Visiting an attraction takes multiple of 2 hours and not more than 4 attractions are visited using time-dependent ticket in a day.
4. All attractions can be visited at any time during the trip.
5. Time dependent tickets are used only when whole half or full-day is available.

**Proof)**

**Case 1**. ∀ ticket combination in **Table 12** can be simulated by tickets in **Table 13**.

Buying $T_{D1}$ and $T_{D2}$ at the date TIK is used satisfies TIK. $T_{D1}$ and $T_{D1}$ may not be available only when semaphore (,π*(FindPH($C_{TD}$)),?) is not enough. This happens only when other time dependent tickets used up (,π*(FindPH($C_{TD}$)),?) which implies that TIK cannot be purchased from the assumptions.

**Case 2**. ∀ ticket combination in **Table 13** can be simulated by tickets in **Table 12**.

Purchasing $T_{D2}$ only is meaningless. For each purchase of $T_{D1}$, matching TIK can be purchased unless there is schedule collision with other tickets. Due to assumptions, this happens only when $T_{D2}$ of other tickets use up all the semaphores for $T_{D1}$ which makes purchase of $T_{D1}$ impossible.

Fig. 3, Table 9, 10, 11, 12, and 13 describes implementation of time dependent ticket using semaphores. First, pigeon holes are structured hierarchically as in Fig. 3. Pigeon holes are created for each day of the trip and AM/PM of each day. Weekday and weekend pigeon holes are created as parent of each day ($D_i$) pigeon hole, and "Day" pigeon hole is created at the root of the tree.

At the beginning of the optimization process, global pigeon hole semaphore values, which represent how many attractions can be visited for each pigeon hole, is generated as in Table 10. For instance, if a trip is from Day 1 10am to Day3 8am, pigeon hole values of v[Day1.PM], v[Day2.AM], v[Day2.PM] are set to c and the values are summed up following the PHTree in Fig. 3. Algorithm generates O(d) semaphores and takes running time of O(d) where d is the number of travel days usually less than 7.

Table 12 describes generalized form of a time dependent ticket with time dependent condition $C_{TD}$. Table 13 shows how a time dependent ticket in Table 12 can be implemented using semaphores. Ticket $T_{D1}$ in Table 13 is equivalent to TIK in Table 12 except that it requires proper semaphore values. Ticket $T_{D2}$ consumes pigeon hole values initialized at Table 10 and reserves a time slot for attractions covered in $T_{D1}$.

Theorem 2 shows proof of equality between tickets in Table 12 and 13. Several realistic assumptions are made for simple and clear proof. Assumption 1 is based on the fact that all time dependent tickets in New York City have only single attraction. Assumption 2 and 4 is made because in most cases travellers can reorder their schedule or hurry up to visit the tourist attractions at the right time. Assumption 3 relies on the fact that transport between tourist attractions takes time and this time can fit into visit time of either previous or latter attraction. Assumption 5 matters only at the start date or end date of the trip when whole half or full-day schedule is not available. Given that schedule can become tentative when entering or leaving a city, refraining from using time dependent ticket on trip start or end date makes sense. Single time dependent ticket in Table 12 expands into O(1) tickets and semaphores in Table 13.

### 3.8 Day-pass tickets

A day-pass tickets is another common ticket form. A day-pass ticket allows a person to visit multiple attractions covered by the ticket within fixed length of dates after ticket activation. For instance, New York Pass (NYP) ticket covers more than 50 tourist attractions in New York City and the ticket holder can visit as many attractions covered by the ticket as long as you visit these tourist attractions in 1, 3, or 5 days following the type of the day-pass ticket.

**Table 14**. Generalized form of a day-pass ticket

| Ticket | Attractions | Price | Cond. |
|---|---|---|---|
| TIK (k days) | As | P | S |

**Table 15.** Day-pass ticket using semaphore

| Ticket | Attractions | Price | Semaphores |
|---|---|---|---|
| for i in 0..(d-k): | | | |
| $T1_i$ | | P | S && (T & member & {$D_i$, …, $D_{i+k-1}$}*, N, k*8) |
| for A in As:<br>for D in {$D_1$..$D_d$}: | | | |
| $T2_{AD}$ | A | | S && (T & member & D, N, -A.expectedVisitHours()) |
| $T3_{AD}$ | | | (A, π*(D), ∞)<br>(,π*(D), -hours2slot(As)) |

Table 14 shows generalized form of a day-pass ticket and Table 15 shows implementation of a day-pass ticket using semaphores. Buying a day-pass ticket of k

days covering n attractions is treated as buying a time dependent ticket for each attraction available only for a single day among k days. To prevent making any infeasible schedule, expected visit hours in $T2_{AD}$ regulates number of visiting attractions and pigeon hole semaphores of $T3_{AD}$ keeps the attractions' visit schedule from collision between visit schedules and regulates the number of attractions visited per day. Proof of equality between tickets in Table 14 and 15 is similar to proof in Theorem 2. From single day-pass ticket, O(d*|A|) semaphores and tickets are generated when d is the number of trip days and |A| is the number of attractions covered by the day pass. While d is likely to be small, |A| can become fairly large, as in case of NYP, and this can be burdensome.

## 4 Set cover problem to integer programming (IP) problem

This section describes how system converts a set cover problem into IP problem and finds optimized solution using GNU Linear Programming Kit (GLPK http://www.gnu.org/software/glpk/ [Aug. 25, 2012]).

### 4.1 Expanding ticket including trip member

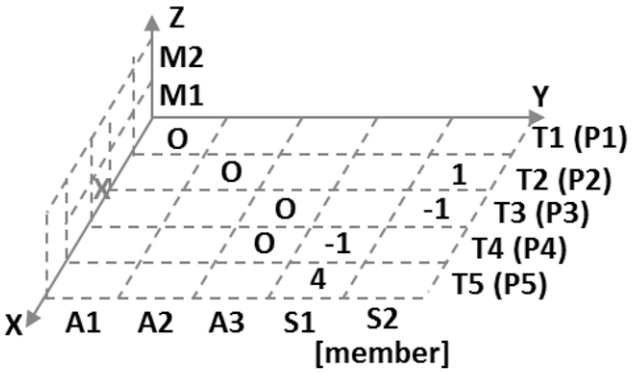



**Fig. 4.** Example of a 3-D set cover model

**Table 16.** 2-dim. model from 3-dim. model by merging trip member variable

| | Price | M1A1 | M1A2 | M1A3 | M2A1 | M2A2 | M2A3 | S1 | S2[M1] | S2[M2] |
|---|---|---|---|---|---|---|---|---|---|---|
| **M1T1** | P1 | O | | | | | | | | |
| **M1T2** | P2 | | O | | | | | | 1 | |
| **M1T4** | P4 | | | O | | | | -1 | | |
| **M2T1** | P1 | | | | O | | | | | |
| **M2T2** | P2 | | | | | O | | | | 1 |
| **M2T3** | P3 | | | | | | O | | | -1 |
| **M2T4** | P4 | | | | | | O | -1 | | |
| **T5** | P5 | | | | | | | 4 | | |

Unlike ordinary tickets where each person may purchase one ticket instance, some member-independent tickets, such as $T3_{AD}$ in Table 15, requires only one instance across multiple trip members. To make optimization universal across member dependent and independent tickets, a 3-D model, as in Fig. 4, is converted into a 2-D model without member axis an in Table 16.

Member information is incorporated into each member-dependent ticket, attraction, and semaphore in 2-D model. For instance, in case of Fig. 4 and Table 16, T1 changes to M1T1 & M2T1, A1 to M1A1 & M2A1, and S2[member] to S2[M1] & S2[M2]. Member-independent tickets and semaphores, T5 and S1, stay unchanged.

### 4.2 Generating integer linear programming equations

Minimize

M1T1*P1 + M1T2*P2 + M1T4*P4 + M2T1*P1 + M2T3*P3 + M2T4*P4 + T5*P5 (1)

Where M1T1>=1, M1T2>=1, M1T4>=1, M2T1>=1, M2T2>=1, M2T3+M2T4>=1,

(-1)*M1T4+(-1)*M2T4+4*T5 >=0, M1T2 >=0, M2T2+(-1)*M2T3 >=0

and M1T1, M1T2, M1T4, M2T1,M2T2, M2T3, M2T4, T5 = 0 or 1

Conversion of a set cover problem to IP is already known (Vazirani [2001]), and Equation (1) shows optimization equations from Table 16. Optimization equation is to minimize the total cost of the tickets when each ticket variable, i.e. M1T1 or T5, can take value of 0 or 1. The condition equations are to keep sum of each attraction/semaphore column larger than or equal to 1/0.

## 5 Experiment

System was tested to see whether IP, which is an NP-hard problem, can finish in feasible amount of time. For comparison, another baseline optimization algorithm, which searches exhaustively over all possible ticket & member combination through for loops, was tested. Systems were tested on attractions and admission tickets in NYC, one of the largest tourist destinations in the world. Total of 94 tourist attractions and 292 tickets were collected. For testing, a laptop machine of 1.30GHz CPU, 2GB memory, 150GB HDD with Ubuntu LTS 12.4 is used.

**Table 17.** Result of ticket optimization using various algorithms

| System | Set cover → IP | Optimization time | Total time |
|---|---|---|---|
| **Baseline** | | - | 90 minutes |
| **GLPK** | 5 sec | 52.5 sec | ≈ 1 minute |

**Table 17** shows the result. A trip visiting 31 attractions were created with 10 trip members of various ages and status, i.e. student, senior, and veteran. There were 150

tickets related to these attractions. The baseline optimization took 90 minutes to finish while GLPK optimization finished in about 1 minute total, 5 seconds for conversion from set cover problem to IP problem, and 52.5 seconds for GLPK optimization, proving that converting ticket optimization problem into an IP problem benefits.

Ticket optimization problem in our experiment solved relatively quickly compared to other NP problems in computer science. We believe that this might be because of relatively small problem size. Ticket optimization problem can often be divided into multiple independent smaller problems. An NP problem loses its complexity quickly if the problem can be divided into smaller independent problems. For instance, without group tickets, which are rare and hard to meet its conditions, ticket optimization of each person becomes independent to each other. Also, many tourist attractions, except a few popular attractions covered by multiple combination tickets, are independent to each other. We did not have enough time to look into implementation of GLPK, but believe that GLPK trims and divides complex problems into smaller problems whenever possible, and this may help GLPK to be fairly faster than the baseline for-loop approach.

## 6 Conclusion

Our system could find the cheapest ticket combination covering multiple attractions within minutes, by converting the problem into a set cover problem and then into an integer programming problem and solving it with GNU Linear Programming Kit. All the attraction tickets in New York City, including combo tickets and day-pass tickets, could be converted into our framework with semaphores. We got computational gain by converting the problem into an integer programming problem rather than solving it through exhaustive search. In the future, we plan to add trip planning/scheduling module on top of the cheapest ticket combination result.

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# Grassroots Branding with Twitter: Amazing Florida

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## Abstract

Social networks sites (SNS) and online communications have revolutionized the way people interact with each other, and these changes have important marketing implications in a number of commercial contexts. In tourism and hospitality context, SNS communications can be considered as electronic word-of-mouth about people's travel experiences. When SNS data is taken into consideration by destination marketing organizations for branding purposes, the visitors to the destination can be regarded as agents of that destination's branding effort, and the branding approach as "grassroots" branding. This empirical study explores a suitability of using publicly accessible data from Twitter for gaining visitors' perceptions about Florida. It examines what positive affective states are associated with the destination and to which destination attributes these affective states are related most closely. Potentially, the study can contribute to developing a non-obtrusive, low-cost, and time-efficient approach to tap into visitors' experiences and affective states expressed through tweeting.

**Keywords:** Destination Florida, Grassroots Branding, Social Network Sites (SNS), Twitter, User-generated Content (UGC).

## 1 Introduction

Social networks sites (SNS) and online communications have revolutionized the way people interact with each other, and these changes have important marketing implications in a number of commercial contexts. The volume of digital data across all countries and industries doubles every 1.2 years (Know It Information Systems, 2012), and the explosion of user-generated content (UGC) is part of the process. The Internet and mobile technology give people the unprecedented power to instantaneously add "digital traces" like reviews of airlines, hotels, and restaurants, customer complaints, travel experiences, photos, and videos to digital data banks. Businesses embrace using UGC in their decision-making process that allows narrower segmentation of customers and, therefore, more precisely tailored products and services, which increases profitability. Since 2000, research on the value and scope of UGC in tourism and hospitality has been accumulating, indicating that UGC has been shaping behaviour patterns of online consumers. For example, travellers trust, rely on, and make extensive use of online UGC to plan leisure trips (Papathanassis & Knolle, 2011; Yoo et al., 2009). UGC has also been recognized as a data source for the purpose of improving the quality of tourist experience or monitoring the perceived

L. Cantoni and Z. Xiang (eds.), *Information and Communication Technologies in Tourism 2013*, DOI: 10.1007/978-3-642-36309-2_13,

images of tourism and hospitality products and services (Akehurst, 2009; Carson, 2008; Pan, MacLaurin, & Crotts, 2007).

Destination branding is a coordinated, concerted effort of multiple destination stakeholders. It incorporates identifying interrelated and consistent brand element mix which would distinguish a destination among its competitors through positive image building (Cai, 2002). "Positioning a destination's image… is a core activity of destination marketing organizations (DMOs), including national and state tourist offices, around the world" (Day, Skidmore, & Koller, 2002:177). Because non-promotional communications on SNS are regarded as electronic word-of-mouth, they tend to affect destination images more than messages by DMOs and travel intermediaries (Connell, 2005). The lack of direct control on the part of DMOs over images that are "out there" presents a challenge to DMOs. Since positioning is "not so much what you say about your products or company as much as it is what your customers say about you" (McKenna, 1991), monitoring and taking into account customers' existing perceptions and experiences "broadcasted" through various SNS is more important than ever. When SNS data is taken into consideration by a DMO, visitors to that destination can be regarded as agents of that destination's branding effort, and the branding approach as "grassroots" branding.

This paper investigates a suitability of using publicly accessible data from Twitter for gaining visitors' perceptions about Florida. Florida is one of the premier destinations within the U.S., with 87.3 million visitors in 2011, 6.1% increase from the year 2010 (http://media.visitflorida.org/research.php). Fifty two DMOs are members of the Florida Association of Destination Marketing Organizations, with "Visit Florida" leading the effort. Florida is probably best known as the "Sunshine" State, the nickname officially adopted by the 1970 legislature; however, other nicknames include "Orange," "Everglades," "Alligator," "Peninsula," "Gulf," and "Flower" State (www.e-referencedesk.com/resources/state-name/florida.html). A strong destination brand, besides being attractive and simple, should convey excitement and quality. It also has to have an emotional quality that resonates with visitors (Morgan & Pritchard, 2002). Thus, the paper analyses Twitter messages about Florida to find out what positive affective states are associated with the destination and to which destination attributes these affective states are related most closely. The authors hope that this empirical study can potentially contribute to developing a non-obtrusive, low-cost, and time-efficient approach to tap into visitors' experiences and affective states expressed through tweeting.

The paper is organized as follows. The Study Background section gives a brief description of the Twitter social network and reviews studies that have used Twitter in the marketing and branding context. It also provides a background to selecting affective states to monitor in messages that mention Florida. The Methods section describes the data collection procedure and geo-locational distribution of the collected tweets. The Results section focuses on frequency and co-occurrence analyses of selected affective states with various destination attributes. The section also presents a polarity analysis of collected tweets. The Conclusion section summarizes main findings, lists limitations of the study, and suggests directions for future research.

# 2 Study Background

## 2.1 Twitter

Twitter, that enables its users to send and read text-based messages of up to 140 characters known as "tweets," registered over 500 million active users as of 2012. It generates over 340 million tweets daily and handles over 1.6 billion search queries per day (All Twitter, 2012). Since its launch, Twitter has become one of the top 10 most visited websites on the Internet (D'Monte, 2009). The Pew Research Center's Internet and American Life Project (2012) estimates that as of February 2012, some 15% of Internet users use Twitter, and 8% do so on a "typical" day. Nearly one quarter (26%) of Internet users ages 18-29 use Twitter, while only 14% do so in the 30-49 age group. With respect to race/ethnicity, 28% of all black Internet users use Twitter, followed by Hispanics (14%), and Caucasians (12%). Internet users, residents of urban and suburban areas, are more likely to use Twitter (19%) than those living in rural areas (14%). A marketing research by Pear Analytics classified tweets into six categories: (1) Small talk – 40%; (2) Conversational – 38%; (3) Pass-along value – 9%; (4) Self-promotion – 6%; (5) Spam – 4%; and (6) News – 4% ("Twitter," 2012).

According to a study by a PR firm Burson-Marsteller (2010) on how the 100 largest companies in the Fortune 500 list were using social media in their marketing efforts, 79% of the companies use Twitter, Facebook, YouTube, or corporate blogs to communicate with customers and other stakeholders. For the U.S. alone, 86% of the top 100 companies use at least one social media platform. Twitter is the most popular of the social media tools (65% of Global 100 companies), followed by Facebook fan pages (54%), YouTube (50%) and corporate blogs (33%).

Perceived benefits of using Twitter by businesses have been formulated in terms of building relationships, convenience of networking, and expanding online branding opportunities (Bulearca & Bulearca, 2010). Burton and Soboleva (2011) demonstrated various ways in which interactive capabilities of Twitter are used by businesses to communicate with consumers and found the lack of consistency in Twitter practices across various organizations. In tourism and hospitality domain, Atadil et al. (2010) investigated the usage of Facebook and Twitter by Turkish lodging industry to evaluate tourists' attitudes towards hotels. A study by Hay (2010) about the use of Twitter as a tourism marketing tool from the perspectives of destination marketing organizations, hotels, and the consumer concluded that twittering provides a voice for the consumer to share common experiences and to learn about experiences of others.

One important aspect of research using SNS, Twitter included, is concerned with "a capacity to search, aggregate, and cross-reference large data sets" (Boyd & Crawford, 2012:663). Bakshy et al. (2011) proposed an algorithm to qualify the influence of 1.6M Twitter users, which took into account the number of followers of each user. Barbagallo et al. (2012) used a set of 500,000 tweets in the tourism domain to analyse the relationship between Twitter sentiment and the likelihood of message re-tweeting. Jansen and Zhang (2009) analysed 150,000 tweets with respect to positive and negative sentiments towards various brands. However, studies in tourism and hospitality field have documented the difficulty of locating, extracting, and interpreting UGC, a situation that limits use of large UGC datasets in research

(Akehurst, 2009). With respect to Twitter, research using large datasets of Twitter messages for marketing and branding purposes in tourism and hospitality has been limited to date.

### 2.2 Branding and Affective States

Personal experiences play an important role in establishing and/or strengthening emotional connection between a visitor and a destination. Feelings and emotions, i.e., affective responses to a destination, or affective states (Eagly & Chaiken, 1993), once originated in destination experiences, can be shared by a visitor through an SNS like Twitter with family, friends, and whole networks of that person's followers. This information, together with destination branding communications, influences consumer attitude and behaviour towards that destination (Blain, Levy, & Ritchie, 2005; Qu, Kim, & Im, 2011; White, 2003).

To date, studies have employed various classifications of basic human emotions or affective states, the schemes are ranging from two basic emotions such as pain and pleasure (Mowrer, 1960) or happiness and sadness (Weiner & Graham, 1984) to as much as eleven emotions (Arnold, 1960ab). A well-known classification by Tomkins (1984) includes nine basic emotions: anger, interest, contempt, disgust, distress, fear, joy, shame, and surprise. Parrot (2001) categorized affective states into six primary emotions: love, joy, surprise, anger, sadness, and fear. Researchers have also classified primary emotions from the "polarity" point of view, i.e., whether they convey positive, negative, or neutral feelings. Love and joy are considered the positive group, with surprise classified as a neutral emotion, capable of being positive or negative.

The branding approach implies that the destination needs to convey *excitement* and *quality* (Morgan & Pritchard, 2002). To contain this exploratory study within manageable bounds, the affective state of positive surprise was chosen to represent *excitement*, while *quality* was interpreted as "beautiful", i.e., "generally pleasing," "excellent" (www.merriam-webster.com/dictionary/beautiful). Since Florida is well-known for its theme parks of Orlando and Tampa, nightlife of Miami, and a unique nature attraction of the Everglades, this choice seemed justified. Following Parrot (2001), the emotions conveying surprise are amazement and astonishment. Merriam-Webster thesaurus (www.merriam-webster.com/thesaurus/amazing) defines "amazing" in two ways: (1) as "causing a strong emotional reaction because of unexpectedness" and (2) as "causing wonder or astonishment." Merriam-Webster lists the synonyms associated with the second meaning as astonishing, astounding, awesome, awful, eye-opening, fabulous, miraculous, portentous, prodigious, staggering, stunning, stupendous, sublime, surprising, wonderful, and wondrous. It is worth noting that some of these synonyms are very close to such affective states as amusement, elation, and delight, classified under the primary emotion of joy (Parrot, 2001).

# 3 Methods

## 3.1 Data Collection

A preliminary search at the end of February 2012, containing the words “Florida” and various synonyms for the affective state of positive surprise, as well as synonyms of the word “beautiful,” indicated that some descriptors were used noticeably more than others in tweets mentioning Florida. Therefore, for this study, the authors acquired tweets by performing a search for the following key words: “Florida” + {"amazing”, "astonishing", "beautiful", “incredible", "magnificent", "marvelous", and "wonderful"} for the period of 160 days starting March 1st and ending August 7th, 2011. During this time period, the search was performed every two hours by a specially designed software program, which used Twitter API. In total, 121,396 messages were collected. About 5% of the cases retuned by the search were deemed erroneous, as the found messages did not contain the key words; these messages were excluded. The final database contained 114,732 tweets; out of them, 88,804 (77%) were unique tweets, the rest of the messages were re-tweets. The most re-tweeted message (435 times) was on a debut concert tour by an American rapper and read *“... Florida u were amazing tonight!!!! Thank u soooo much for the love!!!!!...“* Two thirds (68%) of the messages have not been retweeted.

On average, 786 tweets were collected daily, with the maximum of 1,449 tweets on June, 29th (Fig. 1). The number of tweets decreases in the beginning of April, and then restores, peaking on June 29th, just before the Independence Day. Contrary to authors’ previous finding for tweets on other topics of interest that demonstrated strong correlation between the number of tweets and day of the week, this study did not find any relationship between twitter activity and the day of the week. The number of tweets was only slightly below average on Tuesdays and Wednesdays.

More than half of tweets contained the word “beautiful” (52%) and over the third contained “amazing” (37%). Other searched descriptors were ranked in this order: “wonderful” (7.0%), “incredible” (2.7%), “magnificent” (0.35%), “marvelous” (0.25%), and “astonishing” (0.22%). The percentage of retweets varied between these categories from 18% to 32%. The percentage of retweeted messages with words “amazing” and “beautiful” was 22% and 24%, respectively.

## 3.2 Geo-locational Distribution of Tweets

Twitter users have the ability to provide with messages their current tweeting location, if they choose to. However, only 1.84% of the tweets were geo-tagged in the sample. While the majority of twitter users do not include the information on their current location, many of them do provide some indication of their place of residence with account registration. If a user elects to make this information public, it is frequently a city, state, or a country of their residence. Some users select a profanity or a word that does not resolve to any specific location (e.g., 129 users listed their location as “global”). The authors have developed a code which uses geonames API (www.geonames.org) to resolve listed locations and were able to determine the locations for 48,191 tweets. Many of these locations were, however, “fuzzy”, due to “non-locational” locations (e.g., “global”), errors in locations’ names, or multiple locations with the same name. After filtering the most common locational problems

and merging the locations with close coordinates, 36,470 tweets that shared 4,209 unique locations all over the globe were identified. Over half of these locations were presented in the database only once and were responsible for only 6% of all tweets. On the other hand, over 75% of all tweets (24,242) with locational information had locations that appeared in the database at least 10 times. A relatively low number of these locations (470) allowed the authors to filter them for one of the abovementioned problems manually.

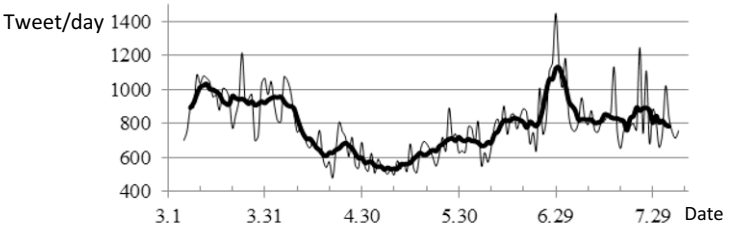


**Fig. 1.** Number of tweets per day with a week-long running mean.
NB: The April 22nd is excluded due to an error in the tweet collection procedure.

The registration locations most often listed the following countries: U.S. (87%), UK (5.7%), Canada (3.8%), and Australia (0.7%). Between the U.S. states, 51% of tweets listed Florida as their registration; other states included New York (5.8%), California (4.1%), Texas (3.9%), etc. (Fig. 2A). The Floridian locations concentrated in large urban areas of Miami, Orlando, Tampa, Jacksonville and Tallahassee, while other U.S. locations were presented mainly by the urban areas of the East Coast, Midwest, and Texas (Fig. 2 B&C).

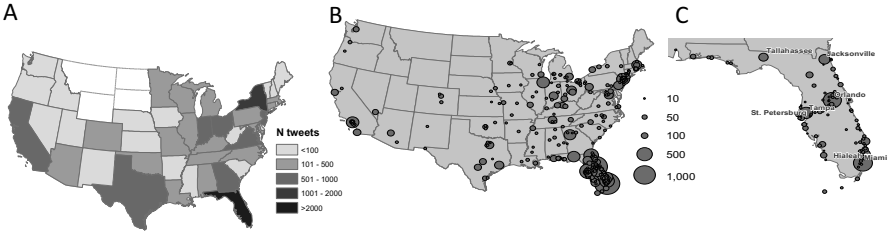


**Fig. 2 A, B&C.** Number of tweets from accounts with conterminous U.S. locations.

## 4 Results

### 4.1 Frequency and Co-occurrence Analysis

Three largest "pools" of tweets, Beautiful, Amazing, and Wonderful, which accounted for 52%, 32%, and 7% of all collected tweets respectively, were analysed using the CATPAC software (Woelfel, 1998). As stated in the CATPAC manual, "CATPAC is a self-organizing artificial neural network that has been optimized for

reading text. CATPAC is able to identify the most important words in a text and determine patterns of similarity based on the way they are used in text" (Woelfel, 1998:11). CATPAC has been long employed in content analysis of political discourse in media, focus groups interviews, marketing, and tourism-related research (Doerfel & March, 2003; Gretzel & Fesenmaier, 2003; Kim, Su, & Hong, 2007; Lockyer, 2005; Kirilenko et al., 2012; Xiang & Pan, 2011). It counts the most frequently used words in a textual file, while some auxiliary words that do not add to the meaning, that is prepositions, articles, pronouns, etc., are specified in what is called an Exclude file and are ignored in the analysis.

CATPAC can visualize the output by creating diagrams of the most frequent words. These diagrams show the strength of associations between the words. The diagrams for the ten most frequent words in each of the three pools, Beautiful, Amazing, and Wonderful, are presented on Fig. 3. For example, on the "Beautiful Florida" diagram, the words "beautiful" and "florida" are most closely associated (*florida is so beautiful*). "Beautiful" is also strongly associated with "beach" (*hello beautiful florida beach vacation*) and "love" (*love beautiful florida*). However, the words "sunny" and "today" are related more closely than the words "sunny" and "beautiful" (*It s beautiful, warm & sunny today in Florida!*)

**Fig. 3.** Affective Florida Image

The co-occurrence of an affective descriptor and another word in a tweet need not mean anything, at first glance. Actually, "for a singular co-occurrence the reservation is fully justified as the connotative item may be totally out of context... At the second thought, however, some law of large quantities comes to mind and then co-occurrence becomes symptomatic" (Mazanec, 2010:505). When tweets mentioning Florida contain a specific connotation with persistent frequency, it increases the likelihood of relationship between these words. The results reported here are based on five months of data collection (March 1-August 7, 2012) and will be updated when the data collection concludes. The purpose is to collect tweets for a full year in order to

account for a seasonality effect, if any, in tweeted experiences. The following paragraphs report results related to ten most frequent words (these words are considered as attributes of Florida experience) for each pool of tweets. The three pools, i.e., Beautiful, Amazing, and Wonderful, share 14 most frequent unique attributes of Florida experience (Table 1).

Three attributes, "day," "love," and "weather," belong to each pool of tweets. However, days in Florida are more often characterized as "beautiful" (*Beautiful day in Florida. Relaxing with the team for a while*) than "amazing" or "wonderful." "Love" is closely associated with both "beautiful" and "amazing" (*Love Florida, so amazing; I love beautiful South Florida :)*). "Weather" goes with "beautiful" (*enjoying this beautiful florida weather :)*).

With respect to the "Wonderful Florida" pool of tweets, the most often mentioned attribute was "time." It was noted that the stable word combination "have a wonderful time" was often used, which was considered as too generic (*Hope you re having a wonderful time in Florida*) and not relevant to the topic of this study. Combination of "wonderful" together with "family" (*Had a wonderful time with family in Florida*) does not add to the image of Florida, either. Based on these considerations and the relatively small size of the Wonderful pool, it was eliminated from further analysis.

**Table 1.** Frequencies of Attributes of Florida Experiences

| | | **Beautiful FL** | | **Amazing FL** | | **Wonderful FL** | |
|---|---|---|---|---|---|---|---|
| | | 61142 tweets | | 43029 tweets | | 8199 tweets | |
| # | Attribute | N* | %** | N | % | N | % |
| 1 | Beach | 3758 | 3 | 1297 | 1.6 | | |
| 2 | Day | 9860 | 7.9 | 1685 | 2 | 852 | 4.8 |
| 3 | Family | | | | | 313 | 1.8 |
| 4 | Great | | | | | 309 | 1.7 |
| 5 | Home | | | 1250 | 1.5 | 344 | 1.9 |
| 6 | Hope | | | 1785 | 2.1 | 659 | 3.7 |
| 7 | Love | 3302 | 2.6 | 3087 | 3.7 | 482 | 2.7 |
| 8 | Morning | 2287 | 1.8 | | | | |
| 9 | South | 3280 | 2.6 | | | | |
| 10 | Sunny | 2114 | 1.7 | | | | |
| 11 | Time | | | 3554 | 4.3 | 1036 | 5.8 |
| 12 | Today | 2025 | 1.6 | | | | |
| 13 | Wait | | | 1228 | 1.5 | | |
| 14 | Weather | 4.79 | 3.3 | 1395 | 1.7 | 327 | 1.8 |

N* - Number of times an attribute is mentioned in the respective "pool"

% - Attibute mentioned relative to the total number of words in the respective "pool" (auxiliary words are not counted)

With respect to the "Beautiful Florida" pool of tweets, the most often mentioned attributes were "day," "weather," "beach," and "south" (Table 1): *Beautiful day in Florida. Relaxing with the team for a while; Beautiful sunset weather. Florida Beach*;

*thanking My God that I woke up and got to see this beautiful morning in south florida.* Sunny mornings is a stable positive affective connotation (*It is a beautiful sunny morning in Florida* or *Gainesville* or *FortLauderdale*, etc.).

"Amazing Florida" is most strongly associated with such words as "time," "love," "hope," and "day." Interestingly, these attributes are the least tangible; therefore, the affective state of "amazing" refers to the perception of the destination as a whole*: Last night in Florida :( had an amazing time; Love florida, so amazing, beach life is spectacular; Happy birthday to Loveee you girrl: hope you have an amazing day in florida!!! ;).*

### 4.2 Polarity Analysis

A feasibility of measuring polarity of sentiments expressed in the collected dataset was explored. While only tweets with positive affective descriptors were collected, the procedure included the verification algorithm that they were indeed positive. The existing techniques of automatic detection of sentiment expressed in the text are usually based on an annotated word database with each word assigned certain attributes, such as polarity, or manifestation of positive or negative sentiment. A code, based on the software designed by CLiPS (Computational Linguistics & Psycholinguistics) research centre at the University of Antwerp, was developed. Measuring polarity of tweets as a mean polarity of all words in the message, it was found that, when the search words are excluded, mean polarity of tweets is just 0.01, with 1/3 of all twits having polarity of 0 (Fig. 4A). With the search words added, the mean polarity increases up to 0.09 (Fig. 4B). When the positive and negative words were counted separately, the mean negative polarity was close to zero (-0.002); only 12% of tweets contained words with negative polarity. Correspondently, the positive polarity changed little.

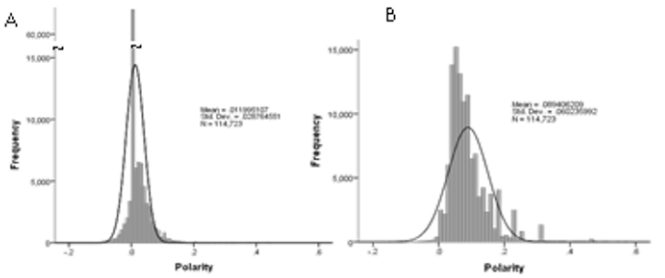


**Fig. 4 A&B.** Polarity Distribution of Tweets.

Among the tweets with the most negative sentiments (polarity below 0.15) there were found complains about weather, amenities, entertainment, even though the overall impression of a tweet was positive (*Florida: Dumb, beautiful, and deadly*; *In Clearwater, Florida were the wonderful beach is! But NOOOO SUN! There ugly nasty dirty rain!!!*; *Its ugly over here and beautiful at the beach... Stupid florida*; *Florida is beautiful, yet so boring..*; *florida hotel sick*). Frequently a negative sentiment was expressed towards the place of permanent residence rather than Florida

(*Goodbye nasty Texas weather. Hello beautiful Florida!*). In other cases the negative polarity was due to differences in objective and subjective senses of words (*Florida is amazing, the food is insane!*).

Tweets with highly positive sentiment (above 0.15) generally expressed happy attitude (What a amazing day in Florida! Perfect perfect perfect; Breathtaking florida ocean beautiful; Perfect. Florida has the most beautiful girls anywhere!; Loving Florida right now amazing). Messages with a highly positive sentiment were those where a significant amount of advertising was detected.

## 5 Conclusion

In 1997, Stone (1997) made several predictions about directions that content analysis would take as a research method in various fields, and these predictions have proved to be remarkably accurate. The availability of the online publicly accessible textual UGC, combined with the rising processing power of computers and development in computer-aided software instruments, is drawing interest of tourism and hospitality researchers. Social scientists have focused on explaining personal and organizational behaviour in a constantly evolving social environment that now increasingly involves dynamic human-computer interactions. Much of the thematic text analysis has been very practically oriented, as evidenced by the growing number of business, hospitality, and tourism content analysis applications. Practical convenience and cost/benefit considerations have been guiding the division of labour between human coders and machines (Stepchenkova, 2012).

This study, as authors hope, provides an insight into user-generated information that may be helpful for DMOs and travel organizations in Florida. It shows how the destination is viewed by visitors and residents, as well as what types of analyses can be performed on the Twitter data. Among various descriptors that characterize the affective state of positive surprise associated with Florida, “amazing” is by far the most often used descriptor; it is mainly applied to such intangible ideas as time, love, and hope. Between the two descriptors of “beautiful” and “magnificent” that convey the quality of Florida experience, the former was used most often, referring to such tangible aspects of the destination as morning, day, beaches, and weather. The finding makes perfect sense, since amazement is an emotion, or affective state, which describes the state of the speaker, while the “beautiful” descriptor is often applied to people or objects other than the speaker himself/herself. The authors note that the analysis of tweets, including polarity assessment, while conducted “in very broad strokes,” is sensitive enough to detect these differences.

This exploratory study has limitations on two levels. At a higher level, there are limitations associated with the theoretical foundations of the research as well as data collection design. Only one affective state, that of positive surprise, have been tested, which may have led to overlooking other, more frequently used affective states associated with Florida. Several descriptors indicating positive surprise and two descriptors, beautiful and magnificent, indicating quality of experience were selected after a preliminary search in order to reduce the amount of tweets that contained the word “Florida”. However, a number of potentially important descriptors may have been missed due to a low degree of formalization in the descriptor-selecting process.

For example, such words as “sunshine state” used in the official Brand Florida, were not included. Marketing professionals can make research reflect a specific need of a DMO by posing a practically relevant question of interest and, thus, bring the data search process into focus. At a lower level, there are limitations associated with this particular data analysis. CATPAC analyses could have been more precise if the data were “cleaned” more thoroughly by joining single and plurals (e.g., beach/beaches), taking care of synonyms, and aggregating concepts where appropriate (e.g., treat “South Florida” as one word). More thought could have been given to the construction of the “exclude” file. Based on authors’ previous experience with computer-assisted data analysis, the largest differences between text populations are often found not at the level of the most frequent words but on the level of the mid-frequent ones. Therefore, future research will need to expand the number of key words, or destination attributes, that are counted in each of the affective image pools.

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# Multi-Dimensional Data Modelling for a Tourism Destination Data Warehouse

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## Abstract

Information and communication technologies (ICTS) play a crucial role to increase the knowledge base of destination stakeholders. Organisational learning and managerial effectiveness can particularly be enhanced by applying methods of business intelligence (BI). Although huge amounts of data are available in tourism destinations these valuable knowledge sources typically remain unused. The described problem is solved by conceptualizing, prototypically implementing and testing a novel destination management information system (DMIS) that applies methods of BI and data warehousing for the leading Swedish ski destination, Åre. As being a central DMIS component, the destination-wide data warehouse (DW), its underlying multi-dimensional data model, the technical architecture, as well as critical implementation issues are discussed. Finally, the prototypical implementation of the DMIS focussing on the data warehouse and OLAP functionalities for customer feedback processes proved the suitability and effectiveness of the proposed overall architecture.

**Keywords:** business intelligence, data warehouse, multi-dimensional modelling, data mining, tourism knowledge destination

## 1 Introduction

The economic development of whole industries is related to the availability of knowledge needed to reconfigure resources to remain competitive (Back et al. 2007). Also the competitiveness of tourism destinations depends on how communication and information needs of tourism stakeholders can be satisfied. Sustainable knowledge sources emerge through the generation, management and intelligent access of relevant information (Shaw & Williams, 2009). Thus, information and communication technologies (ICTS) play a crucial role to increase the knowledge base of destination stakeholders by decreasing information asymmetries among them. Organisational learning and managerial effectiveness can particularly be enhanced by applying methods of business intelligence (BI) which enhance large-scale intra and inter-firm knowledge exchange, offering destination suppliers reliable, up-to-date and strategically relevant knowledge, such as information about tourists' travel motives and service expectations, information needs, channel use and conversion rates, occupancy trends, quality of service experience and added value per guest segment (Min et al., 2002). However, although huge amounts of customer-based data are available in tourism destinations (e.g. tourists' website navigation, transaction and

L. Cantoni and Z. Xiang (eds.), *Information and Communication Technologies in Tourism 2013*, DOI: 10.1007/978-3-642-36309-2_14,

survey data, respectively), these valuable knowledge sources typically remain unused (Pyo, 2005; Höpken et al., 2011, p. 417).

The described problem is solved by conceptualizing, prototypically implementing and testing a novel destination management information system (DMIS) that applies methods of BI and data warehousing for the leading Swedish ski destination, Åre. The application supports knowledge generation by allowing knowledge transfer and absorption processes at the level of the destination management organisation and small and micro-sized enterprises. The architecture of a destination-wide data warehouse (DW), as central DMIS component, especially the underlying multi-dimensional data warehouse model (Inmon, 2002; Kimball et al., 2008) as well as the technical architecture and critical implementation issues are discussed. Finally, for testing purposes, selected examples of online analytical processing (OLAP) by using customer-based data stored in the developed destination DW are presented.

The paper is structured as follows: section 2 discusses the state-of-the-art of DW in tourism. Main section 3 presents the newly developed multi-dimensional data model for a central DW in tourism destinations: sub-section 3.1 evaluates existing data modelling approaches for DW; 3.2 introduces a literature-based set of indicators for decision support at the level of destinations; 3.3 elaborates the DW bus matrix and defines processes and dimensions; 3.4 exemplarily for the feedback process, presents corresponding fact and dimension tables, respectively. Section 4 evaluates the proposed DW architecture and multi-dimensional data model by presenting a prototypical implementation of DMIS for the leading Swedish ski destination of Åre. The conclusion section summarizes main results and sketches future research agendas.

## 2 State-of-the-art of data warehousing in tourism

Since the widespread adoption of computerized reservation and booking systems in the 1980ies, huge and comprehensive databases are available for all types of tourism transactions related to customers' booking and consumption behaviour (e.g. Passenger Name Record [PNR] databases of global distribution systems [GDS]; the Airline On-Time Performance database of the Bureau of Transportation Statistics [www.transtats.bts.gov/], etc.). Especially airline companies soon started to analyze customer data as input to process and product optimization. A prominent example in the area of revenue and yield management is the *DINAMO* system introduced by American Airlines in 1988 (Smith et al., 1992). Further early examples are: demand forecasting (Subramanian et al., 1999), prediction of cancellation behaviour and no-shows (Garrow & Koppelman, 2004) or customer segmentation (Min et al., 2002). Only recently, however, DM became important for all types of tourism branches because of its ability to discover unknown patterns in huge data bases, and, in contrast to most statistical methods, to also consider non-linear relationships (Olmeda & Sheldon, 2002; Magnini et al., 2003; Fuchs & Höpken, 2009; Höpken et al., 2011). Although, the potential of DM is not fully used in tourism yet, all major DM techniques are found to be applied: descriptive/explorative analyses are used in form of reports or OLAP, e.g. to visualize tourism arrivals per dimensions, like time/season, travel type or customer origin (e.g. *TourMIS;* Wöber, 1998; *Destinometer*; Fuchs & Weiermair, 2004). Methods of supervised learning (e.g.

classification, estimation and prediction) are used to explain tourists' booking, cancellation and consumption behaviour (Morales & Wang, 2008) or to predict tourism demand (Law, 1998; Chu, 2004; Vlahogianni & Karlaftis, 2010). As a method of unsupervised learning, clustering is one of the most heavily used DM technique in tourism typically applied to the task of customer segmentation as input to product positioning and differentiation, dynamic pricing or customer relationship management (Bloom, 2004). With the uptake of the World Wide Web the topic of web DM gained particular attention in tourism. *Web content mining*, i.e. the analysis of content from online tourism platforms and websites, especially deals with the analysis of user generated content (UGC), like tourists' comments in blogs or review platforms (Bronner & Hoog, 2011). Methods of text mining, typically based on statistical or linguistic approaches, are applied to feedback aggregation, opinion mining or sentiment detection (Kasper & Vela, 2011; Gräbner et al., 2012). *Web content mining* additionally deals with the extraction of knowledge about tourism markets and offers (Walchhofer et al., 2010). *Web usage mining* is dealing with the analysis of tourists' behaviour when using online platforms or websites. Although current applications focus on descriptive analyses, also supervised and unsupervised learning techniques have recently been applied in the tourism domain: e.g. customer segmentation for website adaptation and product recommendation (Wallace et al., 2004; Pitman et al., 2010), or sequential association rule mining for click-stream analysis (Jiang & Gruenwald, 2006).

Although, in general, DM techniques are used by all tourism stakeholders, especially for whole tourism destinations, a comprehensive approach and a systematic integration of data from different available data sources, based on a central DW, is still missing. Beside organizational constraints and privacy concerns, the main obstacle to realize a central DW is the absence of a homogeneous data model. Although approaches for modelling business areas, like retail & sales, procurement, accounting, human resource, E-commerce, etc. exist, an overall and general data warehouse model for the tourism domain and for tourism destinations is missing (Kasavana & Knutson, 1999). Several initiatives for homogeneously modelling data and processes in tourism took place in the past or are still active, e.g. UN-EDIFACT TT&L (www.unedifact.org), ANSI ASC X12I TG08 (www.x12.org), IFITT RMSIG (Höpken, 2004), Harmonise (Dell'Erba, 2005), and OpenTravel (www.opentravel.org), but these initiatives focus on operative processes and, thus, do not consider specific aspects and needs of a DW and consecutive analyses as input to decision support. TourMIS (Wöber, 1998) defined a data warehouse model for basic tourism indicators, like arrivals, visitors, etc., but does not cover all business processes and indicators relevant for a tourism destination.

## 3 Multi-dimensional data model for a destination data warehouse

A central and homogenous data warehouse is a prerequisite for destination-wide and stakeholder encompassing analyses (Kasavana & Knutson, 1999; Cho & Leung, 2002). This development step, however, typically fails due to the heterogeneity of available data and the absence of a common data model. Indeed, agreeing on relevant business indicators and underlying business processes and defining an expressive

destination DW model is a critical success factor for a powerful decision support system for tourism destinations (Pyo, et al., 2002).

### 3.1 Normalized vs. multi-dimensional data modeling

Compared to an operational database, a data warehouse is theme-oriented, time-oriented (periodic updates), integrated (aggregating data from different data sources) and invariant (new data are appended but existing data never changed) (Inmon, 2002). Two basic approaches for modeling a data warehouse exist: multi-dimensional models (Kimball, 1997) and normalized models (Inmon, 2002). As a modeling framework, multi-dimensional modeling (MDM) is a logical/conceptual design technique: a single dimensional model is composed of a fact table and several dimension tables. Facts, typically, show numeric and additive characteristics, which can be accumulated along a dimension. Thus, MDM is business process or transaction oriented, i.e. each MDM task models one business process. Accordingly, a master MDM diagram for a large company (or a tourism destination) may consist of 10 up to 25 single MDM diagrams; and each MDM diagram will have four up to 12 dimensions. To drill across, separate fact tables are linked together through conformed (i.e. shared) dimensions. This *dimensional modeling* approach (Kimball, et al., 2008) offers the advantage of a relatively simple and straight-forward database design, which supports even powerful analyses and is also relatively well understood by the end users. By contrast, the *fully normalized modeling* approach (Inmon, 2002) offers the advantage of a better support of data integration, because redundancies are avoided and the identification of inconsistencies is simplified (especially if inconsistencies should be solved in underlying operational databases as well).

Interestingly, by comparing the two approaches and their evolution during the last decade, a convergence into a unified approach can be observed, consisting of a two layer data model with a normalized data structure (to foster data integration) and a multi-dimensional data structure generated from the normalized data structure (to enable data analyses and OLAP). Kimball (1997) calls the first layer the Master Data Management and the second layer the *Data Warehouse*, while Inmon (2002) calls the first layer the *Data Warehouse* and the second layer *Data Marts*.

The concept of a normalized data model is especially relevant for companies aiming to overcome inconsistencies across different operational databases (even enabling to correct data in operational databases in a second step). For instance, in case of tourism destinations, the focus is not on reducing inconsistencies, but rather on enabling powerful analyses on data from the whole destination. Moreover, destination stakeholders are relatively independent from each other (compared to departments of one company). Thus, a normalized data model as basis for eliminating inconsistencies between source systems is not of high priority or unrealistic. Rather, due to destination stakeholders' autonomy, overlapping parts across different systems are relatively rare (e.g. typically no overlapping products) and, thus, inconsistencies across different systems unlikely. Consequently, for a tourism destination a normalized data model seems dispensable, while the direct integration of source data into a homogeneous multi-dimensional structure seems most appropriate.

### 3.2 Indicators for decision support

Based on a literature review (Ritchie & Ritchie, 2002; Pyo et al., 2002; Cho & Leung, 2002; Wang & Russo, 2007; Bornhorst et al., 2010) and qualitative input from stakeholders of the Swedish destination Åre gathered within a series of requirement definition workshops, a set of business indicators are defined which fulfil the requirements for a powerful decision support (Pyo, 2005; Fuchs et al., 2011):

1. *Economic performance*: bookings, overnights, prices, turnover, occupancy
2. *Customer behavior*
    a. *Website navigation & search*: sessions, page views, search terms, referrer sites
    b. *Booking and consumption behavior*: booking channels, conversion rates, days to arrival, length of stay, cancellations, (spatial) guest tracking
    c. *Customer profile*: country of origin, age, gender, skiing travel behavior, customer life time value, average/last length of stay, preferred type of accommodation, preferred mode of accommodation booking, preferred mode of transportation, purpose of visit
3. *Customer perception & experience*
    a. *Destination brand awareness*: destination brand visibility, customers' destination knowledge, used information sources
    b. *Destination value areas (functional & emotional)*: skiing & non-skiing winter activities, summer activities and attractions, services and features, atmosphere, social interaction
    c. *Value for money and customer satisfaction*: functional value, emotional value (e.g. fun and excitement), satisfaction
    d. *Loyalty*: cognitive, affective and conative loyalty

Additionally to the indicators listed above, corresponding OLAP and data mining analyses have been defined as part of the requirement definition process. OLAP analyses especially define relevant context dimensions for indicators (e.g. bookings per time period, per customer, etc.) and will, thus, serve as basis for the empirical evaluation of the proposed data warehouse architecture.

### 3.3 Processes and dimensions – the data warehouse bus matrix

Table 1 presents processes and dimensions defined by the multi-dimensional data model for a destination data warehouse. In general, business processes should be modelled on the most detailed level of granularity in order to enable flexible and powerful analyses (Kimball, et al., 2008). Accordingly, the data warehouse bus matrix in Table 1 shows business processes (column one), business indicators originating from the business processes (column two), the fact type (column three; T (transaction) = one entry per transaction, PS (periodic snapshot) = one entry per each period in time, AS (accumulated snapshot) = one entry covering all phases of a process), and dimensions linked to the processes.

**Table 1.** The Tourism Data Warehouse Bus Matrix

| | | | Dimensions | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Business Process** | **Indicators** | **Fact type** | Time | Date | Customer | Cust. Usage Profile | Cust. Demographic Profile | Product | Vendor | Supplier | Channel | Location | Feedback | URI | Session | Survey | Marketing |
| Information Request | 2A | T | x | x | x | x | x | x | | x | x | | | | | | |
| Web Navigation | 2A | T | x | x | x | x | x | x | | x | | | | x | x | | |
| Booking | 1, 2B, 2C | AS | x | x | x | x | x | x | x | x | x | | | | | | |
| Stay | 1, 2B, 2C | AS | | x | x | x | x | | | | | x | | | | | |
| Consumption | 1, 2B, 2C | T | x | x | x | x | x | x | x | x | | x | | | | | |
| Location Tracking | 2B | T | x | x | x | x | x | | | | | x | | | | | |
| Feedback | 3A-D | T | x | x | x | x | x | x | x | x | x | x | x | | | x | |
| Capacity | 1 | PS | | x | | | | x | x | x | | | | | | | |
| Marketing Activity | 1 | T | | x | | | | x | x | x | x | | | | | | x |

In detail, the multi-dimensional data model for tourism destinations defines the following business process:

- *Information request:* customer requests for information about the destination (e.g. products, prices, etc.) issued via the destination website, third-party websites, travel agencies or by phone or email; represented by time and date of the request, the requesting customer (together with his usage and demographic profile), the corresponding product and supplier, and the used channel (e.g. web, phone, etc.)
- *Web navigation:* detailed customer online navigation behaviour on the level of single page views (URI); represented by time and date of page view, customer, product (and its supplier) related to the viewed page, session and URI
- *Booking:* customer bookings of single products, together with change or cancellation status (thus, constituting an accumulating snapshot); represented by time and date of booking, customer, booked product (together with vendor and supplier) and booking channel (e.g. phone, web, etc.)
- *Stay:* individual overnights and stays in a tourism destination (on a per-day basis), covering also same-day visitors or tourists arriving without prior booking; represented by date of stay, customer and the concrete location of stay

- *Consumption:* consumptions of single products or services of any kind, e.g. food and beverage, souvenirs, tickets, etc. (on a per-day and per-person basis, where appropriate); represented by time and date of consumption, consuming customer, consumed product (together with vendor and supplier) and the concrete location of consumption
- *Location tracking:* movements of customers within the destination; represented by time and date, customer and the reached location, e.g. point of interest or (rastered) GPS coordinates
- *Feedback:* structured and unstructured customer feedback, like ratings, comments, etc.; represented by time and date, customer, related product (together with vendor and supplier), channel used (e.g. web, offline survey), concrete location the feedback relates to, a description and categorization of the question or topic the feedback is given to (dimension Feedback) as well as the corresponding survey, if appropriate
- *Capacity:* provided capacity (by number of units) of products or services on a per-day basis (periodic snapshot); represented by the date and offered product (together with vendor and supplier)
- *Marketing activity:* marketing activities and corresponding investments executed by the destination; represented by the time period (date), related product (together with vendor and supplier), marketing channel and characteristics of the marketing activity, like campaign name, type, etc.

Most dimensions in Table 1 are used by several business processes and, thus, such processes share the same physical table in the DW. One customer, for example, who typically executes several processes, like web navigation, booking, consumption and feedback, is stored only once in the customer dimension table and can, thus, be easily identified across different processes. Such conformed dimensions interlink different processes and enable cross-process analyses, like identifying interesting and previously unknown relationships between customers' booking/consumption, web navigation and feedback behavior, respectively (Kimball, et al., 2008).

### 3.4 Fact and dimension tables (of the feedback process)

The fundamental design principle of multi-dimensional modelling is the separation of *facts* and *dimensions* (Kimball, 1997). Facts, on the one hand, are single information pieces which are looked at from different perspectives during analysis and correspond to the indicators defined in 3.2. Dimensions, on the other hand, are the perspectives for looking at the facts. Typically, several dimensions are linked to one fact table; a fact table together with its dimensions can be visualized as a star schema. Exemplarily for the feedback process, Fig. 1 shows the typical star schema: the fact of the feedback process is the single value from customer feedback (i.e. a questionnaire rating score ranging from 1 to 5), whereas typical dimensions are the data and time the feedback is given and the corresponding product and location the feedback is related to. Fig. 2 presents a more detailed visualization of the dimension *date*, thus, especially illustrating attribute hierarchies as an important concept of multi-

dimensional modelling to support drill-up and drill-down functionality within OLAP analyses.

It is, finally, important to note that each single customer feedback (i.e. answer to one question within a questionnaire) is stored in the data warehouse as a single entry in the feedback fact table. The questionnaire item the customer feedback belongs to is stored in the specific dimension *Feedback*. Thus, customer feedback is modeled in a dynamic manner, meaning that new surveys with new questions can dynamically be added without having to change the data model itself. Additionally, as customer feedback is stored on the most detailed level of granularity, the maximal number of dimensions can be linked to customer feedback, thus, enabling quite powerful and flexible OLAP analyses (Kimball, et al., 2008).

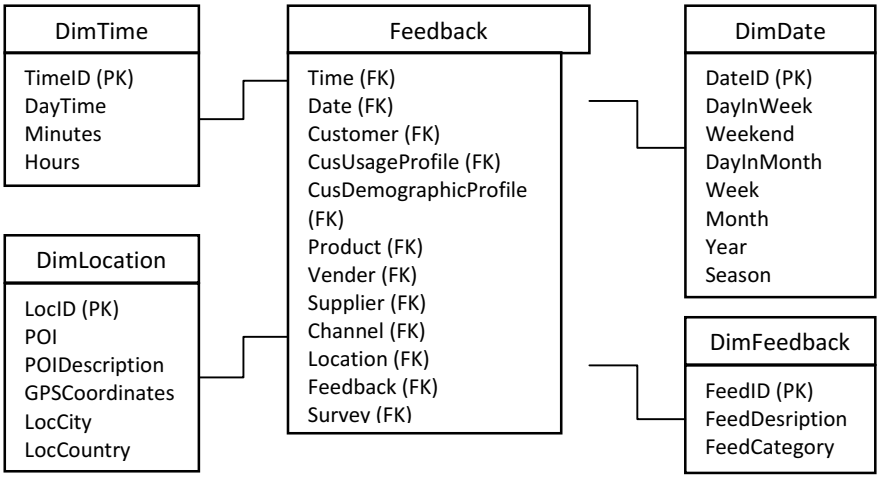



**Fig. 1.** Star schema with fact and dimension tables for feedback process

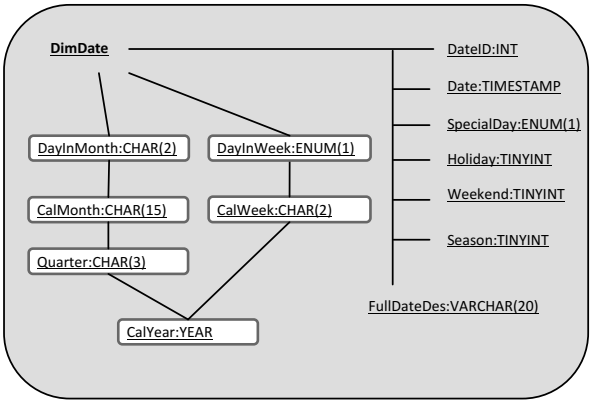



**Fig. 2.** Date dimension with attribute hierarchies

To sum up, this is only one example demonstrating crucial aspects of data warehousing in a tourism destination context: In order to achieve a powerful DW solution, it is most important to provide an expressive and carefully designed multi-dimensional data model, rather than trying to reach the same goal by complex and typically not user-friendly analyses functionalities.

## 4 DMIS prototype

In the course of the DMIS requirement engineering, beside business indicators itself, also corresponding visualization and analysis functionalities have been defined with destination stakeholders. Based on a prototypical implementation of the DMIS for the Swedish destination Åre, the suitability and effectiveness of the proposed DMIS approach in general and the data warehouse model in specific have been proved. Fig. 3 illustrates the overall technical DMIS architecture, the different components and their interplay.

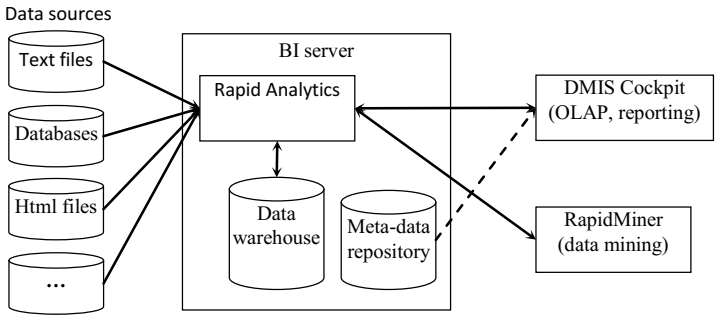
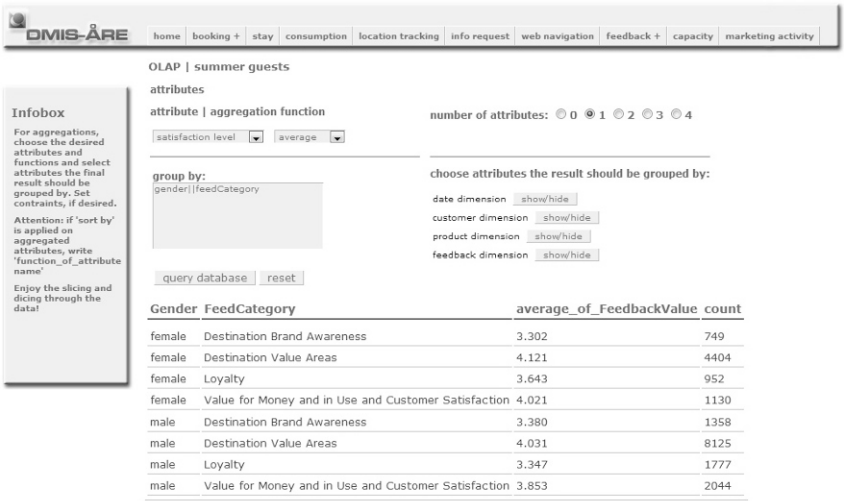



**Fig. 3.** Technical architecture and components of DMIS

Information are extracted from any type of data sources at the tourism destination (e.g. text files, databases, html files), transformed into a homogeneous format and loaded into the multi-dimensional structures of the destination data warehouse by business process and data source specific ETL processes based on the Rapid Analytics BI server. Depending on accessibility of data sources and criticality of up-to-date information, ETL processes are executed following different chronologies, like periodically, event-driven or on-demand (Kimbal et al., 1998). The DMIS cockpit supports reporting and OLAP analyses and grants tourism managers and business analysts real-time access to the data stored in the data warehouse. The DMIS cockpit is developed as *html* web application, enabling a fully dynamic and data structure independent OLAP functionality, making use of the meta-data repository. The RapidMiner data mining software enables specialised business analysts to execute powerful data mining processes, like classification, estimation or prediction (Höpken et al., 2011).

Fig. 4 shows the DMIS cockpit user dialog for executing OLAP analyses. The user (1) selects the facts (or attributes in general) to be shown, together with the approriate aggregation function, (2) defines one or several attributes (i.e. dimension

characteristics) the data are grouped by and (3) specifies constraints the data are filtered by, if necessary. Fig. 4 shows an example OLAP analysis for feedback data. The selected fact is the feedback value itself (i.e. 1= totally unsatisfied; 5= totally satisfied), aggregated as average values. The data are grouped by the feedback category and customer gender. The example demonstrates the flexibility and understandibility of the OLAP approach, based on multi-dimensional data structures, as well as the effectiveness of the specific modelling approach for feedback data (described in section 3.4), enabling to flexibly compare average feedback values for different customer groups, feedback categories or even products, time periods, etc.




| Gender | FeedCategory | average_of_FeedbackValue | count |
|---|---|---|---|
| female | Destination Brand Awareness | 3.302 | 749 |
| female | Destination Value Areas | 4.121 | 4404 |
| female | Loyalty | 3.643 | 952 |
| female | Value for Money and in Use and Customer Satisfaction | 4.021 | 1130 |
| male | Destination Brand Awareness | 3.380 | 1358 |
| male | Destination Value Areas | 4.031 | 8125 |
| male | Loyalty | 3.347 | 1777 |
| male | Value for Money and in Use and Customer Satisfaction | 3.853 | 2044 |

**Fig. 4.** OLAP analysis for feedback data

## 5 Conclusion and outlook

The paper presented the architecture for a destination management information system (DMIS) and, as the main focus, a data model for a tourism destination data warehouse (DW). Starting from business indicators which fulfil the requirements for a powerful decision support, a multi-dimensional data warehouse model has been proposed and discussed by defining relevant business processes, facts and dimensions. Due to a sound literature review and input by domain experts the presented data model can claim reference status for tourism destination data warehouse modelling. Moreover, a prototypical implementation of the DMIS, focussing on DW and OLAP functionality for customer feedback processes, evaluated the overall architecture and successfully demonstrated the effectiveness of the multi-dimensional modelling paradigm in supporting powerful and flexible OLAP analyses.

So far, multi-dimensional modelling has been based on a DFM-like graphical notation (Dimensional Fact Model, Golfarelli & Rizzi, 1998) as well as detailed data definitions in Excel sheets. Resulting meta-data are stored in an XML-based repository. As a future research activity the suitability of the Common Warehouse

Meta-model (CWM, http://www.omg.org/spec/CWM/1.1/PDF/) or specific UML (Unified Modeling Language) extensions (UML profiles for multi-dimensional modelling; Dhawan & Gosain, 2009; Lujan-Mora et al., 2006) will be evaluated. In doing so, particularly an automated meta-data generation will be offered. A second future vein of research is the extension of the multi-dimensional data model in order to integrate DM models (e.g. cluster models, association rules) directly into the multi-dimensional structures. Cluster models, for example, can be integrated by adding a cluster-membership attribute directly into the corresponding dimension, or by adding a specific cluster dimension in case of clusters being built by characteristics from different dimensions. Similarly, frequent item-sets or association rules can be integrated as new fact table, but reusing existing dimensions like product, customer, date, etc. Hence, OLAP functionality can be reused to most flexibly visualize DM models.

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## 7 Acknowledgements

This research was financed by KK-Foundation project '*Engineering the Knowledge Destination*' (no. 20100260; Stockholm, Sweden). The authors would like to thank the managers Lars-Börje Eriksson (Åre Destination AB), Niclas Sjögren-Berg and Anna Wersén (Ski Star Åre), Peter Nilsson and Hans Ericsson (Tott Hotel Åre), and Pernilla Gravenfors (Copperhill Mountain Lodge Åre) for their excellent cooperation.

# What did they say about us? Message Cues and Destination Reputation in Social Media

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## Abstract

This paper focuses on destination reputation and how online conversations have changed the nature of destination marketing. In particular, structural equation modelling (SEM) was used to identify the importance of various cues within social media in defining the online reputation of a destination; message characteristics as well as the attitude of users to be "reputation seekers" were found to have a significant impact on opinions expressed about a destination in social media; other positive correlations were found among the role of being reputation seekers on the perception of the message characteristics, in particular the message sidedness, consistency, and the overall message's argument strength. A much weaker effect was found between the perception of a dominant opinion and trust towards online conversations. It is concluded that these results provide an excellent foundation for understanding user comments and therefore, managing social media within a destination marketing program.

**Keywords:** online reputation; eWord-of-Mouth; social media; message cues; place branding

## 1 Introduction

Online public opinions using various forms of social media are creating huge challenges for the tourism industry, which is intrinsically a 'reputation-dependent' domain. In particular, stories about visiting a destination that are created by travellers have been shown to substantially effect visits to a destination (Gretzel, 2006; Tussyadiah, et al, 2011; Xiang and Gretzel, 2009; Yang et al. 2008). As such, this issue represents a central concern for destination managers who try to manage the way the products and services within the destination are communicated. Indeed, several researchers (Morgan et al. 2003, 2004; Go and Govers, 2009) have noted that the emergence of social media has forced destination managers to rethink branding strategies (Xiang and Gretzel, 2009), suggesting a shift from an "architecture" brand perspective (Morgan et al. 2003; 2004), to a "live context perspective" where travel markets "are conversations," and where the monitoring of online conversations should represent the first phase of any destination marketing strategy.

Unfortunately, little research has examined the importance of the various messages contained within online conversations as they are proxies for public opinion (i.e., online reputation).Thus, this study focuses on identifying the importance of various

The original version of this chapter was revised. The erratum to this chapter is available at https://doi.org/10.1007/978-3-642-36309-2_48

L. Cantoni and Z. Xiang (eds.), *Information and Communication Technologies in Tourism 2013*, DOI: 10.1007/978-3-642-36309-2_15,

message cues supporting the online reputation of a destination and is based on studies in organizational reputation whereby the analysis of the intangible assets of an organization are defined by beliefs and attitudes shared among a group of stakeholders (Fombrum, 1996; Deephouse, 2000; Passow et al. 2005; Yang et al. 2008; Marchiori and Cantoni, 2012).It is argued that the results of this study will provide the necessary foundation for developing tools which can be used to assess or evaluate the huge amount of information (i.e., conversations) about how travellers perceive the destination, and therefore enable destination marketing organizations to design more effective strategies to attract prospective travellers.

## 2 Conceptual Development

### 2.1 Reputation in online media

Reputation is a complex construct which reflects the dynamics of modern society and is used by consumers to simplify information processing (Bergler, 1948).In tourism, the reputation of a destination is important as prospective travellers who do not have previous experience with a destination encounter several risks/limitations during their decision-making and therefore use the reputation of the place to guide their travel decisions. Recently, several researchers have noted that the role of recommendations from several second-hand sources, which act as reputation mediators, is crucial in this decision-making process (Fesenmaier, et al. 2006; Passow et al. 2005; Yang et al. 2008).In particular in the online domain, word-of-mouth comments are generally found on social media websites and can be considered proxies of a dominant public opinion (reputation) as well as the readers (perceived reputation). Figure 1 provides a theoretical model of factors affecting the reputation of tourism destinations in online media.

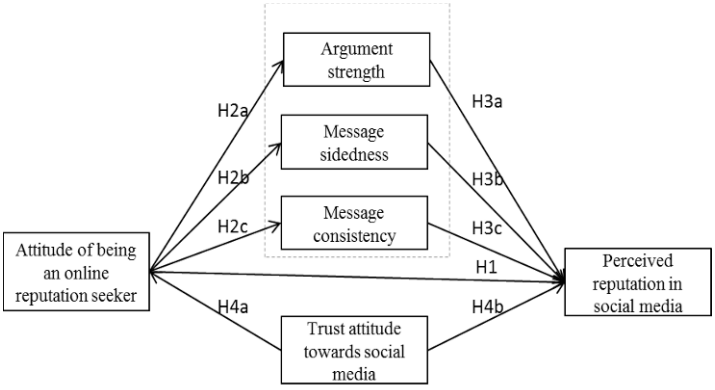


**Fig. 1.** Model of message cues and online destination reputation in social media

Importantly, this research suggests that the participation in the reputation creation process (either by contributing to the word of mouth or even viewing the comments) represents the verbalization of the opinions of that group of people, and eventually

influences their prior beliefs. From this research (and shown in Fig. 1), it is hypothesized that:

*H1: The extent of involvement in online media about a destination positively correlates with the online reputation of that destination.*

### 2.2 Online Message Components and Perceived Online Reputation

Recent tourism research also indicates that intention to visit a destination can be influenced by the exposure to online contents (Yoo et al. 2009; Dickinger, 2011), and that the analysis of user generated contents is an efficient way to measure travellers' attitudes, beliefs, and values about that destination (Dickinger et al., 2011). Moreover, Marchiori and Cantoni (2012) have argued that online users generally recognize a dominant online public opinion about a tourism destination. Dual-process theory (Deutsch and Gerard, 1955), a psychological theory designed for the analysis of the persuasiveness of received messages, provides a foundation with which to assess the basic cues for seeing and interpreting online messages, arguing that these messages must be noticed and interpreted as relevant and credible in order to generate an attitude/behaviour change. More recently, Cheung et al. (2009) evaluated the message components of Dual-process theory within the context of perceived credibility in eWord-of-Mouth. The results of their study demonstrate that several message components including the perception of argument strength (Cacioppo et al, 1983), message sidedness (a positive or negative polarity, Park et al. 2007), and message consistency (congruence with others' opinions, Cheung et al., 2009), are critical drivers in the mental elaboration of online conversations. Following from this research, it is posited that the elaboration of the messages present in online conversations affect one's perception of an online expressed reputation about a destination as well argument strength, message sidedness, and message consistency. Moreover, it is hypothesized that one's attitude toward being a reputation seeker affects his/her perception of the message characteristics expressed online. Thus, the following hypotheses were developed:

*H2a: Attitude of being a reputation seeker towards reputation in online media has a positive effect on a perceived argument strength.*

*H2b: Attitude of being a reputation seeker towards reputation in online media has a positive effect on a perceived message sidedness.*

*H2c: Attitude of being a reputation seeker towards reputation in online media has a positive effect on a perceived message consistency.*

*H3a: The message component "argument strength" has a positive effect on the perception of an online reputation of a tourism destination.*

*H3b: The message component "message sidedness (polarity of the message expressed online) has a positive effect on the perception of an online reputation of a tourism destination.*

*H3c: Online conversations' consistency has a positive effect on the perception of an online reputation of a tourism destination.*

Furthermore, a number of studies have examined the role of trustworthiness (defined by the trustee's ability, integrity, and benevolence) in determining one's attitudes toward online messages (Dickinger, 2011; Gefen et al. 2008: Yoo et al. 2011).The results from these studies indicate that user-generated content is generally considered

to be highly trustworthy whereby the information provider accepts the rules of conduct, is considered to be honest, and keeps promises (Dickinger, 2011).Yoo et al. (2011) found that trust in travel user generated contents increases the benefits travelers derive from its use in the course of planning pleasure trips. Therefore, in this study we posit that the trust attitude towards social media will affect the attitude of being a reputation seeker, suggesting that people search for the online expressed dominant opinion because they generally rely on online conversations. Moreover, it is hypothesized that that nature of attitude of trust towards online conversations will positively influence one's perception of reputation in terms of online expressed dominant opinion. More formally, it is hypothesized that:

*H4a: Trust attitude towards social media has a positive effect on being a reputation seeker.*

*H4b: Trust attitude towards social media has a positive effect on the perception of an online reputation of a tourism destination.*

## 3 Research Design

The research model was tested using the online survey method of people who currently use the Internet and travel. In particular, a panel of 120,000 American adults (18 years and older) who requested travel information about U.S. travel destinations from the travel website VacationFun.com were used as the sample frame for this study. In order to ensure variability in traveler perception, eight different U.S. tourism destinations were selected with the aim to represent the main American tourism destinations. A pre-screening of destinations in three main geographic American segments (East Coast, West Coast and Central) was conducted and a final set of eight destinations were selected on the basis of the population of a destination needed to be equal or greater than 300,000 inhabitants and the online content analysis pre-screening needed to have resulted in a negative polarity in at least one topic dimension. Two destinations were selected that had the extreme polarities (mainly positive or mainly negative): San Francisco was selected as the destination that was found to be positive in all the topic dimensions, and Detroit for being the destination that was found to be negative in the majority of the topic dimensions. The other six destinations (i.e., Kansas City, Las Vegas, New Orleans, Orlando, Phoenix, and Seattle) differed in terms of popularity and character. As such, the study adopted a quasi-experimental design whereby eight separate but almost identical surveys were developed. The data collection effort focused on the reputation (i.e., perception of a dominant opinion) about a tourism destination prior to and after exposure to "authentic" online conversations (i.e., stimulus materials) about a tourism destination.

A pilot study was first conducted with 10,000 American internet users in order to test the reliability and validity of the constructs; based upon this effort, minor adjustments were made. A final panel of 120,000 American travelers was divided into 15,000 contacts per each destination and were contacted on three separate occasions between July 23, 2012 to August 20, 2012.Responded that completed the questionnaire were entered into a lottery drawing of a $100 gift card. Based upon the process, 4,115 responses were obtain, of which 2,660 were usable; this represents a response rate of 3.4%, with an average of 332 completed responses per destination.

The survey included four sections where in Section 1 the subjects were exposed to the name of a tourism destination and were asked to indicate if they had visited it in the last 5 years. In Section 2 subjects were exposed to a list of 20 links that, if selected, opened screenshots (stimuli materials) of original online conversations related to the given tourism destination. Subjects were asked to select and *view at least one link* in order to proceed with the questionnaire. In Section 3, after the user had navigated among the stimuli materials, follow-up questions were asked, designed to cover the study constructs. Constructs regarding argument strength, message sidedness, and message consistency were adopted from Cheung et al. (2009), Cacioppo et al (1983), and Park et al. (2007). To measure the attitude towards reputation, and perceived reputation in online media, authors elaborated items from Deephouse (2000), and Marchiori and Cantoni (2012). Finally, the construct related to trust towards online conversations was adopted from Gefen et al. (2008), Yoo et al. (2011), and Dickinger (2011). All study items were measured using a 5-point Likert scales ranging from 1=Strongly Disagree to 5=Strongly Agree. Finally, Section 4 included demographic questions, which were asked in order to better understand the profile of respondents.

The creation of the stimuli materials for each destination followed a three step process:

*Step 1*. Query selection and links (URLs) collection: five search activities based on five topic-related keywords (one keywords-combination per topic search), were performed using Google (considering the first 3 pages of results) in order to gather the tourism destination's online representation. A total of 1,200 URLs (= 150 URLs x 8 destinations) were analyzed. Search topics covered the following five main tourism-related reputation thematic dimensions (Marchiori et al., 2010; Marchiori and Cantoni, 2012):

*Good value for money*. Keywords used: name of the destination + costs + accommodation + tips;
*Culture*. Keywords used: name of the destination + culture + tips;
*Overall image*. Keywords used: name of the destination + trip + experience + tips;
*Weather*. Keywords used: name of the destination + trip + weather + tips; and,
*Safety*. Keywords used: name of the destination + safety + tips.

*Step 2*. URL coding procedure: coders were asked to identify the links containing user generated contents/online conversations (Xiang and Gretzel, 2009), and per each page to define the main value of expressed judgments (sentiment polarity), using a 5-point Likert scale ranging from 1 (=contents in the page express mainly negative value judgments) to 5 (=contents in the page express mainly positive value judgments), and N.A. (Not Applicable = The item does not express any value judgment).
Among the 150 URLs gathered per each destination, an average of 25% presented online conversations. Inter-coder reliability has been calculated using ReCal2 (Freelon, 2010), obtaining a Krippendorff's alpha value greater than .90, resulting a high level of inter-coder agreement (Lombard et al., 2010). Table 1 shows the results of the online content analysis, presenting per each destination the distribution of the frequencies of positive and negative judgments expressed per topic dimension.

**Table 1.** The sentiment represented in the online content by destination.

| | Money | Culture | Image | Weather | Safety |
|---|---|---|---|---|---|
| Detroit | L | H | L | L | L |
| Kansas | H | H | L | H | L |
| Las Vegas | L | H | H | L | L |
| New Orleans | H | H | H | L | L |
| Orlando | H | H | H | L | H |
| Phoenix | H | L | H | H | H |
| San Francisco | H | H | H | H | H |
| Seattle | H | H | H | L | H |

L= Low: majority of sentiment expressed on the URLs is negative
H= High: majority of sentiment expressed on the URLs is positive

*Step 3.* Creation of the stimuli materials: from the URLs analysis, the four highest ranked URLs per each of the five topic dimensions have been selected to be used as stimuli materials in the form of a screenshot of the page. Figure 2 shows an example of the website of the highest ranked URLs for the dimension "safety" as it describes New Orleans.

Data were analyzed as an aggregate of all collected responses. Structural equation modeling (using the tool M-Plus) was used to evaluate the hypothesized causal relationships between the respective constructs.

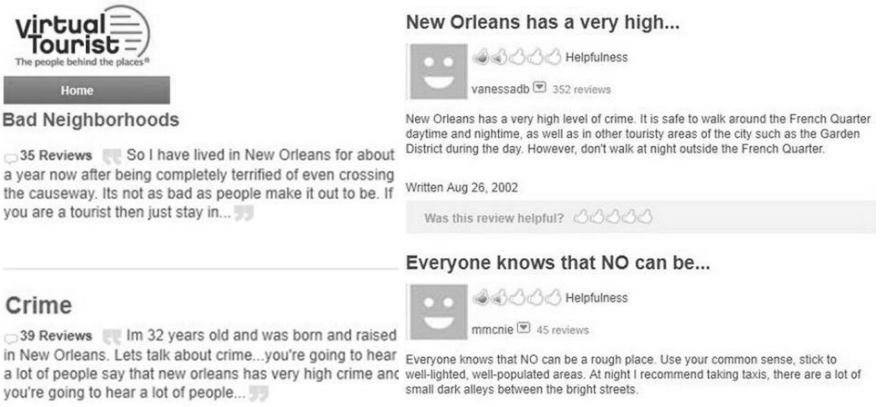


**Fig. 2.** Example of treatment: A mashup social media website for New Orleans

## 4 Results

### 4.1 Sample demographics

As can be seen in Table 2, the majority of respondents were female (68%), and 40+ years old. The majority of respondents declared to have completed a college (34.7%) and have an yearly income of more than $50,000. Almost 62% of them declared to be advanced Internet users or experts. Last, the majority of respondents had previously

read (or looked at) user-generated contents (e.g. photos and video) posted online about a destination. Among the eight tourism destinations, the ones most visited were: Las Vegas (30% of the respondents had visited the destination), followed by Orlando (29.8%), New Orleans (19.3%), and San Francisco (18.2%). The least visited destinations were: Detroit (8.5% of the respondents had vised the destination), Seattle (13.1%), Kansas City (13.8%), and Phoenix (18.2%). Out of the 20 stimuli materials proposed per each destination, respondents in average viewed between 1 to 5 stimulus (72.3%), the 22.4% viewed between 6 to 10 stimulus, and the 5.3% viewed more than 11 stimulus. The main topic viewed by the respondents was the "overall image", followed by online contents related to the value for money at the destination, then culture-tradition, safety, and lastly contents about the weather.

**Table 2.** Demographic characteristics of the respondents

| | | | |
|---|---|---|---|
| Male | 32% | Less than $20,000 | 4.30% |
| Female | 68% | $20,000-$29,999 | 6.00% |
| | | $30,000-$39,999 | 6.20% |
| 20 years and below | 0.50% | $40,000-$49,999 | 9.40% |
| 21-25 | 1.70% | $50,000-$74,999 | 18.90% |
| 26-30 | 3.90% | $75,000-$99,999 | 16.00% |
| 31-40 | 11.70% | $100,000-$149,999 | 14.00% |
| 41-50 | 22.20% | $150,000-$199,999 | 4.30% |
| 51 - 60 | 32.70% | $200,000 or more | 3.00% |
| 61 years and older | 27.20% | Do not wish to comment | 18.00% |
| Less than high school | 0.50% | Novice | 3.50% |
| High school | 9.20% | Intermediate User | 34.60% |
| Some college, not completed | 24.80% | Advanced User | 43.60% |
| Completed college | 34.70% | Expert | 18.30% |
| Post graduate work | 29.60% | Use of UGC | 79.60% |
| Do not wish to comment | 1.30% | Not use of UGC | 20.04% |

### 4.2 Measurement Model Analyses

Table 3 presents the descriptive and reliability statistics for the constructs in the research model in order to evaluate the extent to which each measurement item was internally consistent. As can be seen, the values for Cronbach's Coefficient alpha for most of the constructs substantially exceeded the required threshold value, with the only exception of perceived reputation having a Coefficient alpha of 0.67, which is only marginally acceptable.

**Table 3.** Descriptive and reliability statistics for constructs in the research model

| | Mean | Std. Dev. | Coefficient Alpha | Item |
|---|---|---|---|---|
| P_REP_1 | 3.87 | .725 | 0.669 | I have an idea on what other people online think about the destination. |
| P_REP_2 | 3.60 | .809 | | I think that the people online have a common opinion about the destination. |
| P_REP_3 | 3.63 | .780 | | I think that the people online have a common opinion about the destination only for specific aspects |
| ARG_1 | 3.78 | .793 | 0.891 | The contents are convincing. |
| ARG_2 | 3.65 | .836 | | The contents are persuasive. |
| ARG_3 | 3.64 | .838 | | The contents are strong. |
| ARG_4 | 3.82 | .820 | | The contents are good. |
| SIDED_1 | 3.76 | .922 | 0.731 | The contents stress positive implications about the destination. |
| SIDED_2 | 3.77 | .900 | | The contents stress favourable opinions of the destination. |
| SIDED_3 | 3.74 | .870 | | The contents include both pros and cons of the destination. |
| CONS_1 | 3.67 | .783 | 0.892 | Opinions posted in descriptions are consistent with each other. |
| CONS_2 | 3.62 | .777 | | Opinions posted in descriptions are similar to each other. |
| CONS_3 | 3.65 | .773 | | Authors of the descriptions had similar opinions about the destination. |
| CONS_4 | 3.59 | .782 | | Authors of the descriptions had similar experiences at the destination. |
| AT_REP1 | 4.07 | .724 | 0.880 | I try to understand the reputation of the destination presented online. |
| AT_REP2 | 4.01 | .784 | | I try to understand which aspects of the destination have a bad reputation online. |
| AT_REP3 | 3.96 | .767 | | I try to understand if the people online have a similar opinion about the destination. |
| AT_REP4 | 4.11 | .770 | | I try to understand if the people online posted travel experiences similar to travel experiences I would like to have. |
| AT_REP5 | 3.98 | .773 | | I try to recognize the main opinion posted in the social media. |
| AT_REP6 | 3.94 | .773 | | I try to recognize the contents which differ from the main opinion posted in the social media. |
| TRUST_1 | 3.68 | .779 | 0.808 | In general, I trust comments/materials posted by other travelers. |

| | | | |
|---|---|---|---|
| TRUST_2 | 3.73 | .832 | I feel confident that the comments/materials provided by other travelers are posted with the best intentions in mind. |
| TRUST_3 | 3.60 | .820 | The comments/materials posted by other travelers are a reliable source of travel information. |
| TRUST_4 | 3.59 | .942 | I trust reviews, ratings, and comments by other travelers more than evaluations provided in formal and official travel articles, etc. |

Column 1 displays the name of the variables used in M-Plus.

In order to further investigate differences in the perceived reputation between the tourism destinations analyzed, Tables 4 and 5 present the descriptive and reliability statistics of the respective constructs for each destination. As can be seen, the values did not vary greatly depending on destination, confirming the stability of overall construct measurement. However, the values of Cronbach's Coefficient alpha for the construct "perceived reputation" was less that than the required threshold value for five destinations out of eight (Las Vegas, New Orleans, Phoenix, San Francisco, and Seattle); additionally, the values of Coefficient alpha for the construct "message sidedness" was less than the required threshold for two destinations: Orlando and Phoenix. Further post hoc analysis was conducted to identify the most robust composition of the respective constructs; the results indicate that the initial constructs components were the most reliable, and as such, were used in the following analyses.

**Table 4.** Descriptive statistics for each destination

| | P_REP | | ARG | | SIDED | | CONS | | AT_REP | | TRUST | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Mean | St.Dv | Mean | St.Dv | Mean | St.Dv | Mean | St.Dv | Mean | St.Dv | Mean | St.Dv |
| Detroit | 3.65 | 0.61 | 3.57 | 0.71 | 3.20 | 0.74 | 3.51 | 0.69 | 4.01 | 0.61 | 3.56 | 0.66 |
| Kansas | 3.67 | 0.61 | 3.62 | 0.74 | 3.65 | 0.66 | 3.56 | 0.65 | 3.92 | 0.61 | 3.61 | 0.68 |
| Las Vegas | 3.67 | 0.64 | 3.67 | 0.71 | 3.84 | 0.75 | 3.67 | 0.69 | 4.03 | 0.61 | 3.65 | 0.70 |
| New Orleans | 3.70 | 0.57 | 3.74 | 0.69 | 3.74 | 0.68 | 3.56 | 0.76 | 4.03 | 0.60 | 3.64 | 0.69 |
| Orlando | 3.74 | 0.66 | 3.71 | 0.72 | 3.86 | 0.65 | 3.67 | 0.70 | 4.02 | 0.65 | 3.59 | 0.70 |
| Phoenix | 3.63 | 0.61 | 3.71 | 0.76 | 3.86 | 0.72 | 3.65 | 0.66 | 3.97 | 0.65 | 3.57 | 0.73 |
| San Francisco | 3.76 | 0.59 | 3.77 | 0.80 | 3.85 | 0.69 | 3.69 | 0.64 | 4.02 | 0.59 | 3.66 | 0.70 |
| Seattle | 3.70 | 0.61 | 3.79 | 0.73 | 3.89 | 0.73 | 3.68 | 0.68 | 3.98 | 0.61 | 3.63 | 0.73 |

P_REP = perceived reputation construct; ARG = argument strength; SIDED = message sidedness; CONS= message consistency; AT_REP = attitude towards online reputation; TRUST = trust attitude towards social media

**Table 5.** Cronbach's Coefficient alpha for each destination

| | P_REP | ARG | SIDED | CONS | AT_REP | TRUST |
|---|---|---|---|---|---|---|
| Detroit | 0.702 | 0.865 | 0.746 | 0.888 | 0.903 | 0.784 |
| Kansas | 0.735 | 0.905 | 0.748 | 0.896 | 0.886 | 0.825 |
| Las Vegas | 0.687 | 0.885 | 0.747 | 0.893 | 0.876 | 0.821 |
| New Orleans | 0.553 | 0.864 | 0.730 | 0.912 | 0.868 | 0.807 |
| Orlando | 0.705 | 0.891 | 0.696 | 0.885 | 0.877 | 0.793 |
| Phoenix | 0.634 | 0.897 | 0.639 | 0.893 | 0.890 | 0.808 |
| San Francisco | 0.651 | 0.911 | 0.706 | 0.865 | 0.858 | 0.814 |
| Seattle | 0.666 | 0.903 | 0.752 | 0.891 | 0.878 | 0.818 |

P_REP = perceived reputation construct; ARG = argument strength; SIDED = message sidedness; CONS= message consistency; AT_REP = attitude towards online reputation; TRUST = trust attitude towards social media

### 4.3 A model of drivers influencing the perception of reputation in online media

Figure 3 briefly summarizes the results of the SEM analysis where the overall goodness-of-fit measures were found to be within acceptable cutoff measures (CFI=0.912, TLI=0.900, $\chi 2/df \leq 2.5$, RMSEA=0.067, SRMR=0.097) (Kline, 1998); additionally, all of the regression coefficients were significant at $\alpha = 0.05$. R-squared values for the respective constructs have been reported in Figure 3. As can be seen, the three constructs related to the message characteristics have a positive and significant effect on the perceived reputation of a destination in online media (argument strength = .454; message sidedness = .057; message consistency = .316).

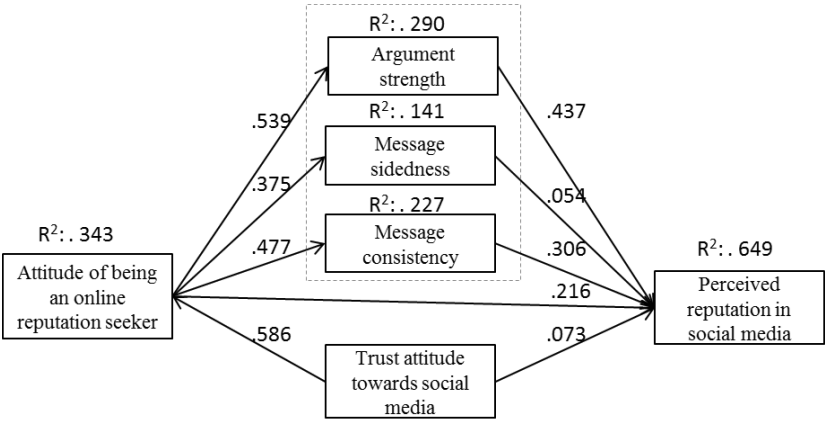


**Fig. 3.** Relationship between Message Cues and Destination Reputation

Also, the strength of one's attitude toward being a reputation seeker has significant and positive effect on the perception constructs related to the message characteristics (argument strength = .539; message sidedness = .375; message consistency = .477). Finally regarding the trust attitude towards online conversations, it was found to have a significant positive effect on the perceived reputation in online media; moreover, the trust attitude towards online conversations is a significant driver for being a reputation seeker in online media. Thus, all of the respective hypotheses are confirmed.

## 5 Conclusions

The results of this study clearly identify the role various message cues have on the perception of an online reputation – in particular, argument's strength, and message consistency. This result suggests that the main drivers to online destination reputation are the messages' persuasiveness and strength, and if those messages were congruent with the opinions of others. However, message sidedness, the perception of a polarity meaning the presence of a majority of negative or positive comments, are not significant, suggesting that sentiment polarity among the online conversations is not a main issue in travelers perception of destinations. Interestingly, the results also show that the ability to recognize a dominant opinion is driven by an attitude of being a "reputation seeker" (i.e., the attitude towards reputation in online media), suggesting an overall tendency of the respondents to be familiar with the concept of reputation, and an overall attitude to search online for the main opinion of others web users regarding a destination. Another interesting finding is importance that trust plays in online conversations and therefore, destination reputation. In particular, trust appears to lead to the attitude of being reputation seeker, suggesting that the more people rely on online conversations, the more they search for the dominant opinion expressed. Additionally when it comes to analyze the perception of a dominant opinion, the issue of trust resulted weak. This result suggests that, the role of who is posting online is not one of the main issues affecting the process of understanding a dominant opinion.

Last, results from the descriptive and reliability statistics of the respective constructs for each destination suggest room for improvement of the stimuli materials creation and the number of the stimuli to use in a quasi-experiment research design.

Therefore, future research should consider a further investigation of the items defining the perceived reputation construct in online media, and extend this research to cover actual web navigation. Moreover, an investigation of a possible change of prior beliefs after an exposure to online conversations should be conducted in order to estimate the role of the perceived online reputation in the mental representation of a place, and its related implication in the decision-making process. Furthermore, a comparison between participants who have visited the destinations and those who have not should be taken in order to understand the role of prior experience with the destination in destination reputation. Clearly, destination reputation is important tourism marketers in the management of the online presence of their tourism destinations. And an understanding of the message cues provided on social media is essential to this effort. It is hopeful that this study identifies some key considerations that they might consider.

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# Tourism Destinations as Digital Business Ecosystems

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## Abstract

Tourism has been experiencing very relevant changes since when Information and Communication Technologies (ICTs), in all their forms, have started to pervade the industry and the market. In the last decade, a new concept gained the attention of both researchers and practitioners, that of Digital Business Ecosystem (DBE). It can be considered as a technological infrastructure aimed at creating a digital environment to support and enhance networking between enterprises and stakeholders operating within a sector. Aim of this paper is to assess the extent to which the technological connection has affected the structural configuration of the tourism system and, specifically, of tourism destinations. The present study argues that two components can be considered when assessing the relationships among stakeholders within a tourism destination: a real and a virtual one. Further it shows how these two components are structurally strongly coupled and co-evolve forming a single system.

**Keywords:** digital business ecosystem, network analysis, tourism destinations, SMEs.

## 1 Introduction

In the last decades, Information and Communication Technologies (ICTs) have radically and unforeseeably changed society as a whole. New ways of collective human behaviour have appeared and individuals, society, and ICTs are today so deeply intertwined in a dynamic feedback process that a profound restructuring in the whole of human activities has occurred. Rather obviously, travel and tourism, as activities deeply rooted in human nature, have been retransformed as well, and the nature of the entire sector has been (and is still being) deeply modified. ICTs and travel and tourism have developed, since the beginning of their recent history, a strong relationship. The first ever industrial real-time computerized system is an airline reservation system (Sabre) and appeared in the early 1960s. Since then, Internet, ICTs and the so-called Web 2.0, have transformed the structure of the market value chain, altered the power position of stakeholders and generated opportunities and threats for all organisations involved in the tourism system (Berne et al., 2012; Buhalis & Law, 2008: Del Chiappa, 2013).

As well noted by the seminal work of Werthner and Klein (1999: 1): "Information technology does not only enable, but also induces changes", mainly for activities that rely so extensively on information exchanges such as travel and tourism. Broadly, it could be argued that with the World Wide Web commercial and business functions have been developed to a good level of sophistication thus making real the idea of a

L. Cantoni and Z. Xiang (eds.), *Information and Communication Technologies in Tourism 2013*, DOI: 10.1007/978-3-642-36309-2_16,

networked organization able to function without spatial or temporal constraints. Furthermore, digital marketing channels are impacting operational practices of firms, their functional structure and the way they operate in a globalised economic environment (CMO Council, 2011). This is particularly relevant in fragmented sector, such as tourism, where ICTs may allow small and medium enterprises (SMEs) to be flexible and efficient without suffering from market fluctuations, despite the disadvantages due to their size (Dini et al., 2008).

One question that arises today is: is there anything beyond what might be called an *anecdotal* evidence for the importance of the role played by ICTs in tourism? Is there some indication that this strong relationship is, or has become, deeper?

Aim of this paper is to examine this question by adopting an uncommon perspective, and assess the extent to which the technological connection has affected the structural configuration of the tourism system. We shall consider a tourism destination, the essential unit of study for understanding the phenomenon, and study the network formed by its physical and virtual components. When relationships are strong, it is natural to call for a concept such as the one of Digital Business Ecosystem (DBE), that can offer a different view for understanding the structural and dynamic behaviour of our object of study.

The paper is structured as follows. Section 2 introduces the concept of DBE and briefly discusses its application in the tourism field along with a short discussion on the main literature dealing with the analysis of coupled networks. Section 3 presents the methods used in this paper and section 4 discusses the outcomes of the analysis and the main implications. Finally, section 5 concludes the paper summarizing what presented and highlighting possible future developments for this line of investigation.

## 2 Digital business ecosystems

We can restate the development of modern ICTs observing its evolution from a simple tool to improve the efficiency of some task by automating operations to a complex system which plays a crucial role affecting the very essence of business processes not only from an operational point of view, but also, and more importantly, from a strategic point of view.

If we consider only the recent history (Nachira, 2002) we started from having available simple functions to exchange messages (e-mail). Then a new form of *mass communication* appeared. The World Wide Web has allowed unprecedented possibilities to make easily and cheaply available a wealth of materials to a wide and undifferentiated (in time and space) audience. As a consequence, commercial and business functions have been developed to a good level of sophistication so that the idea of a networked organization has become a reality, easing the capability to conduct business without having to be constrained by spatial or temporal factors.

The progress to a higher socialization of ICTs has now made much more relevant (and fashionable) the concept of digital business ecosystems. At the very beginning the concept was not well delineated and defined. The concept obtained a broad definition in the framework of a EU funded project (Nachira, 2002; Nachira et al., 2007). As reported (Nachira et al., 2007: 5) “The synthesis of the concept of Digital

Business Ecosystem emerged in 2002 by adding *digital* in front of Moore's (1996) *business ecosystem* in the Unit ICT for Business of the Directorate General Information Society of the European Commission".

The analogy used is the one with a natural ecosystem, the biological community of interacting organisms fully embedded in their physical environment. Thus, a DBE is a networked system which comprises the buyers, suppliers and makers of certain products or services, the socio-economic environment, including the institutional and regulatory framework (the business ecosystem defined by Moore, 1996) complemented by a technological infrastructure aimed at creating a digital environment for the networked organizations that supports the cooperation, the knowledge sharing, the development of open and adaptive technologies and evolutionary business models (Stanley & Briscoe, 2010). In others words, a digital ecosystem is a transparent virtual environment where open relationships between entities are established thus determining interaction and knowledge sharing, and where each entity is committed and cooperative (Boley & Chang, 2007). In a digital ecosystem "the network can be physical and logistical or virtual, can be local or global, or a combination of all the above" (Nachira et al., 2007: 8). The leadership structure is dynamic and may be formed and dissolved in response to any stimulus coming from the environment. Further, DBEs oscillate between multiple stable states without having a single optimal or equilibrium configuration (Salmi, 2001).

By its very nature a DBE is a complex adaptive system that exhibits properties of self-organization, scalability, dynamic adaptation to the environment (Baggio, 2008). In a DBE it is possible to recognize two main components: a *physical* one, composed of the business stakeholders in a certain economic or industrial sector and its *virtual* complement formed by the technological equivalents of these stakeholders. The two components are structurally strongly coupled and co-evolve forming a single system. The real part generates the virtual one, but, given the strong relationship between the two, all modifications, changes or perturbations originating in one of them rapidly propagate to the whole DBE (see section 2.2). The interactions within the combined network can be harmonised via ICTs or other traditional forms of coordination mechanism (face-to-face or technology mediated), thus confirming the idea that the offline and online worlds should be taken into account together when analysing a DBE (Dini et al., 2008).

Digital Ecosystems have been considered highly relevant especially in the case of highly fragmented sectors where a high number of SMEs are operating, as it is in the case of tourism. Indeed, in this circumstances, DBEs are considered being able to promote content sharing and Business-to-Business (B2B) interactions thus helping formation of dynamic, efficient and self-organising networks (Dini et al., 2008), to produce opportunities to form alliances and thrive in the network (Moore, 1993) and, finally, to expand the innovation ecosystem outside the firm boundaries thus enhancing the overall competitiveness (Karakas, 2009).

### 2.1 Tourism DBEs

Strangely enough, despite the vast literature on the crucial role ICTs have for the contemporary tourism industry, very little research can be found on the topic of digital business ecosystems in the tourism field. The term seems to be more a

fashionable way used by popular press to describe the strong relationship between tourism and ICTs rather than a lens through which to examine the structure and the behaviour of a tourism system.

The DBE perspective seems to be a promising and interesting topic to be investigated in the tourism sector as a whole, and in tourism destinations in particular. Based on existing research, a tourism destination may be considered as a cluster of interrelated stakeholders (both public and private) embedded in a social network (Baggio et al., 2010b). In such a network, an individual company's performance depends also on the behaviour of other companies and vice versa (Freeman, 1984; Del Chiappa & Presenza, 2012). Further, the performance of a tourism destination as a whole depends on the web of connections between the various players and not only on the intrinsic characteristics of the destination (March & Wilkinson, 2009). That said, it appears that the DBE and its support in enhancing network interactions can be pivotal for destination competitiveness.

The present work aims at exploring this somewhat neglected area of tourism research carrying out an empirical investigation in two tourism destinations by assuming that two components need to be considered at the same time: the real and the virtual one.

### 2.2 A digression on coupled networks

Network science has provided in the last years numerous tools for studying the structure and the dynamic behaviour of many complex systems present in nature, technology and society. Most studies have so far dealt with networks where vertices correspond to single elements or subsystems, and edges indicate interactions or relationships between vertices (da Fontoura Costa et al., 2011). However, a significant number of systems can be treated, more appropriately, as composite assemblies of interacting networks. Networks of different types, in fact, may combine in multiple ways and generate systems whose properties cannot be simply inferred by combining those of their constituents.

Saumell-Mendiola et al. (2012), for example, analyse epidemic spreading on interconnected networks and show that two networks well below their respective epidemic thresholds may sustain an endemic state when coupling connections are added, even in small number. Dickinson et al. (2012), find that in strongly coupled networks, epidemics occur across the entire system when a critical infection strength is overcome, while weakly-coupled systems exhibit mixed phases where an epidemic may occur in one network without spreading to the whole coupled system. Yağan et al. (2011) and Qian et al. (2012) study information spread in online social networks coupled to a physical network (made of firms, for example). They find that even if there is no full diffusion in the individual networks, an information epidemic can take place in the conjoint social-physical network.

Other authors examine the robustness of composite networks (Buldyrev et al., 2010; Vespignani, 2010). The failure of nodes in one network can lead to the failure of nodes in a coupled network that in turn can cause the escalation of failures in the first network, eventually leading to a complete disruption of the system. One consequence is that the value of the critical threshold is smaller than in an isolated network, suggesting that a collapse of the system will happen at a smaller level of sustained

damage. More importantly, in interdependent networks the fragmentation occurs with an abrupt transition. This makes complete system breakdown even more difficult to anticipate or control than in a single network.

## 3 Materials and methods

Two Italian destinations are used here to assess the structural composition of the tourism DBE. One is the island of Elba, a known marine destination whose main networked characteristics have been deeply analysed elsewhere (Baggio, 2007; Baggio et al., 2010a; da Fontoura Costa & Baggio, 2009). The second is Livigno, a mountain area studied by Mulas (2010). For both destinations the networks of core tourism stakeholders were assembled together with those formed by their websites. In these networks the links between the different actors were uncovered following the methods extensively described in Baggio et al. (2010a). In both cases the networked elements were classified into two main categories: physical elements, representing the "real" companies and organizations, and virtual elements, the websites belonging to the tourism stakeholders.

A first analysis was conducted in order to assess the self-organization characteristics of the two networks. The method chosen consists of finding, with a stochastic algorithm, the communities that arise from the distribution of the linkages among all the elements in the networks. The communities (or modules) are groups of nodes more densely connected between them than with other nodes in the network. A modularity index measures the goodness of the division in groups; it is defined as:

$$Q = \sum_i (e_{ii} - a_i)^2 \tag{1}$$

where $e_{ii}$ is the fraction of edges in the network between the nodes in group $i$, and $a_i$ the total fraction of links originating from the group and connecting nodes belonging to different ones. In other words, $Q$ is the fraction of all links that lie within a community minus the expected value of the same quantity that could be found in a graph having nodes with the same degrees but with a random distribution of the links. The index is always smaller than one; higher values indicate better separations of the communities. For easing the comparison between different networks with different numbers of communities, the index can be normalized by the number of modules $m$ (Du et al., 2009).

$$Q_{norm} = \frac{m}{m-1} Q \tag{2}$$

In the last years a wealth of possible techniques have been put forward and employed for detecting communities (for a thorough review see Fortunato, 2010). Here we chose a recent proposal by Karrer and Newman (2011). They use a modified version of blockmodelling for detecting the community structure in a network. The goal of blockmodelling is to reduce a large network to a smaller structure that can be

interpreted more easily. It is an empirical procedure centred on the idea that nodes in a network can be grouped according to the extent to which they exhibit some form of structural equivalence (Doreian et al., 2004). Usually the algorithm starts with some specified blockmodel. The solution is then found by iteratively changing the modules' compositions until a criterion function is minimized. As Karrer and Newman note, however (2011: 1): "most blockmodels, however, ignore variation in vertex degree, making them unsuitable for applications to real-world networks, which typically display broad degree distributions that can significantly affect the results". They use, therefore, a modified algorithm which takes into account the real degree distribution of the network analysed and show how the results obtained are greatly significant in highlighting the structural characteristics of the system that arise, independently from the nature of the components.

Once identified the communities in our networks we measured, for each module, the proportion of nodes representing the physical and the virtual components in order to assess the interrelation possibly present between them.

The second investigation concerns the efficiency of the digital ecosystem compared with the one of the pure physical component. To this aim, a *cost* was assigned to each links. Specifically, three different values were used: 1 for a link between two virtual elements, 2 for a link between a virtual and a physical element and 3 for a link between two physical elements. Although arbitrarily chosen, these values can reasonably represent the real-life efforts in establishing and maintaining such connections, as the analyses on transaction costs for real and virtual connections and operations has shown (Hagel & Armstrong, 1997; Rayport & Sviokla, 1995; Upton & McAfee, 1996). The efficiency of the weighted network are calculated at global and local level (da Fontoura Costa et al., 2007). They measure the capability of the whole system (global efficiency: $E_{Glob}$) or of a single node (local efficiency: $E_{Loc}$) to allow for exchanges (information, goods etc.). Network efficiencies depend strongly on the general topology of the network (number and distribution of connections), and are obviously influenced by the cost associated with each connection.

## 4 Results and discussion

The two networks examined show topological characteristics that clearly indicate their complex and heterogeneous structure (Baggio et al., 2010a; Mulas, 2010). This fact, as known, has significant effects on the dynamic behaviour of the system and on the processes that unfold over these networks, such as information diffusion and spreading, robustness or fragility, or self-organization in modular components (da Fontoura Costa et al., 2011; Newman, 2010). In particular, the distribution of the connections each node in the network has (termed degree distribution) exhibits a marked scale-free structure (power-law form degree distribution), a well-known signature of complexity. Moreover, this topology is almost identical (apart from some scaling constant) for both the physical and the virtual components of the tourism systems (see Fig. 1 which shows the cumulative degree distributions for the networks studied) .

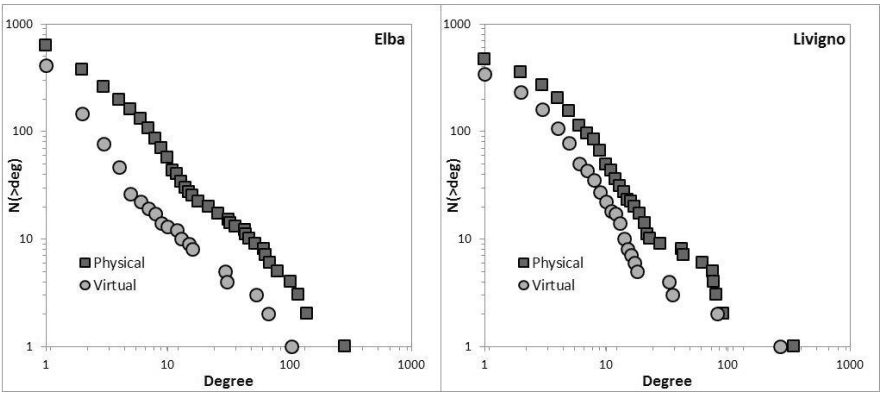


**Fig. 1.** Cumulative degree distributions for the physical and the virtual components of the Elba and Livigno networks

The modularity analysis recognises seven communities for the Elba network and eleven for Livigno. The normalised modularity index is $Q_{norm} = 0.1$ for Elba and $Q_{norm} = 0.5$ for Livigno, showing a much better separation of the latter's modules. This can be interpreted as due to a higher propensity to form cooperative groups by the Livigno's tourism operators. If we identify the nodes of these communities as belonging to the physical or the virtual components we obtain the situation depicted in Fig. 2. As can be seen, all modules have a mixed population and the distribution of both types of elements can be assumed to be rather uniform. On the average, a community in the Elba network has 48% of virtual elements and a Livigno community has 43%. The Gini coefficient, showing the uniformity of these proportions across all modules is 0.1 for Livigno and 0.2 for Elba (the coefficient is 0 for maximum uniformity, 1 for maximum inequality).

The first conclusion is therefore that from a structural point of view, the physical and the virtual components cannot be easily separated thus strongly reinforcing the idea that a DBE is more than just an anecdotic phenomenon. That said, it can be argued that the role of the virtual elements has become so important that they modify the very nature of the tourism systems considered.

Once ascertained the fundamental structural role of the virtual elements in a tourism destination, a study of the differences in the efficiency with which a network behaves when considered in its pure physical component or as an integrated real-virtual system can provide a stronger argument in favour of considering a DBE as such and not as a simple "addition" of two separate components.

In both our cases we calculated both the global and the local (individual) network efficiencies for the whole ecosystem and for the pure physical component. To make the analysis more realistic we considered, as stated in section 3, the "costs" of establishing and maintaining the relationship between different typologies. This analysis highlights well the contribution at all levels (for the whole system and for the

single stakeholders) of the structural modifications that the introduction of technological elements provides.

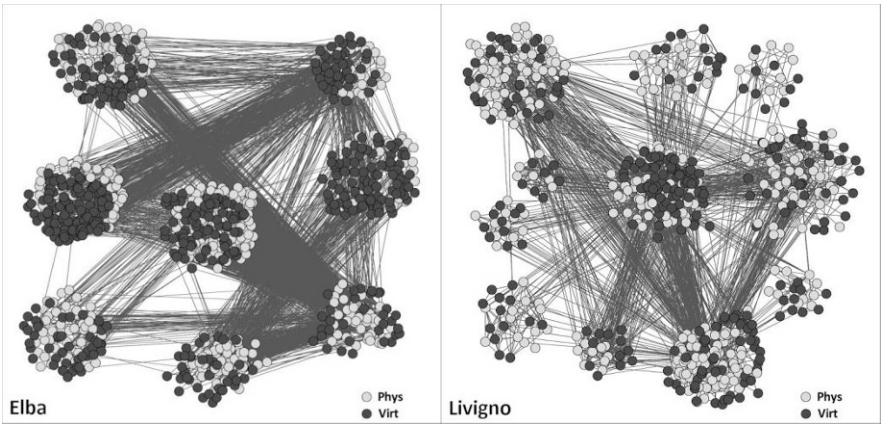


**Fig. 2.** The communities recognized by modularity analysis. Physical and virtual elements are identified

Table 1 reports the global efficiency coefficients for the cases examined. It is rather clear how the addition of the virtual component has a positive effect on the whole ecosystem.

**Table 1.** Global efficiency values

| **Component** | **Elba** | **Livigno** |
|---|---|---|
| Physical | 0.118 | 0.144 |
| Ecosystem | 0.154 | 0.188 |
| *Difference* | *31%* | *30%* |

Fig. 3 shows the cumulative distributions of the local efficiencies for the two networks. The case of the whole ecosystem and the one of the pure physical component are highlighted. Given the highly non-normal shape of the distributions, comparing means would be scarcely meaningful. Visually, the difference between the two cases is clear for both systems. In order to assess the significance of this difference, a number of non-parametric tests can be run. In our case the Wilcoxon signed ranks, the 2-sample Kolmogorov-Smirnov and the marginal homogeneity tests seem relevant (Sheskin, 2000; Siegel & Castellan, 1988). Table 2 reports the results; all of them confirm the visual impression with very high significance.

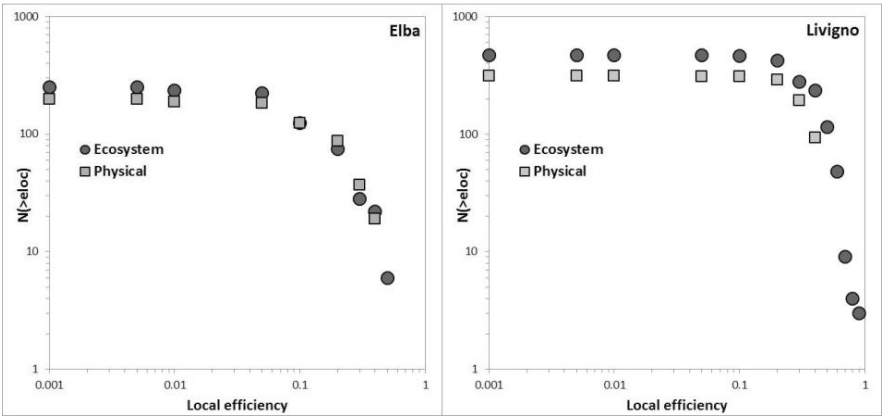


**Fig. 3.** Cumulative distributions for the local efficiencies

**Table 2.** Test results on the local efficiency distributions

| Test | Values | Elba | Livigno |
|---|---|---|---|
| Wilcoxon Signed Ranks | Z | -2.697 | -3.085 |
| | p-value (2-tailed) | 0.007 | 0.002 |
| 2-sample Kolmogorov-Smirnov | F | 0.105 | 0.209 |
| | p-value (2-tailed) | $<10^{-4}$ | $<10^{-11}$ |
| Marginal Homogeneity | Std. MH Statistic | -2.515 | 3.730 |
| | p-value (2-tailed) | 0.012 | $<10^{-4}$ |

All our initial hypotheses have thus been confirmed: the virtual component of a destination is a structurally crucial element, and its role is quite important in its effects on the dynamic behaviour of the system. Therefore the idea of considering a tourism destination as an integrated digital business ecosystem is not just a fashionable way of describing what happens today in the industry, but reflects a real intrinsic characteristic.

## 5 Concluding remarks

The strong relationship existing between ICTs and tourism leads almost naturally to considering a tourism system as an integrated ensemble in which both a real physical component (the companies and organisations active in the field) and a virtual one (the digital representations of the physical elements) act in a strongly coupled way. The resulting networked system can be seen as a digital business ecosystem in which the structure and the dynamic behaviour are of peculiar nature.

Despite the vast literature on the crucial role ICTs have for the contemporary tourism industry, still little research exists that analyses digital business ecosystems in the

tourism field. With this work, we investigate this somewhat neglected area of tourism research carrying out an empirical analysis of two Italian tourism destinations.

Findings revealed that the interrelationships between the real and the virtual world are so tight that it will be difficult, if not impossible, to consider them separately any more. The coupling has reached a stage where the two elements influence each other so deeply that the idea of a DBE is not only a fashionable way to describe a tourism destination, but reflects a real characteristic of the system.

Needless to say, the implications for both researchers and practitioners are important, as they have, at this point, not only a number of examples to demonstrate the importance of ICTs in their areas, but also a strongly theoretically based validation of what up to now could have been considered a "motivated feeling".

Specifically, this paper adds to the growing research which applies network analysis to study tourism destinations from a systemic point of view and suggests that both the real and virtual components need to be addressed when assessing interorganisational relationships. In fact, the virtual dimension has become a structurally crucial element, especially if the tourist area as a whole is characterised by a significant diffusion of technological instruments.

The outcomes assessing the strict relationship between the tourism destination networks that can be drawn based on real and virtual perspectives are relevant also for marketing practices. Indeed, they suggest that destination managers cannot treat the virtual world as a separate entity any more, but they should consider online activities not differently from all the other more traditional ones. Moreover, by favouring their diffusion and integrated usage, they could achieve a much better functioning of the system by increasing its efficiency both at a global and individual level. Finally, a secondary but not less important conclusion is the verification of the substantial similarity of the topologies of the virtual and physical components. This confirms the possibility, already stated elsewhere (Baggio et al., 2010a) of using the websites' network as a significant sample for the analysis of a tourism destination, which might greatly ease the data collection thus helping a growth in the application of network science in the study of tourism systems.

Although this study helps filling a gap in the existing literature and does offer some interesting implications for practitioners, it does have some limitations. In particular, the analysis of a narrow number of cases could be seen as a constraint on the outcomes presented here. However, the rigorous methodology employed coupled with the vast literature stating the crucial importance of ICTs in the tourism field, and other more general considerations on the validity of this type of case-study research (Flyvbjerg, 2006) allow us to confidently pose our conclusions as a general conjecture. More and more extensive studies will be able to confirm (or disproof) what attained in this paper.

Finally, a more extensive and deeper discussion on the importance of the DBE concepts in tourism is definitely needed. Space constraints forbid us to do it here, but future work on this issue is already planned.^

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# Attracting User Social Media Engagement: A Study of Three Budget Airlines Facebook Pages

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## Abstract

The role of social media has changed from information delivery to distribution channels. Budget airlines have used their Facebook pages to delivery promotional materials connect new customers, invite user engagement, and information distribution. One of the main purposes of wall posts is to invite user involvement. The results in this study indicated users interested on commenting wall posts which were "fresh", that means posts published within two days. In order to increase user engagement, airlines should keep publishing new wall posts so as to encourage users to "like" or "share" these information with their network. The company responses were not significant, only five, 14 and 17 responses were found for Air Asia, Easy Jet and Jet Blue respectively. The outcome of the study questions the role and suitability of social media tools for marketing purpose in the airline business especially in relation to other segments within tourism industry.

**Keywords:** Facebook, user involvement, user engagement, airline, social media

## 1 Introduction

The use of social media and Web 2.0 is frequently called as one of the "mega trends" within the tourism and hospitality industry (Xiang & Gretzel, 2010, p. 179) while this new form of application in information and communication technology (ICT) is changing the communication flow between businesses, business to consumer and consumer to consumer significantly (Au 2010, Jones & Yu, 2010; Kasavana et al., 2010; Kietzmann et al., 2011,).

Having a closer look, over 30% of the UK leisure travelers choose their accommodation on basis of social media sites like Tripadvisor or Facebook (Koumelis, 2011), while across the Atlantic in the United States roundabout 40 million shoppers use social media in their shopping experience (Renshaw, 2010). According to the European Travel Commission (2012), "Facebook is the traveller's social network of choice, with 29% using this platform for holiday inspiration, ahead of TripAdvisor (14%), Twitter (6%) and Pinterest (4%)." and is the largest cyber community, accommodating 11.5% of global population (Internet World Stats, 2012).

By analyzing the development of ICT in the industry, researchers proved that social media seem to be useful to intensify and match customer relations because of the

L. Cantoni and Z. Xiang (eds.), *Information and Communication Technologies in Tourism 2013*, DOI: 10.1007/978-3-642-36309-2_17,

possibility of in-depth penetration with individualized and relevant content (Wang & Fesenmaier, 2004; Kotler et al., 2006; Booz & Co., 2007). Dellarocas (2003) has point out that industry now has tools at their hands to understand and react to the needs of consumers better than ever. Varying levels of adoption do not only exist for the size of the firm but also extends to the industry type (Evans et al., 2000, Schegg et al., 2008). Mistilis et al. (2004) suggest that while airlines are early adopters, hotels are particularly slow in their uptake of new technologies. But in reality social media sites of airlines lack over these of hotels: it's all about accommodation.

This purpose of this study was to have a closer look on the use of social media in the tourism sector, focusing on the airline industry and their use of Facebook. The authors believe this question is of relevance because social media is not equally used the same way within the whole industry: some sectors like hospitality are more suitable to social media applications than other sectors for instance like transportation providers such as airlines in general and low-cost airlines in particular. The objectives of this paper are at first examine the overall use of social media within low cost airline sectors, and then how low cost airline reacts engage and influence users. Finally, it is of interest to know how low cost airline integrate social media with their business model.

## 2 Research Background

Prior studies discuss that social media plays an important role in tourism, not only for consumers hunting for travel information and decent trip insights but also for the supply side in terms of a new marketing tool (Chan & Denizci Guillet, 2011; Arlt & Thraenhart, 2011; Huang, 2011; Xiang & Gretzel, 2010; Minghetti & Buhalis, 2010). In a brief review, this research background sums up the recent work done on social media applications in tourism focusing on publications of the past two years. These studies were segmented according to the 4 P's of marketing proposed by McCarthy (1960), product, price, place (distribution) and promotion.

There were limited studies analyzed the application of social media tools that support or provide hard selling tourism products. Studies related to recent research cover only hospitality sector but not airlines (Chan & Denizci Guillet, 2011, Noone et al., 2011). Besides, many prior studies examined internal processes and management functions (Huang, 2011; Inversini & Cantoni, 2011; Isacsson & Gretzel, 2011; Lee & Wicks, 2010; Leung et al., 2011; Li & Wang, 2011; Liburd et al., 2011; Pantelidis, 2010; Sigala, 2011; Stringam & Gerdes, 2010; and Stankov et al., 2010), and several scholars analyzed how social media tools are used for promotional purposes (Chan & Denizci Guillet, 2011; Huang, 2011; Huang, Yung, and Yang, 2011; Inversini & Cantoni, 2011; Leung et al., 2011; Kasavana et al., 2010; and Munar, 2010). When looking at the sectoral focus, majorities were again used hospitality as subject of analysis, and the remaining covered the tourism sector in general. None of them focused on the airline sector. As mentioned before, social media seems suitable for intensifying customer contact (communication). Several studies analyzed the use of social media in terms of their application on customer contact, market research and relationship management but none of them were focused on "promotion" (Chan & Denizci Guillet, 2011; Kasavana et al., 2010; Kim & Hardin, 2010; Pantelidis, 2010; Sánchez-Franco et al., 2010; and Sigala, 2011). Moreover, the effect of social media

tools on pricing in tourism, and use of social media for distribution purposes has been overlooked by researchers.

In summary, many prior studies did not concentrate or differentiate the marketing function or focused on specific sectors using social media. As stated above, many studies were widely covered several areas, only few studies concentrate on single topic. If there is a tendency in terms of analyzing single sectors of the tourism industry, the accommodation segment was given favor among all these studies. This complies with Fuchs et al, (2009) and Sánchez-Franco et al. (2010) findings that especially numerous hotels and tourism businesses have made social media tool as part of their marketing mix. This leads to the result that airline sector is not very well covered in terms of analyzing the application of social media. This is interesting because on one hand, airlines were probably the early adopters of Internet-based technologies within their marketing mix. On the other hand, this sector seems to be always overlooked by researchers. Social media emphasis on interaction between customer and organization, as a result, customers expected feedback from the organization. Word-of-mouth, could influence corporate image (Lin & Lu, 2010) so organization should pay attention to customer complains, customers' travel experiences or anything related to service recoveries.

## 3 Methodology

Taking all social network sites into account, Facebook seems to be largest cyberspace, with its members covering 12% of the world's population (Internet World Stats, 2012). This study examined the Facebook pages of the three budget airlines including Air Asia, Easy Jet and Jet Blue. These three airlines were the most popular one in Asia, Europe, and North America respectively and the use of social media tools is within their marketing mix in opposite to, for instance, Ryanair or Southwest Airlines, which are focusing on true low-cost with minimized marketing presence. The three selected airlines are comparable, because they actively maintain the community via social media for marketing purpose, and their product and brand image are very similar to each other as well as the customer segments. These three airlines present their products as a lifestyle for a hybrid customer segment, which is looking for a tailored but fashionable "low-cost some-frills" product beyond a very low fare and different image such as Ryanair or Southwest Airlines. These two airlines are following a pure low-cost no-frills policy, using the price as their one and only principle in marketing. Their pricing strategies are different from the three selected airlines. Ryanair did not have Facebook or Twitter account, and adopted a very basic use of ICT to communicate with the customer. Therefore it is excluded in this study.

Data were collected from 15 June to 10 August 2012. Facebook wall posts which were published from 15 June to 31 July 2012 were captured into an Excel worksheet. This date range was selected because all three airlines have popular wall posts with a dramatic increase in "people talking about this". This statistics added up all counts of likes, shares and users' comments. As each airline owned more than one Facebook page, only the global and official pages were included in this study, all other regional pages or fan pages were excluded. The data collected, focused on the four steps to engage customers: user connection, user engagement, influential power, and integration functions. These four steps were proposed by Facebook during their

marketing conference (Facebook, March 2012). First, airlines must get users connected before they could start any marketing activities on social media. To get them connected, users must be able to locate the social media pages via the airline official online channels such as websites. Then airlines should get users engaged via interaction over time. Inviting them participate lucky draw, competitions, and online games could encourage users actively engage with the page. Prior study confirmed word-of-mouth, especially recommendations from friends, could influence users' perceptions and corporate image (Lin & Lu, 2010). Therefore it is very important to encourage users to share the company information, especially promotional materials, to their friends so as to increase the influential power. Finally, as people frequently engaged with Facebook, the Facebook page should not only use as information distribution channel, but also should act as business channels. As a result, certain airline business functions should be integrated into the Facebook page.

To examine the performance of the three budget airlines, 13 types of data were collected from their Facebook page for further analysis. To examine the connectivity, the airline official websites were visited on 31 July 2012 to check if there were any linkages from the website to the social media. Then the weekly data on "number of new likes" and "number of people talking about this" were captured. For measuring the user engagement, the content of the wall post within the study period were captured. The influential power of each wall post could be examined by calculating number of shares, user comments, and the likes from the user friends' network. Finally, the number of Facebook applications available were collected for examine the system integration. Table 1 summarized the types of data collected for this study.

**Table 1.** Types of data collected from airlines' Facebook page

| **Types of Association** | **Data collected from Facebook Page** |
|---|---|
| Connect | 1) Linkage to Facebook page from official website; 2) No. of likes; 3) no. of new likes; |
| Engage | 1) No. of people talking about this; 2) No. of post per day; 3) post types; 4) users' comments |
| Influence | 1) No. of post by the airline; 2) No. of shares; 3) No. of comments; 4) No. of likes of user's comments |
| Integrate | 1) No. of Facebook apps; 2) types of apps |

## 4 Findings and Discussions

### 4.1 Connecting Users

Connecting users here refer to whether there is any links from official website to Facebook and how many users were connected to the Facebook page. Social media is very popular among business world so it was quite surprise to found that Easy Jet's website did not provide any linkages to any of the social media sites. Easy Jet fans may need to pay extra effort to locate the official Easy jet Facebook page as there is no direct linkage between the company website and Facebook. For both Air Asia and Jet Blue, these two websites provided icon linkage connecting Twitter, YouTube,

Facebook, and their blog. As a result, the total numbers of likes and the total number of new likes were the lowest among the three. Table 2 presented the statistical data collected from the airline Facebook page that was collected on 15 June 2012.

**Table 2.** Airlines Facebook page user connection statistics

| | **Air Asia** | **Easy Jet** | **Jet Blue** |
|---|---|---|---|
| Social media link available on airline website home page | Twitter, YouTube, Facebook, blog | Not Available | Twitter, YouTube, Facebook, blog |
| Total no. of likes | 1,554,796 | 108,073 | 629,695 |
| Average no. of new "likes" per day | 814 | 213 | 321 |
| Airline base continent | Asia | Europe | North America |

### 4.2 Engaging Users

Air Asia accumulated 1.5 million likes while Jet Blue had attracted around 630,000 likes from their page. Though there were only 108,000 total likes in East Jet's page, these fans were found relatively involved in the Facebook activities when we comparing the "numbers of people talking about this". The ratio of "talking about this" to total likes for each airline was 1.42%, 4.85%, and 0.91% for Air Asia, Easy Jet and Jet Blue respectively. This ratio indicated Easy Jet's users have the highest engagement via the Facebook page among three airlines. Though their fans size was small, however, a company may want to engage an "active" Facebook fans which may bring higher influence power that we would cover in next section.

From the data collected, Air Asia has the highest number of wall posts and highest average number of posts per day (85 wall posts, 1.81 posts per day) within the study period. Easy jet ranked second with 53 wall posts (1.13 posts per day), and Jet Blue has posted 46 wall posts which imply 0.97 posts per day. As mentioned before, the more users' comments and share, the higher influential power the post would be.

All 184 wall posts were classified into six categories including promotions (special fare, new routes promotion, and new apps promotion), sharing (external link sharing, photo and videos sharing, and profile update), announcement (company announcement, ad hoc emergency announcement, and pre-promotion announcement), invite engagement (photo competition, lucky draw, guessing games, interactive games, and polling), celebrities at destination (announcement of celebrities visiting a destination), and user involvement (photos posted by customers to the wall and were highlighted by Jet Blue administrator). Among all six categories, 28% of post belongs to promotion, 20% belongs to information sharing, and 15% belongs to announcement. 14% were invite user engagement, 8% were announcement of celebrities visiting one of the flight destinations, and 16% comes from user involvement. Interestingly, promotion post was not the main focus of Easy Jet and Jet Blue. For Easy Jet, around 55% of the wall posts were from the customers. Apparently Easy Jet intentionally selected some interesting users post published on their wall. This can arouse users' interest to upload their interesting Easy Jet fleet photos to the wall. Majority of the posts were the photos of Easy Jet's fleet taken by

the customers. This can encourage more users to share their feelings about Easy Jet with others via the Facebook page. For Jet Blue, 46% of the posts were related to link sharing including videos and photos sharing. Several company public announcement links were also published here. The social media approach among three airlines has significant difference. Air Asia mainly adopt Facebook page as their marketing channel therefore majority of the wall posts were related to ticket promotion. For Easy Jet, although they did not have large number of fans connected, their encourage users to post on the wall. For Jet Blue, their posts mainly linked to external URL could redirect their Facebook user to their destination pages so as to obtain more comprehensive information (Table 3).

**Table 3.** Statistics of Airlines Wall Posts

| | Air Asia (%) | Easy Jet (%) | Jet Blue (%) | Total (%) |
|---|---|---|---|---|
| Promotion | 35 (41) | 13 (25) | 4 (9) | 52 (28) |
| Sharing | 12 (14) | 3 (6) | 21 (46) | 36 (20) |
| Announcement | 18 (21) | 2 (4) | 8 (17) | 28 (15) |
| Invite engagement | 10 (12) | 6 (11) | 9 (20) | 25 (14) |
| Celebrities at Destination | 10 (12) | - - | 4 (9) | 14 (8) |
| User involvement | - - | 29 (55) | - - | 29 (16) |
| Total no. of wall post | 85 (100) | 53 (100) | 46 (100) | 184 (100) |
| Average no. of wall post per day | 1.81 | 1.13 | 0.98 | |
| Highest no. of post per day | 5 | 5 | 3 | |
| Average weekly "people talking about this" | 22,098 | 5,246 | 5,744 | |
| Total no. of users' comments | 4,945 | 506 | 2,716 | |
| No. of company responses | 5 | 14 | 17 | |

Although the user engagement among all three airlines were quite successful, it was not common to see the company response to users' comment. From the data collected, Air Asia has only five responses which were the lowest among all three. Although Easy Jet and Jet Blue have a higher response rate, there were only 14 and 17 responses.

### 4.3 Influential Power

The purpose of publish a wall post has two fold, first to invite user engagement, and second is to influence potential customers via users' own network. From the statistics collected from Facebook's "number of people talking about this" that reflect the total number of shares, likes, and comments, the user reactions on company wall posts were somewhat different among three airlines. Fig. 1 indicated Air Asia's fans mainly interested in ticket promotion. When there are new promotion post appeared, users will share the information with their friends. For Easy Jet's fans, they mainly interested in involving the polling activities telling Easy Jet where they want to fly during summer holidays. For Jet Blue fans, they are more interested in the company announcement on new route.

By calculating the fans involvement ratio (highest people talking about this / total number of likes), Easy Jet got the highest users' involvement ratio among all three airlines. Air Asia got more than 1.5 million total likes but the users' involvement ratio was only 3.5%. Jet Blue's ratio was even lower with only 2.1%. Although Easy Jet has only 108,073 likes, but their user involvement ratio was 13.8%. This result may shed some light to the type of message should be posted in Facebook. Customer may more focus on the promotion and the service related to them such as polling the new destination and flight route.

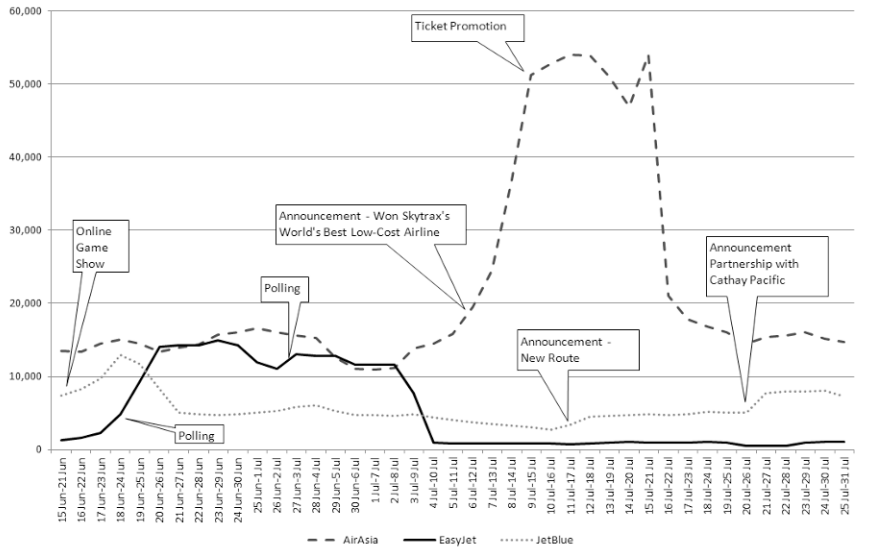


**Fig. 1. "**People talking about this" trends among three airlines

As shown in Fig. 2, around 90% of the wall post user comments were appeared on the first two days of the post published. Only 10% of the users post comments after the third publish date. This indicated social media users like respond to the "fresh" information, and seldom reacts to dated ones. This may also provide some guidelines to any company on the frequency of post in order to engage the user. This result also align with the airlines existing behavior that was posting frequency were about 1-2 days as user were more active once a post published. As a result, in order to increase the influential powers among users' network, airlines should consistently publish new wall posts so as to maintain the users' engagement.

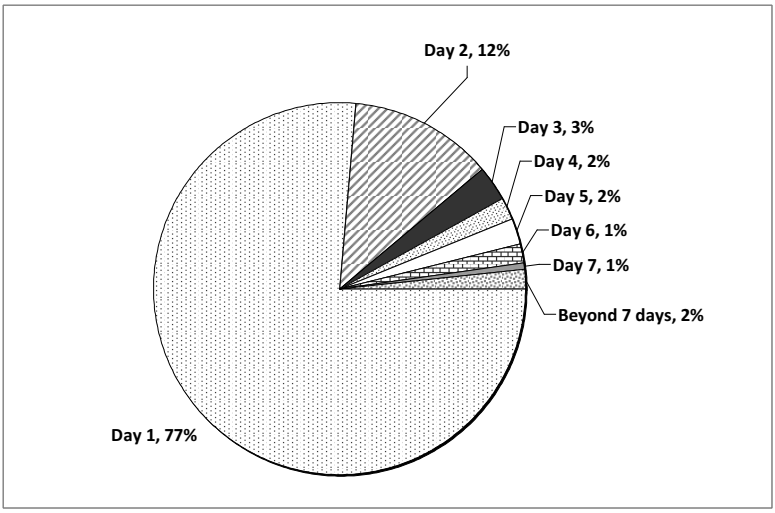


**Figure 2.** Posting Ratio of Airline Wall Post Users' Comments from publish date

### 4.4 Integrate Functions

Studies have confirmed people visit their Facebook account several times a day (Rainie et al. 2012). Therefore additional functions on Facebook page would provide conveniences to users when they want to perform the business related activities. Furthermore users can have higher interaction and engagement with the page rather than simply read the wall post contents.

Generally speaking, all three airlines provided several integrated features for their customers. However, the target of each airlines apparently has significant different. Air Asia mainly focused on obtaining business; therefore their integrated features were related to ticket selling and promotions, such as interactive FAQ, joint promotion with Chengdu tourism board on their new route, and an external link to their flight schedule web page. They also listed the job opportunities on their Facebook page to encourage their fans to become their employees. To provide convenience and encourage users to upload holiday videos, Easy Jet provided a movie making application. By simply upload a series of photos, this application can automatically generate a movie so user can directly upload it to the Facebook page. Easy Jet Facebook page provided a customized flight booking applications that allow users to book flights directly from Facebook, and Air Asia provided an external link for flight schedule search. Interestingly, Jet Blue did not provided any flight-related features in their page. They focused on obtaining new frequent flyer members. Their page allowed users to register as new members, and also gain mileage points when they use the Facebook check-in functions. Furthermore, their holiday granter application allows user to personalize a video for their boss asking for holidays.

All three airlines continuously provide user engagement campaign encourage users to participate and win a holiday prize, especially for Air Asia, this campaign provided a

monthly prize so users can regularly submit photos to participate the competition. Easy Jet encourages users to upload holiday movies to win the holiday. Jet Blue not only invite user to share a children book title on the Facebook page, they also donate the book. This can reflect Jet Blue not only focus on business but also social responsibilities. Table 4 listed the integrated features available on the Facebook page.

**Table 4.** Integrated functions available on Facebook Page

| **Type of Integrations** | **Air Asia (N=9)** | **Easy Jet (N=11)** | **Jet Blue (N=8)** |
|---|---|---|---|
| Facebook standard features | Photos<br>Video Albums<br>Events<br>Notes | Photos<br>Video Albums<br>Events<br>Notes | Photos<br>Video Albums<br>Events |
| Campaign | submit photos, win a monthly prize | upload movies, win a holiday | Soar with Reading - Share children book title, Jet Blue donate, and user win holiday |
| Facebook Apps | Ask AirAsia – FAQ<br>Joint Promotion with Chengdu Tourism Board | Flight bookings<br>Memory maker<br>Link to you tube<br>You above all – TV advertisement<br>FAQ | Getaways Granter<br>Go Places – gain miles when using Facebook check-in<br>Location – Airport map |
| External Link | Flight Schedule | Welcome info | True Blue - Frequent Flyer official page |
| Others | Job Opportunities | | |

## 5 Conclusions

This study examined the social media strategies among three popular budget airlines by the four steps of user engagement (Facebook, March 2012). The results indicated Air Asia successfully attracted 1.5 million likes which was the highest among all three airlines. Besides, they have the highest number of wall posts and average post of day. Fans normally respond to wall posts only when it is “fresh”. The results indicated around 90% of the fans commented on company wall posted within the first two days. Nevertheless, Easy Jet’s fans have highest involvement ratio (13%) but Air Asia only has 3.5%. Different airlines have different strategies. Air Asia mainly use Facebook for distributing promotion airfare; Easy Jet use Facebook to engage with customers; Jet Blue share their from company information with their fans via external link sharing.

By connecting and engaging user in the social media, companies can make use of the fans network to influence their friends via word of mouth. Integrating the business with the social media will be the new trend of business. Three examined airlines have adopted different strategies in social media. However, one common point is that no

matter the airlines responded to any post or not, customers would still post or respond to both positive and negative comments on the wall.

This research provided a solid suggestion on the frequency of post initiated by company. This also shed the light on what kind of post content that could arouse the interests of the users and that may spread the e-word-of-mouth through the social media.

## 6 Limitations and Implications on Future Research

This study has several limitations. First, only the wall posts posted shown on "highlights" section were captured. Any post by users that were not shown in this section was not analyzed. Second, this study only captured 1.5 months wall post which might not reflect the some seasonal fans behavior.

The findings in this study indicated users' mainly engage in "fresh" wall post therefore in order to invite users' engagement; airlines should keep posting on the wall so as to encourage more user engagement. However, the number of wall posts might affect the users' perceptions. Future studies could examine how users' responses on the wall post frequency and number of wall post whether users welcome these posts or feel annoying. Furthermore, content analysis of users' comments is required. Wall posts engage users to respond, however, these responses might be negative comments that will affect the corporate images and word of mouth. As a result, other than simply focus on the involvement ratio and number of likes, the nature of the comments should also be analyzed by social network analysis. It might be also subject to future research, if there is a link between business model and the use of social media, why users are more involved into feedback on accommodation then on transportation and how important social media feedback for airlines really is.

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# Backpacking, Social Media, and Crises: A Discussion of Online Social Convergence

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## Abstract

The use of social media during a disaster or crisis event has become a topic of interest among scholars from various disciplines, including recent studies in tourism. The purpose of this paper is to explore how backpackers travelling in the midst of the crisis have used social media and how friends and family seeking information about the travellers have used this emerging media. The discussion is situated within a conceptual framework based on the concepts of 'collective intelligence', 'Digital Social Convergence', and 'Hyperawareness'. Two main case studies of backpackers caught in a crisis are presented: a natural disaster (the Chilean earthquake in 2010) and political violence (the violence surrounding the protests in Bangkok in 2010).

**Keywords:** Disasters; Independent Travel; Social Media; Case Study

## 1 Introduction

The use of social media during a disaster or crisis event has become a topic of interest among scholars from various disciplines, including recent studies in tourism. This paper seeks to contribute to this growing body of research by focusing on the use of social media during a crisis event by one particular segment of tourists, backpackers, through the examination of two case studies. The backpacker tourism market is particularly resilient, as compared to other tourism niches. Between 2002 and 2007, backpackers' spending increased by almost 40%, a much higher rate of growth than the overall international travel market. The backpacking and youth tourism sectors have had continued growth during the past decade in spite of global crises, such as 9/11, SARS, the Avian Flu, and the recent economic crisis (WYSE Travel Confederation, 2010). Additionally, the global distribution and independent travel tendencies of backpackers often place them at an amplified risk of being caught in a natural and man-made crisis or other dangerous situations.

The use of social media and mobile devices has become an ubiquitous part of the backpacker experience (Paris, 2012). Recent innovations in information and communication technologies have provided a perceived 'safety-net' for backpackers, as they can maintain contact and share their experiences with friends and family. While instantaneous communication with people anywhere in the world can reduce the perception of risk of independent travel, things do go wrong. Social media can provide a means for friends and family to seek out news and help when crises do occur. Previously, the ability to get news updates and mobilize searches was nearly impossible. With contact only through occasional letters and postcards, family and

L. Cantoni and Z. Xiang (eds.), *Information and Communication Technologies in Tourism 2013*, DOI: 10.1007/978-3-642-36309-2_18,

friends back home could never really know the location of backpackers. Instant, global contact mediated by social media now provides friends and family a better starting point from which to begin when the worst occurs.

The purpose of this paper is to explore how social media have been used by backpackers travelling in the midst of the crisis and how it has been used by friends and family seeking information about the travellers. The discussion is situated within a conceptual framework based on the concepts of 'collective intelligence', 'Digital Social Convergence', and 'Hyperawareness.' Two main case studies of backpackers caught in a crisis are presented: a natural disaster (the Chilean earthquake in 2010) and political violence (the violence surrounding the protests in Bangkok in 2010).

## 2 Literature Review

The channels used for communicating information during crises or disasters have often utilized a top-down approach. Meaning, information is gathered by authorities and government officials and is then dispersed to the public (Sutton, Hansard & Hewett, 2011). Thanks to the widespread use of Twitter, Facebook, and other forms of social media, however, the direction of information is shifting. Since the inception of these social media platforms, researchers have tried to study their usage during crisis events. Social media and crisis have been the topic of several recent tourism studies, however, most focus on the management of crises (e.g., Palen, Anderson, Mark, Martin, Sicker, Palmer & Grunwald, 2010; Pennington-Gray, London, Cahyanto & Klages, 2011; Sutton, Hansard & Hewett, 2011). There have been only a few studies focused on the tourist perspective and the use of social media during a crisis event (e.g., Pennington-Gray, Kaplanidou & Schroeder, 2012), even though some researchers acknowledge that tourists may be more vulnerable during disasters (Palen et al., 2010).

While individuals affected by disasters and crises are increasingly using these forms of communication, there is a lack of scholarly research on the topic of tourists and disaster situations (e.g., Hughes & Palen, 2009; Hughes, Palen, Sutton, Liu & Vieweg, 2008; Schroeder, Pennington-Gray, Donohoe, Kiousis & Mandala, 2012). For instance, Hughes & Palen (2009) examined the use of Twitter during four events in a narrow time frame to compare the behaviours of Twitter users. Their goal was to gather this information for comparison to future events in order to demonstrate the social effects of Twitter. Hughes et al. (2008) delved deeper into the communications and activities during disasters by examining different actors involved and their behaviours. While both of these studies are early investigations into social media behaviours during crises and disasters, they do not explicitly discuss how tourists are affected; even though tourists are obviously present during the disasters examined in these studies. For many tourists, social media is the easiest and most accessible form of communication (Schroeder et al., 2012) and when they find themselves in the middle of a natural or man-made disaster, they often turn to social media to communicate their status to others and notify emergency response personnel of the disaster's severity.

Traditionally, during a crisis or disaster, government authorities have had the responsibility of disseminating vital information to first responders and the concerned

public. Due to recent innovations in "new media" technologies (Pennington-Gray, Kaplanidou & Schroeder, 2012), such as Facebook, Twitter, and other crowdsourcing platforms, the public is now able to assist authorities and the public during disasters in the form of real-time information and post-crisis support. This shift in information delivery has been the focus of several articles that discuss the legitimacy of public information and the overall management of disasters, natural or man-made (e.g., Heinzelman & Waters, 2010; Sutton, Hansard & Hewett, 2011; Vieweg, Palen, Liu, Hughes & Sutton, 2008).

Real-time updates from the ground are important for travellers, local victims, and emergency responders. Emergency response teams often rely on internal sources to coordinate rescue and relief efforts in the past. While this has been advantageous in most instances, problems have surfaced in regards to community needs. During the January 2010 earthquake disaster in Haiti, United Nations authorities halted relief efforts in the community of Logane because internal sources revealed the area was not safe for emergency teams (Heinzelman & Waters, 2010). Community leaders were confused by the UN's decision and tried to voice their concern "yet the international response system was simply not structured in a way to utilize these inputs, creating a communication disconnect between Haitians and emergency response organizations" (Heinzelman & Waters, 2010, p. 3). For the Haitian disaster, standard emergency relief protocol did not allow community leaders to participate in decision-making discussions, which resulted in a lack of communication and support for communities in need. Similarly, failures in crisis management can be seen in tourism destinations as well. Peters & Pikkemaat (2005) discuss the response to an avalanche disaster in Galtuer, Austria. One conclusion illustrated the lack of media coverage and cooperation during the avalanche; citing that fragmented information and misplaced blame lead to the disaster (Peters & Pikkemaat, 2005). To facilitate the accuracy of information dissemination in future disasters, Peters & Pikkemaat (2005) mentioned an Internet-based system was put in place to aid in communication. These systems are at the front of the agenda for academics and practitioners in the crisis and disasters field, and several key conferences have address the topic including the 2011 Dubai International Humanitarian Aid and Development conference.

Several recent studies have explored the digital social convergence that occurs during and after crisis events. The internet and social media in particular, have supported the convergence of individuals both at the physical site of a crisis and those converging in virtual spaces. Physical social convergence is a term that describes the diversity of people that descend on an area or region after a crisis or disaster (Hughes, Palen, Sutton, Liu & Vieweg, 2008). The social convergence of individuals to physical sites of disasters has been examined by sociologists dating back to the 1950s (Fritz & Mathewson, 1957). With respect to physical social convergence after a disaster, tourists are often present. For example, helpers and supporters can be seen as volunteer tourists whom assist in the rebuilding of communities after natural disasters such as, Hurricane Katrina.

Kendra & Wachtendorf (2003) classified seven behavioural groups of individuals that digitally converge in the midst of a crisis: the anxious, the returnees, the curious, the helpers, the exploiters, the mourners, and the supporters. The Anxious are those who seek out information about loved ones. The Returnees consist of people that return to

the site to assess damages and often document and share what they see and experience. The Curious often do not have direct connection to the crisis or victims; however they digitally converge in the aftermath of a crisis out of curiosity. Obviously, the helpers and supporters arrive with altruistic intentions to aid those affected by a crisis event. Helpers often converge to offer assistance in anyway possible and often provide valuable information for the anxious. Similarly, Supporters converge to show gratitude to responders to a crisis. Mourners, whether family of the victims, friends, or others affected by the disaster, converge to pay their respects. Lastly, the Exploiters often use the disaster to further personal or political agendas.

Digital social convergence is the collective activities and interpretations of people in response to a disaster. They are channelled through on-line media sources, such as websites, blogs, and social media (Hughes, Palen, Sutton, Liu & Vieweg, 2008). While actors at a disaster site often have first-hand observations and information, digital social convergence allows for information dissemination from sources that may not be as reliable, leading to rumours and misinformation (Mendoza, Poblete & Castillo, 2010). Not all social media information about a disaster is false, however, the majority is small bits of information that is often taken out of context (Hughes et al., 2008). All of these bits of information can now be gathered collectively and corroborated. The result of many of the digital social convergent activities in the midst of a crisis event results in a collective intelligence about the event that was not possible before.

Recent tragedies and disasters related to backpackers illustrate the displays of online social convergence activities. In 2007, a solo female backpacker disappeared while travelling from West Africa to Turkey via the Middle East. Using a blog on LiveJournal. The blog was submitted to Digg, which brought in many new volunteers. Hundreds of individuals mobilized to help find her. They helped by translating documents between English/Arabic, interviewing witnesses on the ground, searching hotels, and even tracing IP numbers to actual physical addresses allowing for the location of her last email located near the Syria/Lebanon border (Andrews, 2007). The search continues today with volunteer detectives piecing together new details and searching social media and the Internet for the person of interest. Facebook has been used in a similar way by a father during his search of his daughter who went missing during a backpacking trip in Croatia (Dobbin, 2008).

The recent escalation of on-line social convergence has lead to new forms of interaction between different actors that respond to disasters. While government authorities are still considered the most reliable sources of information during a crisis, many are increasingly turning to on-line chatter for up-to-date information on the victims (Palen, Vieweg, Liu & Hughes, 2009). For example, during the 2007 Virginia Tech shooting crisis, information regarding the status of victims was broadcasted via social media sites to the concerned public (Vieweg, Palen, Liu, Hughes & Sutton, 2008). The convergence of small bits of information on a digital level was shown to contribute to the collective intelligence of the shooting as it unfolded. This “real-time” information from observers on the campus was used by emergency response personnel to assess the crisis and make decisions about future actions. Clearly, digital social convergence is helpful during times of disaster, even if some information is not accurate. The information set as a whole is useful to paint a picture of a disaster

situation; providing problem-solving intelligence for emergency personnel, people involved in the crisis, or loved ones. For instance, in the aftermath of a 2010 earthquake in Chile, Hawaii was hit by a tsunami. Sutton, Handard & Hewett (2011) examined the communication efforts of Hawaii during this time and found that although existing governmental networks worked well to inform the population of the impending tsunami, social media was a large contributor of information dissemination. In 2010, a devastating earthquake in Haiti forced the relocation of many and provoked questions about emergency communications. Heinzelman & Waters (2010) examined this disaster and found that most communication was between emergency teams and the government, turning the rest of the population toward social media to gather information. According to Starbird, Palen, Hughes & Vieweg (2010), social media and blogging were a major avenue of communication during a flood in the Red River Valley of the US and Canada.

Social media has provided tourists with a certain hyperawareness when traveling. Hyperawareness is the social awareness that individuals share with one another by continually staying in touch across different locations (Farnham & Keyani, 2006). Today, tourists are continuously connected to family, friends, and news outlets through on-line media, which can contribute to a sense of security (Pennington-Gray, Kaplanidou & Schroeder, 2012). Social media and mobile devices allow individuals to monitor events as they are occurring and can help increase the level of situational awareness, particularly important during crisis events. Being able to tap into the collective intelligence facilitated by the digital social convergences during and after a crisis can provide the necessary information for heightened levels of hyperawareness of individuals caught in a crisis.

The grassroots efforts of individuals using social media to disseminate information during a crisis will become more commonplace in the future (Vieweg et al., 2008). The assistance social convergence and collective intelligences provides to authorities is invaluable. Especially with tourists, where social media is often the most widely used form of communication, on-line collaboration and problem solving has the potential to become a vital source for organizing a response to disasters. The two case studies presented later in this paper clearly illustrate this.

## 3 Methods

For this study, case study methodology was applied to two recent crisis events: the 2010 earthquake in Chile and the political protests that turned violent in central Bangkok in 2010. These two cases were chosen because they occurred in and around two major backpacking destinations. Also, one is a natural disaster and the other is a ‘man-made’ crisis. A variety of data sources were compiled for each of the crisis events. For the natural disaster, real time social media accounts were examined, and interviews were conducted with backpackers caught in the earthquake. For the violence in Bangkok, real-time, geographically situated (around the backpacker enclave of Khoa San Road) twitter streams were downloaded and examined. Additionally, real-time blog post and YouTube videos were also examined.

### 3.1 Chilean Earthquake Case Study

In the early morning hours on February 27th, 2010 one of the largest earthquakes ever recorded shook the country of Chile. This 8.8 magnitude earthquake struck off the coast, causing infrastructure damage from the aftershocks and tsunamis. Around 1.5 million people were displaced after the earthquake toppled residential buildings and ignited fires across the city of Concepcion. Effects of the Chilean earthquake, in the form of tsunamis, were felt as far as Hawaii and warnings were issued in countries as far as Australia. More than half of the country was declared a disaster area.

For this case study, a key informant interview was conducted with a backpacker in Chile during the crisis. Additionally, that individual's social media profiles were examined, including Facebook and Twitter. Additionally, Tweets during the crisis were examined for details regarding backpackers in Chile during the crisis. Several hashtags were used to do so including #Chile and #ChileanEarthquake. It was difficult, however, to distinguish the backpackers from other posts, as the majority of these tweets focused on the sharing of news stories about the earthquake. However, one case in particular focused on the use of Twitter by family members seeking missing loved ones backpacking in the area of the earthquake. Additionally, secondary sources were also examined, including news stories.

### 3.2 Bangkok Protests

Violence and political unrest between two opposing parties has been stirring in Bangkok, Thailand since 2006 when a military coup ousted former Prime Minister Thaksin Shinawatra and forced him into exile. One party, the red-shirted populists, was protesting for equal opportunity for the overworked poor with hopes of new elections and the democratic representation of the country. The nationalist yellow-shirts were fighting to keep the current government in place and consisted mostly of the urban middle class. From 2007-2010, several protests took place that upset the tourist industry directly, such as the sit-in that shut down the airport and stranded travellers. In 2010, the red-shirt protest turned violent leaving many expatriates and tourists to fend for themselves on the streets of Bangkok. These violent clashes in 2010 included road blocks, small arms fire, several large fires, and even the use of grenades. One particular clash between the two groups that occurred on April 10, 2010 was the focus of this case study because the clash took place in the streets directly adjacent and connected to the historical backpacker enclave of Khoa San Road.

For this case study, hashtag searches for #ksr and #KhoaSanRoad were used to find Tweets posted during and directly after the clashes that focused on the geographical area of Khoa San Road. In total, 186 tweets were downloaded. The first was posted at the outset of the clashes and the last was six hours after. Additionally, photos, blog posts, Youtube videos and news stories that linked to the Tweets provided additional insights into the use of social media during this crisis.

## 4 Results and Discussion

The purpose of this paper was to provide an exploratory glimpse into the social media behaviour of backpackers during and after two crisis events. The behaviours during

these events provide illustrations of the different types of actors present, as well as insights into the tourists' perspectives of these two crises. Several selected illustrative examples are presented and discussed.

The recent earthquake in Chile provides a good context of how social media can be used in the midst of crisis. Twitter was used extensively in the aftermath of the earthquake. One example is that of a missing British couple, who went missing after the quake in the surfing destination of Pichilemu. Shortly after, the sister of one of the missing started a Twitter account to try to find her missing brother. A review of the tweets and re-tweets on her account indicated that she interacted a lot with the Twitter accounts of one of the surfer resorts and Pichilemu.com, as well as individuals from all around the world; providing a good example of digital convergence. These virtual interactions clearly illustrate how powerful a tool that Twitter is. A group of geographically dispersed individuals digitally converged in the aftermath of the crisis. The loved ones, who could not get in contact with the missing backpackers, created their Twitter account specifically to locate the couple. Their behaviour is representative of the Anxious (i.e., Kendra & Wachtendorf, 2003. The other individuals, some located in the disaster zone, and others located around the world, converged as Helpers to assist the search and add to the collective intelligence as the event unfolded. Many of these individuals were complete strangers. The missing couple was found shortly after the search began, unharmed. In addition to Twitter, Facebook, Google Person Finder (a platform designed specifically for finding missing people during a crisis), and Couchsurfing.org were all used to mobilize the search for the missing couple. Through each of these platforms the group of helpers each added a piece of information to the collective intelligence regarding the missing couple's travel itinerary leading up to the disaster and their eventual location.

One particular backpacker, 'Chris', was interviewed one week after the earthquake. Chris provided a first-hand account of the Chilean earthquake and shared a similar experience to that of the missing couple: "Following the Chilean earthquake last week, we found dozens of comments on Facebook and Twitter asking where we were, if we were OK, and if we needed help. People were asking the Twitter community if anyone had heard from us and by the time I answer emails and logged into Twitter to say we were safe, people I had emailed had posted on twitter and Facebook that we were safe. It was nearly instantaneous and this wide group of virtual friends we've never met were rallying around to look for us."

These two examples of the digital social convergence in the aftermath of the Chilean earthquake illustrate the altruistic behaviour of individuals. While the limited scope of this case study did not result in clear expressions of the other digital social convergent behaviours, the Bangkok protest case study did. Additionally, while the Chilean earthquake illustrated the behaviour of individuals globally, many of the examples during the Bangkok protests illustrate how social media was used by the tourists in Bangkok. During 2010, political tension was on the rise in Bangkok, and eventually violence broke out between anti-government protesters and authorities. The speed in which the violence broke out and the location next to the popular backpacking enclave caught many tourists off-guard and forced them to ride out the violence. For these tourists, the use of social media to communicate was more accessible and easier (i.e., Schroeder et al., 2012) than relying on local authorities that were more focused

on quelling the violence. During this crisis, Twitter provided a type of “life line” for tourists and expatriates trying to navigate the city; posting comments about which streets were safe from the violence.

Many of the posts to Twitter during the protests and violence around Khoa San Road were focused on providing information updates for other tourists and backpackers in the area. For example posts by the backpacker with the Twitter name Eloren provided updates on the status of shops, police blockades, and safety during a 4 hours period.

> Eloren Many shops closed on **KSR** today, they all have signs mentioning : "Closed from 11-15". I guess they're early because of the events about 4 hours ago
> Eloren Police blocks **ksr**. Fire started near burger king. Gun shots about 3 hours ago
> Eloren All bars shops closed on **ksr**. Police blocking street. Fire & gunshots in background about 3 hours ago
> Eloren Tourists and locals around **KSR** should all be alert and cautious! #Thailand about 3 hours ago
> Eloren Police injured at head. Backing down **ksr** about 2 hours ago_
> nomadicmatt @eloren what's going on up there? is **KSR** still shut down? where are the tourists? about 1 hour ago
> Eloren Tourists back on **ksr** but everything closed. All the attention seems to be on kok wa intersection. Reds still massively there

In addition to status updates, situational updates were directly sought such as in the exchange:

> inspirability @Patee122 Thank you kaa' she wanna go to **KhoaSan** for Songkran mhh is it safe in Bkk?about 1 hour ago
>
> Patee122 RT @inspirability:Thank you kaa' she wanna go to**Khoa San** for Songkran mhh is it safe in Bkk?: No it isn't .about 1 hour ago

A tweet by another individual also gave thanks to an individual for information while also showing support for the cause of the protestors. This is an interesting illustration of supportive behavior:

> JuanMedin @nomadicmatt Thanks for tweeting from **KSR**. Is it advisable to go there? I feel sympathy for the red cause. about 6 hours ago_.

While there was no completely “exploitive” behavior observed, one individual’s posts were a bit more sensational. This particular individual is a reporter for Reuters, and thus could be seen as exploiting the crisis with a bit of shock and awe writing to get noticed among media outlets. A summary of his tweets was picked up on several news sites: "Barricades going up at Khoa San. Reds preparing for soldiers' return. Several pools of blood on road....Don't listen to bland Thai govt reassurances. Khoa San is a dangerous place. I've seen 2 tourists with injuries...Khoa San is shuttered up, red shirts everywhere. It looks like a warzone...Pitched battles in streets around Khoa San. Tourists ducking for cover. A red shirt with an AK47. Scenes of chaos at Khoa San. Tourists tell me they saw horrific injuries, an old man with an eye hanging out.”

The overall collective first-person insights provided through Twitter during the crisis were used to create and organize an on-line crisis map in the wake of 2010 protests in Bangkok that facilitated the mobility of tourists through the violence in the streets. This map was populated with information from people, including tourists, caught in the violence as opposed to emergency response teams. This collective behaviour illustrated the speed that information was shared through social media and the importance of digital social convergence (i.e., Kendra & Wachtendorf, 2003) in crisis problem-solving and facilitating hyperawareness (i.e., Farnham & Keyani, 2006) for individuals during the crisis.

One particular back and forth conversation highlighted the use of Twitter as the crisis ended and 'returned' back to normal. While this conversation took place between two individuals, it did so in public in the twittersphere. Both of these individuals have thousands of followers who likely noted the updates and re-tweeted (RT) the play by play. The conversation also notes how the excitement of the crisis abated and how the normal KSR came back to life. The crisis took place just a day before the popular SongKran festival that includes a large street water fight in which locals and tourists are eager participants.

> nomadicmatt looks like my plan to go meet people on **KSR** is not going to happen41 minutes ago
> Eloren Bars opening slowly in **ksr** again. 35 minutes ago
> nomadicmatt My Songkran on **KSR** is most likely ruined now lol. I guess I shouldnt have gone up there to reserve my room today lol 31 minutes ago
> Eloren @nomadicmatt road probably open but seems over on**ksr**. Music is back. Kok wa however still packed30 minutes ago
> Eloren Ok I guess **ksr** is back to "normal" again. I'm heading back to my room .29 minutes ago
> nomadicmatt RT @eloran road probably open but seems over on**ksr**. Music is back. <---only in Thailand would a riot the block over not stop the party 27 minutes ago

The conversation between these two individuals is also in stark contrast to the earlier tweets during the crisis that vividly described the violence that broke out. The speed at which the crisis returned back to normal, and the seeming ambivalence of some tourists were also noted in commentary by some individuals.

> richardbarrow RT: BobThailand: So, how many backpackers you think will be throwing water in the next couple of days on **KSR** for Songkran? (I think 1000's)2 minutes ago

> Thai faq Considering the violence tonight I was amazed to see so many tourist. Some were actually posing for pictures as the army was shooting.

In the days after Khoa San road was full of people enjoying the water fights, but there were some photos uploaded that showed makeshift memorials of people injured or killed during the violence.

## 5 Conclusions

In this exploratory study two case studies were used to illustrate the digital social convergence behaviours of backpackers and other geographically dispersed individuals during and after crisis. While these two case studies only provide an initial glimpse into this behaviour, it does so from the backpackers' first person experiences. This study can provide a basis for future research into the use of social media by individuals during crisis. Future studies should focus on examining the behaviours at a larger scale, during other types of crisis events, and how other types of ICTs mediate the experience of tourists during crisis. This study was limited by the lack of complexity and technical ability of the researchers for the data collection, as most data was gathered from publically and conveniently located sources. More complex research designs can further build upon the findings of this study. While this study is quite basic in nature, it does provide an initial glimpse into the potential of the decentralized and highly distributed problem-solving that can take place through these technologies. While this was highlighted in the behaviour of backpacker tourists during crisis in this paper, it could also include other incarnations of this emerging phenomenon such as community based tourism planning, collaborative marketing, or responsible tourism campaigning.

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# Destination Expertise in Online Travel Communities

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## Abstract

Virtual communities rely on active and committed members who make regular contributions. These contributors typically get psychological and social rewards for their virtual community activities. Given their importance for community sustainability, it is essential for community platforms to understand who their most active members are and what status seeking strategies they employ. This research looks at TripAdvisor and its dedicated Destination Experts to examine how localized the expertise is in this community, how the community acknowledges expertise, whether status seeking strategies can be detected, and if the Destination Experts differ from general reviewers. The findings reveal that Destination Experts are active throughout the TripAdvisor platform and are indeed important and influential pillars of the community.

**Keywords:** travel forum; online content creation; virtual community; expertise; status.

## 1 Introduction

Travellers increasingly rely on user-generated contents as sources of information (Jacobsen & Munar, 2012; Cox et al., 2009; Yoo & Gretzel, 2008). Travel reviews are the most frequently used and produced form of travel-related user-generated content, at least for American travellers (Yoo & Gretzel, 2012; Gretzel et al., 2011). TripAdvisor remains the most prominent platform for travel reviews[1], with over 75 million reviews and opinions posted and viewed by more than 60 million unique monthly visitors as of September 2012. What is less known is that TripAdvisor also hosts forums that resemble early forms of virtual travel communities, with users posting questions and receiving answers from engaged community members. TripAdvisor currently features over 25 million forum posts covering almost 4 million topics. These forums heavily rely on dedicated members who respond to forum requests. To officially recognize their contributions, TripAdvisor appoints the most active forum members as Destination Experts[2] (DE). DEs are defined as TripAdvisor members who are knowledgeable about destinations and volunteer their time to answer travellers' questions[3]. DEs are listed for each forum and their status is visible in their profile, which means their recognition as an expert for a specific destination can be seen in conjunction with any form of content they post on TripAdvisor including reviews.

[1] http://www.tripadvisor.com/PressCenter-c4-Fact_Sheet.html
[2] http://www.tripadvisor.com/help/how_destination_experts_are_chosen
[3] http://www.tripadvisor.com/help/who_are_the_destination_experts_on_the_forums

L. Cantoni and Z. Xiang (eds.), *Information and Communication Technologies in Tourism 2013*, DOI: 10.1007/978-3-642-36309-2_19,

Without the ability to tie reviews to actual transactions, TripAdvisor struggles to establish the credibility of its user-generated contents (O'Connor, 2008). Trust in travel-related user-generated content is important as it significantly influences intentions to take such contents into consideration for travel planning (Sidali, Fuchs & Spiller, 2012; Sparks & Browning, 2011; Yoo et al., 2009). Credibility encompasses two dimensions: expertise and trustworthiness (Fogg, 2003). Further, perceptions of message credibility are often influenced by perceptions of the credibility of the message source (O'Keefe, 2002). Kusumasondjaja, Shanka & Marchegiani (2012) also found that the reviewer identity influences credibility perceptions of travel reviews. Therefore, one can assume that the DE status serves as an important source cue that is available for TripAdvisor users in the process of judging the credibility of available contents. This makes DEs potentially very influential members of the TripAdvisor community as their messages could be more persuasive.

This paper seeks to establish a detailed understanding of who these DEs are and what their scope of influence is. Specifically, the research seeks to answer the following questions:

> Are destination experts active contributors across all forms of contributions, meaning that their status could serve as a credibility cue throughout the TripAdvisor platform?
>
> Is their expertise limited to a specific destination?
>
> Is their expertise acknowledged by others?
>
> Do destination experts differ significantly from TripAdvisor reviewers without destination expert status?

## 2 Theoretical Foundations

### 2.1 Contributions to Online Communities

Online communities are groups of people who gather online for a specific purpose, and whose interactions are governed by norms and rules (Preece, 2000). Lampel and Bhalla (2007) identify two basic characteristics of online communities: 1) individual actions are visible to others; 2) communication is structured according to set rules that dictate what can be posted and in what manner and form. Understanding online communities requires not only the analysis of the norms, rules and purposes but also of the individuals and their actions as they form the basis of the community (de Souza & Preece, 2004).

Shao (2009) classifies online community activities into three categories: consuming, participating (e.g., rating and voting), and producing, with only the latter two leading to contributions. Not all community members engage in all three activities. Early research into online communities already recognized that there are different types of online community members with different levels of contributions. Nonnecke, Andrews & Preece (2006) distinguish between posters and lurkers, with the latter typically constituting the majority of individuals who register or visit online communities. This imbalance occurs because contributions to online communities represent public goods and generate no obvious reward for the contributor beyond the satisfaction of having contributed to the common good (Lampel & Bhalla, 2007).

Sverdlov (2012) presents Forrester's Social Technographics typology that categorizes social media users as Creators, Conversationalists, Critics, Collectors, Joiners, Spectators, and Inactives based on the type of contributions they make. Kim (2000) also distinguishes among different types of contributors and recognizes that participation might change over time and that initial participation is probably less active/public. Online communities need to encourage contributions in order to be sustainable. This is often done through a form of operant conditioning by rewarding members for their participatory actions with labels or badges (Bishop, 2007).

As far as motivations to contribute are concerned, altruism and reciprocity are often identified as the main drivers of contributions. However, Bishop (2007) stresses that online community contributors likely share their expertise to act upon a number of desires including social recognition. Their varying desires might explain why they flock to one type of community versus another as the community environments differ greatly in terms of focus and structure, including opportunities for social interactions. Therefore, one can assume that communities with different interaction mechanisms and goals will attract different kinds of content creators. In the context of TripAdvisor DEs, this would mean that their high engagement might be limited to the forums.

### 2.2 Characteristics of Content Creators

The literature reports that content creators differ from lurkers in their reasons to join online communities, with participating in conversations and being able to offer expertise distinguishing the two groups the most (Nonnecke et al., 2006). Posters also have a greater sense of membership and community than lurkers. Zhou (2011) reports that social identification with the community is a main driver of participation intentions. Bateman, Gray and Butler (2011) find that content creators have a greater affective commitment to online communities than lurkers. They also found that gender and length of community membership influenced reading posts, which in turn increased the likelihood of posting replies. Interestingly, they did not find a significant influence of age. Sverdlov (2012) shows that cultural/national differences also come into play, with US social media users being much more likely to contribute than European users.

Studies on virtual communities in tourism have explored motivations to contribute quite extensively, finding that informational, social and hedonic benefits are important motivators to engage in travel forums (Wang & Fesenmaier, 2004; Chung & Buhalis, 2008). Yoo and Gretzel (2011) report that reciprocity and altruism are the most salient drivers of travel review creation and indicate that personality characteristics also matter, with social media creators being more extroverted. The demographic characteristics of content creators have also been investigated in the tourism context. Yoo and Gretzel (2012) find no gender differences but report that content creators are younger and more likely Asian in ethnic origin.

Based on the literature one can assume that DEs are highly engaged individuals who are not only motivated by altruism but also by social needs as they seek out the forum environment. This implies that they should invest more in their profiles, including pictures in addition to demographic and travel experience information. Their specific dedication to the forums raises the question of whether they are also different from regular reviewers in terms of demographic characteristics and activities within gthe

community. Therefore, while the current literature has focused on differences amongst posters and lurkers, our research assumes that there are also different types of posters with specific characteristics.

### 2.3 Status and Influence in Online Communities

Lampel and Bhalla (2007) identify contributions in online communities as a form of gift giving and establish a theoretical link between giving the gift of one's expertise/experience to others without direct benefit and status seeking as a main motivation for the contributions. Status refers to an actor's relative standing in a group based on prestige, honor or deference (Thye, 2000). Status is different from reputation in that it involves a formalized ranking, but reputation and status can be closely linked (Lampel & Bhalla, 2007). Also, online communities often have reputation systems in place that make reputation more explicit than in offline settings, e.g., helpfulness votes (Dellarocas, 2003), and can motivate individuals to seek a higher status. Lampel and Bhalla (2007) distinguish between two types of status seeking strategies in online communities: focused (building expertise in a specific area) vs. diverse (demonstrating knowledge across multiple domains). Paris (2011) also found evidence of two distinct status seeking strategies among backpackers who either focused their status creation and display activities on a specific social medium or engaged in them across a broad range of social media.

Status in online communities is displayed through textual communication (Schau & Gilly, 2003) but also through the labels and badges that are often awarded based on number of contributions or votes by others. This has given rise to the phenomenon of "celebrity reviewers" in communities like Amazon.com and TripAdvisor (Lampel & Bhalla, 2007:448). These symbols indirectly increase the value of the individual's contributions and make them more influential as authority cues serve as important heuristics when processing information (O'Keefe, 2002). Another result of status can be receiving more credit than low status individuals for the same effort (Merton, 1968). If status symbols indeed lead to greater expertise perceptions and credit, those individuals with higher status (e.g., TripAdvisor DEs) should receive a high number of acknowledgements by other community members. Acknowledgments in TripAdvisor can happen in the form of compliments, which appear in the profile, or helpfulness votes for individual reviews. Although the DE designation is tied to forum contributions, this is not necessarily obvious for TripAdvisor users. Therefore, the so-called halo effect (Nisbett & Wilson, 1977), which states that global evaluations can influence judgments of individual attributes not necessarily connected to the global evaluation, might cause users to see DEs as experts in general and lead them to more favorably judge other contributions (e.g., reviews).

### 2.4 Content Creation in TripAdvisor

TripAdvisor members are offered different opportunities for contributing content to the community. The most prominent and obvious is in the form of textual reviews for hotels, restaurants and attractions, with opportunities to also add photos and videos. Reviews typically include ratings, but TripAdvisor now also allows users to rate venues without submitting reviews. Trip lists are another form of contribution. A trip list is a compilation of activities and places that a particular contributor recommends for a specific destination. Traveller articles, on the other hand, are summaries of

factual information about a destination, including important travel hints. Finally, TripAdvisor users can post in the various travel forums. These posts are either questions or answers to someone else's question.

TripAdvisor recognizes active members by assigning them "star badges". There are five different star badges to be earned[1]: 1) Reviewer (3-5 reviews); 2) Senior Reviewer (6-10 reviews); 3) Contributor (11-20 reviews); 4) Senior Contributor (21-49 reviews); and, 5) Top Contributor (50+ reviews). These badges appear in the thumbnail profile displayed next to reviews as illustrated in Figure 1. The label Destination Expert is assigned based on Forum posts only and appears on top of the full profile together with the destination for which the person is an expert. The TripAdvisor community can recognize contributors by posting compliments (general endorsements visible on the profile) and helpfulness votes for individual reviews.


**Fig. 1.** Various Profile Views of a TripAdvisor Destination Expert

Since TripAdvisor DEs do not gain economic benefits, one can assume that their status seeking would be a matter of obtaining "ego rewards" (Lampel & Bhalla, 2007:437) and constitutes a pursuit for psychological assets. In the TripAdvisor context, such assets are the above-mentioned badges and acknowledgments but also high numbers of contributions across different types of contents, as these are displayed separately in one's profile when the "Contributions" link is clicked.

[1] http://www.tripadvisor.com/help/what_do_the_different_color_star_badges_mean

# 3 Methodology

The research questions posed at the beginning of this paper are answered based on a sample data set pulled from the TripAdvisor website. The data is gathered by means of Python scripts using the web crawling framework Scrapy[1].

## 3.1 Data Collection

Two different crawlers are used to generate the sample data. One crawler collecting data about DEs and another crawler scraping data about general reviewers not being associated with explicit destination expertise. The scope of TripAdvisor members to be analysed is limited to those members who made contributions regarding destinations included in the collection of "Traveler's Choice 2012 – The Best Destinations"[2]. The data set covering the DEs consists of TripAdvisor members that are displayed as experts in a forum related to a specific destination. Thus, the crawler extracts the experts listed on the destination forum pages and proceeds with collecting their profile data as well as the experts' hotel reviews in case they have contributed any. Finally, the data set consists of 1,418 DEs authoring 11,001 reviews. The data set of general reviewers encompasses TripAdvisor members that have contributed hotel reviews. The crawler extracts the reviewers of the 10 most recent reviews of the top-ranked hotel for each destination contained in the collection of "Traveler's Choice 2012 – The Best Destinations". Following this, the reviewers' profile data as well as their hotel reviews are scraped. The crawled data contains 3,300 general reviewers contributing 23,810 reviews.

The individual profile information of TripAdvisor members being analysed within this research is scattered across three different web pages as presented in Figure 1. The following profile information is scraped from the full profile: name, destinations of a member's designated expertise, age, gender, location, the profile picture, received compliments, the length of membership as well as the total amount of contributions. Furthermore, the total numbers of reviews, ratings of accommodations, restaurants and attractions, photos, videos, forum entries, traveler articles and trip lists are taken from the page displaying the members' contributions overview. Lastly, the members' badges, numbers of reviews in different cities and received helpfulness votes are captured from the thumbnail profile.

## 3.2 Analysis

The data analysis involved basic descriptive statistics to portray the DEs in terms of their characteristics and contributions. Chi Square tests and t-tests were used to test for differences between general reviewers and DEs. Correlations and general linear modelling were employed to examine relationships among contribution-related variables and profile characteristics.

[1] http://www.scrapy.org/

[2] http://www.tripadvisor.com/TravelersChoice-Destinations

# 4 Results

The results of the study reveal interesting aspects of who the TripAdvisor destination experts are and provide insights as to what their expertise and status seeking strategies might be. They also illustrate differences among DEs and general reviewers.

## 4.1 Profile and Contributions of Destination Experts

The gender distribution among the DEs in the sample is almost equal, with 50.8% being female. As far as location is concerned, 41.6% reside in North America, 27.9% in Europe, 11.1% in Asia, 8.7% in Oceania, 8.5% in Central & South America and only 2.2% in Africa. A large proportion of DEs (42.8%) are between 35 and 49 years of age, followed by 50-64 years (35.3%). Only 1% are between 18 and 24, 14.9% are between 25 and 34 years old, and 6% are 65 or older. Most DEs have been TripAdvisor members for a considerable number of years, with the average length of membership being 5.8 years. Only 4% have been members for 2 years or less.

The DEs seem to invest time in their profiles, with 97.5% providing a clearly identifiable location, 86.3% indicating their gender, 70.5% providing information about their age, and 97.8% uploading pictures to their profiles. Exactly a fifth (20.0%) of the DEs do not have a badge displayed on their profile.

The average mean number of total contributions across all DEs is 3,767 (median=2176), with the highest number of contributions being 64,194 and the minimum 95. The vast majority of these contributions are travel forum entries, accounting for on average 95.6% of total contributions. DEs also provide on average 40.6 photos (median=3), 27.6 reviews (median=13), 27.3 ratings (median=1), 7.2 articles (median=0) and 0.3 trip lists (median=0). None of the DEs in the sample has uploaded videos. Table 1 summarizes the distribution of contributions across the various contribution types. Only 5.1% of the DEs exclusively contribute forum entries, suggesting that almost all DEs are engaged across the entire TripAdvisor platform. Interestingly, the number of total contributions is of course significantly correlated with membership length but not strongly (Pearson's $r=.195$; $p<.05$), and is also significantly but only weakly related to age (Pearson's $r=.173$; $p<.05$). Gender and location of residence do also not explain why some DEs contribute more than others.

**Table 1.** DE Contributions Across Various Contribution Types

| **Type of Contribution** | **Prominence** | | | |
|---|---|---|---|---|
| | *Minimum* | *Maximum* | *Average* | *% of DEs who contribute* |
| Forum entries | 86 | 64,171 | 3,663.4 | 100 |
| Reviews | 0 | 1,218 | 27.6 | 89 |
| Photos | 0 | 9,375 | 40.6 | 57.1 |
| Ratings | 0 | 8,832 | 27.3 | 53.2 |
| Articles | 0 | 1,621 | 7.2 | 46.2 |
| Trip lists | 0 | 35 | 0.3 | 10.8 |
| Videos | 0 | 0 | 0 | 0 |

Of those who have contributed reviews, only 10.1% have no badge, 11.6% have reached the Reviewer status, 14.0% are Senior Reviewers, 21.6% are Contributors, 25.3% are Senior Contributors and 17.4% are Top Contributors. The DEs who write reviews follow the general positive mood of TripAdvisor, with 84.7% having never assigned a rating of 1, 70.6% never a rating of 2 and 47.0% never a rating of 3. Only 26.6% have never given a rating of 4 and 17.9% never a rating of 5.

### 4.2 Destination Expertise

The average mean number of destinations for which the DE is designated as an expert across all DEs is 1.4 (median=1), with the highest number of destination designations being 9 and the minimum by definition 1. The average mean number of destinations reviewed is 12.9 (median=8), where the highest number amounts to 239 destinations the minimum number to 0. 1262 DEs contributed reviews in on average 14.5 destinations (median=9). In addition to the result that 89% of the DEs are not only forum contributors but also reviewers, it is interesting that the number of destinations reviewed reach beyond the set of destinations for which the DEs are nominated as experts.

### 4.3 Expertise Recognition

The majority of DEs (69%) has not received any compliments from other users and 13.5% have only received one compliment, suggesting that compliments are not a prominent form of expertise acknowledgment in TripAdvisor. On average, DEs received 1.3 compliments (median=0; max=208). Helpfulness votes seem to be more common. Of those DEs who have contributed reviews, only 3.9% have not received any helpfulness votes for their review contributions. The average number of helpfulness votes received by DEs who review is 54.8 (median=22) given their average 27.6 reviews.

### 4.4 Comparison with General TripAdvisor Reviewers

DEs are significantly more likely female ($\chi^2$=6.2; p=.012), older ($\chi^2$=83.7; p<.001) and from the Americas ($\chi^2$=100.0; p<.001) than general reviewers. They have been members on average twice as long as general reviewers (mean=5.8 compared to 2.6; t=-50.2; p<.001). They are somewhat less likely to include a profile picture ($\chi^2$=14.4; p<.001) but more likely to supply age ($\chi^2$=267.1; p<.001) and gender information ($\chi^2$=570.0; p<.001). Further, they are more likely to have high-level badges displayed in their profile ($\chi^2$=165.1; p<.001). Table 2 summarizes the basic profile differences. They are significantly more active than general reviewers in terms of total contributions (mean=3,766.6 compared to 38.1; t=-42.1; p<.001) and in general across all categories of contributions, with the greatest difference of course occurring for forum contributions (mean=3,663.4 compared to 7.0; t=-42.0; p<.001).

In terms of expertise, the DEs display a much broader area of expertise with posting reviews for on average 14.5 destinations compared to only 9.3 destinations in the case of general reviewers (t=-11.1; p<.001).

**Table 2.** Profile Differences among DEs and General Reviewers

| Profile Characteristic | Virtual Community Member Type | |
|---|---|---|
| | *DEs* | *General Reviewers* |
| *Gender* | | |
| Male | 49.2 | 53.9 |
| Female | 50.8 | 46.1 |
| *Age* | | |
| 18-24 | 1.0 | 3.1 |
| 25-34 | 14.9 | 26.3 |
| 35-49 | 42.8 | 42.5 |
| 50-64 | 35.3 | 25.5 |
| 65+ | 6.0 | 2.6 |
| *Location* | | |
| Europe | 28.0 | 36.0 |
| Asia | 11.1 | 14.8 |
| Africa | 2.2 | 1.7 |
| Oceania | 8.6 | 9.9 |
| North America | 41.6 | 34.5 |
| Central & South America | 8.5 | 3.1 |
| *Average length of membership* | 5.8 | 2.6 |
| *Profile picture* | 97.8 | 99.2 |
| *Age indicated* | 70.5 | 44.6 |
| *Gender indicated* | 86.3 | 49.2 |
| *Badges* | | |
| No badge | 20.0 | 22.4 |
| Reviewer | 10.3 | 19.1 |
| Senior Reviewer | 12.5 | 18.4 |
| Contributor | 19.3 | 16.8 |
| Senior Contributor | 22.5 | 16.1 |
| Top Contributor | 15.5 | 7.3 |
| *Compliments received* | 1.3 | 0.1 |

DEs receive significantly more acknowledgements than general reviewers, suggesting that status indeed matters and halo effects might be at work. DEs' average of 1.3 compliments compares to an average of only 0.1 compliments for general reviewers ($t=-10.4$; $p<.001$). Those DEs who post reviews also receive a higher proportion of helpfulness votes than general reviewers (mean=2.5 compared to 0.9; $t=-19.5$; $p<.001$). It is not clear whether this difference could be due to expertise cues derived from their DE status or their reviewer badges. A general linear model with helpfulness votes per review as the dependent variable and DE status and badge as factors reveals that DE status is a much stronger predictor ($F=429.0$; $p<.001$) than badge ($F=13.7$; $p<.001$) and the interaction of both factors ($F=7.2$; $p<.001$). However, the model generally only predicts 9.3% of the variance, suggesting that other factors

like message content are more important drivers of acknowledgements than expertise cues.

## 5 Conclusion

The results clearly show the significant role of DEs in TripAdvisor in general, not only in the destination forums. DEs seem to employ a diverse rather than focused status seeking strategy in that they contribute to the community across all types of possible contributions. Significantly higher-ranked badges also indicate status seeking by the DEs, although the behavioural data cannot provide insights as to whether obtaining status is an active strategy or just a by-product of high commitment to and activity within the community. Other community members seem to acknowledge DEs, at least significantly more than they acknowledge general TripAdvisor members. Their expertise appears to be rather broad, with many being experts for multiple destinations and with a majority of those who write reviews doing so for more than one destination. In addition, DEs seem more experienced as they are older and have been part of the community for a longer time than general reviewers.

This research makes a theoretical contribution in that it reveals differences amongst posters in a travel community. While previous literature on virtual communities has focused on members' motivations to contribute and distinguished posters from lurkers, the findings of this paper suggest that more research is needed to identify, describe and explain differences within the group of posters. The results also indicate that there are explicit expertise cues, i.e., cues displayed in members' profiles; however, there might also be implicit expertise cues embedded in the reviews that were not captured by our current analysis. This paper clearly illustrates the need to further investigate cues and information processing strategies within virtual community environments.

The findings of this paper are based on data crawled from the most prominent platform for travel reviews. In order to strengthen the findings, the authors plan to examine additional travel communities as well as review websites, such as Yelp[1]. Another issue for future work is to investigate factors that might affect the experts' power of influencing other community members in planning their future travels.

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[1] http://www.yelp.com

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# Personal Profile Information as Cues of Credibility in Online Travel Reviews

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## Abstract

Given the importance of travellers' reviews as a source of travel-related information, source credibility is becoming an increasingly crucial issue in terms of research and application. This study examines the role of self-disclosed personal profile information (PPI) as cues of source credibility in the context of travellers' use of online reviews for trip planning purposes. The results show that the perceived congruence between PPI, i.e., reviewer location and travel interest, and the textual content of the review influences subjects' judgements of the reviewer's credibility. The findings suggest that the availability of the reviewer's self-disclosed PPI serves as credibility cues for travellers' assessments of travel reviewers. The implications of the study, as well as directions for future research, are discussed.

**Keywords:** personal profile information; credibility; trust; travel review; travel planning; social media.

## 1 Introduction

In recent years, social media websites have become an important source of information for prospective travellers. These websites host user-generated content (UGC) in forms such as reviews, testimonials, blogs, and audio/video materials (Xiang & Gretzel, 2010). Travel reviews, in particular, are gaining wide acceptance and often deemed more credible than professional and traditional sources (Cox, Burgess, Sellitto, & Buultjens, 2009; Zhang, Ye, Law, & Li, 2010). However, there are concerns about the lack of travel reviewer's credibility as reported by a number of recent studies. In a 2010 survey, for example, a little more than half (54.6%) of surveyed travellers in the United States reported that the providers of UGC sites do not have effective mechanisms in place to screen out false comments and materials (U.S. Travel Association, 2010). As such, what drives the credibility of travel reviews and how to establish mechanisms to improve the credibility remains an important but challenging research question.

On many social media sites (e.g., TripAdvisor.com), personal profile information (PPI) disclosed by the reviewer him/herself such as user name, gender, photo, etc. is often displayed along the review message. Previous research has shown that PPI affects user's perception of the credibility of the reviewer as well as the review content (Yoo, Lee, & Gretzel, 2007; Forman, Ghose, & Wiesenfeld, 2008; Yoo, Lee, Gretzel, & Fesenmaier, 2009; Xie, Miao, Kuo, & Lee, 2011). These studies primarily

L. Cantoni and Z. Xiang (eds.), *Information and Communication Technologies in Tourism 2013*, DOI: 10.1007/978-3-642-36309-2_20,

focused on the effect of personal characteristics of identity (e.g., gender) on the perceived credibility of travel reviews. However, it is argued that, particularly within a travel planning context, the specific aspects of personal profile information such as self-disclosed location and travel interest in relation to the review content could serve as important cues of source credibility. As such, the goal of this study is to gain a better understanding of the role of travel reviewers with their reviews in the travel planning by investigating the congruence effects of the selected PPI elements with the travel review on the perceived credibility of travel reviewers.

## 2 Research Background

Social media including travel reviews can be seen as new forms of persuasive communication in that online consumers influence each other in different ways with varying degrees of persuasive power. Source credibility plays a significant role in this process because the perceived credibility of a source affects the perceived usefulness of its message and a viewer's intention to adopt it (Sundar, 2008; Rieh & Danielson, 2008). This section provides a review of literature on variables relevant to the study including source credibility in persuasive communication, effects of personal profile information (PPI), as well as congruence between PPI and the message content.

### 2.1 Source Credibility

Interpersonal communication is understood as the interplay between a set of four interrelated variables; the communicator (source), the message (stimulus), the receiver, and the response (Hovland, 1948). Of these components, the source is the principal element that determines the credibility of the message (Wathen & Burkell, 2002; Rieh & Danielson, 2008). The credibility assessment of the source involves the recipients' judgments of relevant source characteristics on its believability, principally trustworthiness and expertise (Flanagin & Metzger, 2008). Trustworthiness (bias, character, safety, or personal integrity) concerns the communicator being unbiased in telling the truth, as subjectively perceived by the recipient (Greer, 2003). Dickinger (2011, p. 380) stated that "the trustworthiness focuses primarily on the provider of the information but not the actual message communicated." Therefore, the characteristics of the source relevant to its message can have impact on the trustworthiness of the source itself as well as the perceptions of the message being communicated. The expertise dimension of a source (competence, authoritativeness, expertness, or qualification) reflects its perceived capacity to provide valid and accurate information (Choi & Rifon, 2002; O' Keefe, 1990). Expertise is also viewed as being a component of the multi-dimensional construct of prior knowledge that includes familiarity and past experience (Kerstetter & Cho, 2004). This aspect of credibility is viewed as an "objective property" of the source (Flanagin & Metzger, 2008, p. 141). Source credibility, thus, is not the reflection of the source's intrinsic attributes; rather, it is the measure of how credible the source is perceived to be by its intended audience (O' Keefe, 1990). Further, the perceived credibility of the source is closely linked to the credibility of the message to be accepted (Rieh & Danielson, 2008).

### 2.2 Effects of Personal Profile Information (PPI)

Self-disclosure is broadly defined "as any information about himself which Person A communicates verbally to a Person B" (Cozby, 1973, p. 73). In computer-meditated communication (CMC), the notion of self-disclosure refers to submitting the identity information of an individual to others online. This idea of self-disclosing the communicator's identity has been studied for its implications on user generated content (UGC) because the content is widely shared online between individuals without prior relationships, which puts the credibility of their contributions (reviews) into question (Cheung & Thadani, 2010; Cox et al., 2009). Source attributes have been found to influence perceptions of source credibility which determines the receptiveness of the users to the message. Yoo et al. (2009) established that the extent to which travel-related UGC creators reveal their identities correlates positively with the perception of their credibility as information sources. Cox et al. (2009) asserted that user-generated reviews are generally perceived as trustworthy, but, when the authors remain unknown, the value of the information diminishes with prospective users. Lee, Law and Murphy (2011), however, found a negative correlation between the disclosing of personal information about hotel reviewers and their helpfulness ratings (credibility). More specifically, it was noted that the only specific information about the extent of the reviewer's travel experience and location show a relatively significant impact on the ratings (Lee et al., 2011).

### 2.3 Congruence of PPI in Relation to Credibility

The criteria of the information user's credibility assessment vary depending on the type of information source being evaluated (Rieh & Danielson, 2008). In communications literature, O'Keefe (1990) stated that the effects of source–recipient similarities on persuasion hinges upon the degree to which the source is believed to be relevant to its message. Flanagin and Metzger (2003) investigated the effect of congruence—the perceived similarity between the source of the message and the message itself—on the source credibility in the setting of personal websites. Similarity (congruence) is conceptualized as the perceived relationship of relevance between the source and the objects it attempts to influence through endorsement (Rifon, Choi, Trimble, & Li, 2004). In the context of consumer reviews, perception of source credibility can occur when the self-disclosed personal information of the reviewer is deemed relevant to what he/she describes in the review. In fact, source characteristics are the important determinant of information quality (Rieh & Danielson, 2008).

Considering the experiential nature of travel, the credibility of travel reviewers is assessed in terms of the extent to which the reviewer offers information that matches the travel needs of individual users. Prior research indicates that a similarity of past travel experience is considered to be an important factor for review users when the credibility of travel reviewers is evaluated. In a survey of travel review users, Gretzel, Yoo, and Purifoy (2007) found that approx. two-thirds of respondents regarded travel reviews to be very useful and credible when the accounts came from those who engaged in travel activities similar to those planned by the users. Kabassi (2010) similarly stated that travellers typically seek a similarity between their experiences and those of other travellers, and, to a lesser degree, demographic commonalities.

These findings suggest that, for travel reviewers, the display of source–recipient similarity in term of travel activities is a significant factor for users' evaluation of a reviewer's credibility.

## 3 Research Hypotheses

It is argued that, within a trip planning context, the congruence of personal information such as travel interest and the reviewer's location to the review content can serve as important cues for source credibility. This section explains these two variables along with research hypotheses.

### 3.1 Travel Interest

Past experience plays a crucial role in travel decision making (Fodness & Murray, 1999). Though there are various ways to communicate individual travel experiences to peer travellers, travel interest appears to have the potential to make a variety of personal experiences relevant to the specific topic of travel experience if it is displayed as part of PPI (personal profile information). Recent evidence shows that there is a desire to share one's travel interest with others having the same kind of interest. A survey of travellers in the United States found that 39 percent of them rated UGC (user-generated content) from those sharing the same travel interests as second highest- in degree of importance- when they were reviewing the online content (U.S. Travel Association, 2010). Thus, the availability of this variable can assist in classifying travel experiences by making an individual travel experience relevant to a particular topic of travel interest. In addition, the variable of travel interest can help travel reviewers display their involvement, whether it be casual or enduring, in a particular travel activity of interest. Trauer (2006, p.8) noted travel interest as having the enduring and situational aspects of individual involvement in travel activities: the enduring involvement includes "the facets of importance and enjoyment, self-expression, and centrality (lifestyle, work) (McIntyre, 1989, 1990)," while the situational involvement describes "the fleeting and short-term engagement in pleasurable activity with no need of special skill and training to enjoy it (Stebbins, 1982)". This temporal difference of involvement indicates variation in the individual levels of knowledge and expertise gained through participation in travel activities of interest. For these reasons, the self-disclosure of travel interest can be a viable cue of both credibility and relevance of a reviewer to a specific type of travel activity. As such, the following hypotheses are proposed:

> *$H1_a$: Congruence between the reviewer's self-disclosed travel interest and the review content will lead to a high level of perceived trustworthiness of the reviewer.*
>
> *$H1_b$: Congruence between the reviewer's self-disclosed travel interest and the review content will lead to a high level of perceived expertise of the reviewer.*

### 3.2 Geographical Location

An important part of travel-related information for trip planning concerns the place to be visited (Hwang, Gretzel, Xiang, & Fesenmaier, 2006). When a topic is related to

the particular place, the input from residents of the destination can be evaluated as credible and relevant due to the assumption that they are well acquainted with esoteric aspects of the location. Arsal, Backman and Baldwin (2008) found that, through an analysis of postings on a travel blog, residents close to a particular destination exert influences on readers especially on the topics related to recommendations of local food and beverage, and destination safety. Posts from individuals who travelled to the location, on the other hand, resonated on such themes as accommodations, monetary issues, and transportation and itinerary suggestions at the destination. In a separate study, reviewers of a hotel who lived in close proximity to the establishment were rated high in helpfulness-credibility (Lee et al., 2011). Therefore, for specific topics of travel and destinations, the reviewer's display of geographical location is indicative of his credulity and relevance to the subject discussed in the review. As such, the following hypotheses are proposed:

> *$H2_a$: Congruence between the reviewer's self-disclosed location and the review content will lead to a high level of perceived trustworthiness of the reviewer.*
>
> *$H2_b$: Congruence between the reviewer's self-disclosed location and the review content will lead to a high level of perceived expertise of the reviewer.*

# 4 Methods

## 4.1 Research Design

To test the proposed hypotheses, the study employed a 3 (travel interest: kayaking, outdoor activities, and shopping) × 2(geographical location: Seattle, WA; Kansas City, MI) between-subjects experimental design. The goal of this design was to examine the effect of the selected reviewer variables on the subjects' perceptions of the source credibility.

Prior to the field experiment, a pilot study of 15 subjects was conducted to make certain the level of congruence between the travel interest/location and review content was perceived differently as planned. Based on the feedback, the review content was modified. In the experiment, the review content contained a short description about a kayaking trip to the San Juan Islands off Seattle and an evaluation of a local restaurant on the Island. As for the manipulation of levels of congruence between the reviewer's PPI (personal profile information) and the review content, reviewer's geographical location included two locations that are considered as geographically apart and different types of tourist destinations: Seattle in Washington for being close to the destination (the San Juan Islands) discussed in the review and Kansas City, Missouri for being inland and presumably distinguishable from the coastal city. For the variable of travel interest, three different types of travel interests were employed, namely kayaking, outdoor activities, and shopping. The travel activity of kayaking belongs in the water-based activities segment (Sung, Morrison, & O'Leary, 1992). Since the individual involvement in the leisure activity varies, paddlers likely possess different amounts of experience and skills that tend to be improved though participation (Chang & Gibson, 2011). Outdoor activities were next chosen to indicate the

reviewer's general involvement in nature-based activities. Lastly, shopping and mall visiting was selected as the non-outdoor type activity. Figure 1 displays the section of the treatment which contains a personal profile with two PPI variables, i.e., shopping as travel interest and Kansas City as geographical location, along with the review content.

The review content, in a textual format, was held constant for all the subjects. The construction of the review content was such that it alluded to the reviewers possessing a higher than average level of expertise in the travel activity described in the content. Similarly, the review contained a message that hinted at the level of knowledge about the location that could be attributed to local residents of the location. Participants were given a short script which asks them to imagine going on a vacation trip to the destination for a kayaking trip. They were then asked to read a travel review and rate it for credibility in terms of trustworthiness and expertise.

### 4.2 Sample and Data Collection

The subjects in this study were undergraduate and graduate students from either hospitality or merchandising program at a major public university in the United States. Students were considered ideal participants in e-commerce related research because of their frequent usage of the Internet for communication and commercial transactions (Hassanein & Head, 2007). A series of student surveys was conducted in a classroom setting with the approval of the instructor and was administered under his or her supervision. A screening procedure prior to the survey administration was performed to filter out those who had had past experience of the travel activity to the destination in order to minimize participant bias.


**Fig. 1.** The treatment - a travel review with the reviewer's personal profile

A total of 272 students participated in the study. Of those, 32 respondents were removed from the data set because they indicated in the survey that they never took a trip over the past year, or that they never used the Internet for trip planning, or that they perceived travellers' reviews for trip planning not important at all. The average age of the participants was 23, while the majority of the respondents were women (189 women vs. 42 men). 54.5% of the participants were currently enrolled in the hospitality management program. More than half indicated themselves as undergraduate seniors (66.8%) of their respective program. Graduate students made up 7.9 percent of the participants.

### 4.3 Measurement

The scales of measurement for this study were adapted from previous research (Yoo et al., 2009; Dickinger, 2011). To measure the dependent variable, i.e., source credibility, a five-item, seven-point Likert scale was used. The trustworthiness dimension was comprised of three items: convincing, believable, and unbiased ($\alpha$ = .664). The expertise dimension was comprised of two items: expert and knowledgeable ($\alpha$ = .709). The specific wording for each measurement items was modified to fit the present study. As an example, the question states "The reviewer is convincing as an information source." The value of Cronbach's alpha for a reliable scale can be at 0.6 or higher, indicating these scales are reliable (Hair, Anderson, Tatham, & Black, 1998).

### 4.4 Data Analysis

To test the proposed hypotheses, analysis of variance (ANOVA) was employed to examine the impact of congruence between the personal profile information (location and travel interest) and the review content on the perceived credibility of the reviewer (trustworthiness and expertise). Likewise, t-test was conducted to examine the congruence effects on the perceived credibility between two different locations: Seattle and Kansas City.

## 5 Results and Discussion

The assessment of the impact of congruence between the PPI (personal profile information: travel interest and location) and the review content on source credibility was subject to one-way ANOVA test with the significant level of .05. First, in order to explore the congruence effect of travel interest on the credibility of the reviewer, three types of the variable (kayaking, outdoor and shopping) were grouped together according to location (Seattle and Kansas City); each group was then assessed for its effect on trustworthiness and expertise.

Table 1 and Figure 2 display the results for both groups. There was a statistically significant difference at the $p < .05$ in perceived trustworthiness within the Seattle group in terms of the impact of travel interest ($F$ (2) = 3.22, $p$ = .043). Post hoc comparisons with Least Significance Difference (LSD) showed that the mean score for Seattle-outdoor ($M$ = 5.27, $SD$ = 0.87) differed significantly from Seattle-kayaking ($M$ = 4.76, $SD$ = 0.19) with the $p$ = .013. Seattle-shopping, however, showed no significant difference of means from either outdoor or kayaking.

**Table 1.** Impact of Travel Interest on Trustworthiness and Expertise

| | Variables | Kayaking | Outdoor Activities | Shopping | | |
|---|---|---|---|---|---|---|
| | | n = 46 | n = 38 | n = 41 | *f* | *p* |
| Seattle | Trustworthiness | 4.76 | 5.27 | 4.97 | 3.223 | *.043 |
| | Expertise | 4.66 | 4.82 | 4.30 | 2.229 | .112 |
| | | n = 32 | n = 37 | n = 35 | *f* | *p* |
| Kansas City | Trustworthiness | 5.12 | 5 | 4.73 | 1.103 | .336 |
| | Expertise | 5.09 | 4.36 | 4.26 | 4.6 | *.012 |

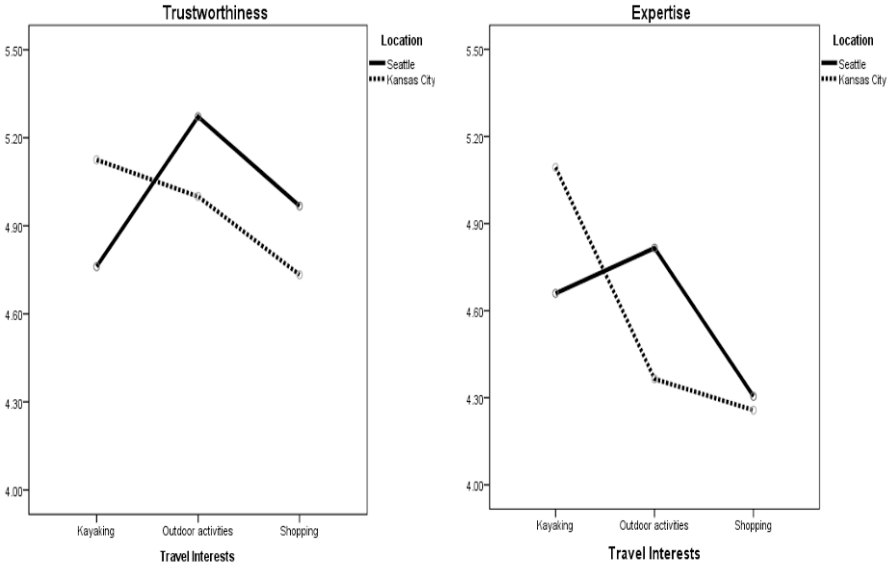


**Fig. 2.** Illustration of Impact of Travel Interest within the Seattle and Kansas City Groups respectively

The same statistical procedure was conducted to compare the effect of travel interests on trustworthiness among the Kansas treatments. The test results yielded no significant differences within the group ($F$ (2) = 1.10, $p$ = .336). Therefore, $H1_a$, which states travel interest in PPI has effect on perceived trustworthiness, was supported. In the case of interaction, there was no significant interaction effect between travel interest and location for trustworthiness ($F$ (2) = 2.35, $p$ = .098).

With regard to perceived expertise, there was no significant difference between the means of the Seattle group ($F$ (2) = 2.22, $p$ = .112). In contrast, an analysis of expertise showed that the effect of travel interest was significant for the Kansas group, $F$ (2) = 4.60, $p$ = .012. Post-hoc tests using LSD revealed that the mean score

for Kansas-kayaking ($M$ = 5.09, $SD$ = 1.23) was significantly higher than the other Kansas treatments: outdoor ($M$ = 4.36, $SD$ = 1.23) and shopping ($M$ = 4.26, $SD$ = 1.3). Thus, these results supported $H1_b$, which states travel interest in PPI has effect on perceived expertise. As for interaction, an interaction effect on expertise was yielded ($F$ (2) = 2.75, $P$ = .066), indicating that the effect of travel interests on expertise changed depending on the location effect to some degree.

An independent-samples t-test was conducted to examine the congruence effect between location and review content on credibility (trustworthiness and expertise). Table 2 display the test results. To gauge the effect, the six treatment profiles were divided into three pairs: the Seattle-Kansas kayaking, Seattle-Kansas outdoor, and Seattle-Kansas shopping. Comparisons of the three pairs for means on trustworthiness showed no significant difference. Therefore, $H2_a$ was not supported. In terms of expertise, the location-review congruence produced a marginal difference of means only between the Seattle and Kansas outdoor treatments $t$ (73) = 1.77, $p$ = .081. The mean score for Seattle-outdoor ($M$ = 4.82, $SD$ = .96) was higher than Kansas-outdoor ($M$ = 4.36, $SD$ = 1.23).

**Table 2.** T-test Results of the Impact of Location on Expertise and Trustworthiness

| | Variables | Kayaking | | Outdoor Activities | | Shopping | |
|---|---|---|---|---|---|---|---|
| | | *t* | *p* | *t* | *p* | *t* | *p* |
| Seattle vs. Kansas City | Trustworthiness | 1.65 | .103 | 1.14 | .257 | .98 | .332 |
| | Expertise | 1.69 | .094 | 1.77 | .081 | .17 | .869 |

The PPI-review congruence led to significant differences in trustworthiness among subjects. The variable of travel interest displayed in the PPI generated variance in their perceptions of trustworthiness. As a result, Seattle and Kansas-outdoor profiles were given high trustworthiness ratings. In prior research, it was asserted that the geographical closeness of the reviewer's location to the place described in the review correlates positively with an increase in the author's credibility (Arsal et al., 2008; Lee et al., 2011). Our results, however, did not find such a correlation in the trustworthiness evaluation as expected. In fact, Kansas-kayaking was evaluated as being more trustworthy with the review than Seattle-kayaking. This contrast to our expectation, however, did demonstrate the effect of the congruence between PPI (location) and the review on perceived trustworthiness in a systematic way.

Subjects' perception of expertise showed a similar effect but with some nuances. The PPI-review congruence among the Seattle profiles did not generate significant differences in the mean scores. The Kansas profiles, in contrast, differed significantly as a result of the experimental effect in terms of mean scores. The Kansas-kayaking generated a mean significantly higher than the outdoor and shopping in the group. Its score was even higher than the Seattle-kayaking. So, it was interesting to see the combination of Kansas and kayaking in the PPI generated the highest score in perceived expertise. In addition, it was quite interesting to see, from the two graphs in Fig. 2, the mean scores of perceived expertise were, generally speaking, lower than those of perceived trustworthiness. This might suggest the congruence of PPI with the review is more likely to be associated with a sense of trustworthiness, rather than the actual expertise of the reviewer.

## 6 Conclusions, Implications and Limitations

Despite the growing importance of social media in travel, the understanding of the credibility judgement of travel reviewers remains under-explored. This study examined the congruence effects between the PPI (i.e., travel interest and location) and the review content as these relate to the reviewer's credibility. The results provide new insights into how the role of the PPI shapes the perceptions of the travel reviewer's credibility and contributes to the tourism literature in several ways.

First, when e-WOM, especially travel-related reviews, becomes an increasingly important source of information in travel and tourism, travellers will rely on various cues to judge the credibility of e-WOM. This study lays the conceptual ground for understanding the persuasive power of personal information associated with travel reviews. Second, it empirically tested two important elements of source credibility that are highly associated with the reviewer's travel experience and proximity to the destination. This is an important difference from previous studies which was primarily focused on the reviewer's demographics. Third, this study also offers practical implications for travel review sites and tourism marketers. The display of personal information such as travel interest and reviewer's location can facilitate the evaluation of the aspects of the reviewer in terms of credibility and relevance, which suggests that trust and credibility can be fostered between peers sharing information on topics of interest.

This study has limitations. For example, the selection of location, i.e., Seattle and Kansas City, was based on the geographical distance with the assumption that these two destinations are apparently different. This might not have necessarily generated the desired variance in subjects' responses due to the complexity in tourism destinations. Future research should focus on further improving the internal and external validities of this research by identifying treatments that reflect the nature of the tourism product in more authentic ways.

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# Social Media Strategy and Capacity for Consumer Co-Creation among Destination Marketing Organizations

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## Abstract

Applying the concept of absorptive capacity in the context of consumer integration for new product development in tourism, this study provided empirical support for the multidimensionality of capacity for consumer co-creation. Co-creation capacity consists of lower level capabilities, including explorative, transformative and exploitative capacity to turn consumer knowledge into consumer-centric products/services. It was identified that social media, in which consumers are increasingly participating in the knowledge exchange processes, is an important avenue for tourism organizations to nurture relationships with consumers that drive participation and integration. Social media strategy is shown to have a positive effect on capacity for co-creation, specifically the capability to process consumer knowledge into valuable assets. Finally, it was also identified that capacity for co-creation among tourism organizations has a positive impact on their performance.

**Keywords:** social media, consumer co-creation, tourism innovation.

## 1 Research Background

The importance of consumer involvement in the ideation and conception of new product development has been highly emphasized in business literature. Recently, the concept of co-creation surfaces and is embraced by business stakeholders and researchers. Co-creation is understood as a process in which value is co-created jointly by firm and consumers through consumer – company interactions (Payne, Storbacka and Frow, 2008; Prahalad and Ramaswamy, 2002, 2004). Engaging active, informed, connected, and empowered consumers in different stages of the value chain will manifest in the co-creation of value that generates and expands knowledge and strengthens firms' competitive advantage (Volberda, Foss and Lyles, 2010). The concept of co-creation dictates that, in order to create value, firms and organizations need to go beyond organizational boundaries into the value chain to foster collaborative exchange and integrate resources and skills to gain competitive advantage. According to Prahalad and Ramaswamy (2002), companies with a consumer-centric view regard consumers as an integral part of their system for value creation, in that consumers can influence the value generation process, compete with companies in value extraction and collaborate with companies in encounters. This means that consumers are not merely asked to contribute information regarding their needs and wants and satisfaction or dissatisfaction from consumption, but are also invited to contribute their creative insights and problem-solving skills to create, conceptualize and experience new products/services (Prahalad and Ramaswamy, 2004).

L. Cantoni and Z. Xiang (eds.), *Information and Communication Technologies in Tourism 2013*, DOI: 10.1007/978-3-642-36309-2_21,

Tourism is arguably one of the greatest and fastest growing creators of experiences (Binkhorst & Dekker, 2009). The unique characteristics of tourism, where experiences are produced and consumed simultaneously, make co-creation particularly significant in tourism. Binkhorst (2005) describes that the uniqueness in tourism lies in "no separation between supply and demand, company and customer, tourist and host…" (p.3). Rather, tourism should be seen as "a holistic network of stakeholders connected in experience environments in which everyone operates from different spatiotemporal contexts" (Binkhorst, 2005, p.3). Therefore, as tourism is seen as a performative action, co-creation between tourists and destinations in the process of experience production and consumption is unmistakable. In tourism literature, co-creation is interpreted from two related perspectives. *First*, co-creation tourism experience is seen as a simultaneous production and consumption or "service experience," which is a mutual co-production of experience by tourists and tourism providers (Minkiewicz, Evans & Bridson, 2009). *Second*, co-creation in tourism is interpreted as the integration of tourists' creativity and ideas in the process of new tourism product/service development and innovation. In this study, the latter perspective of co-creation is adopted.

To date, most studies on co-creation are conceptual propositions or case studies identifying motivators for consumer participation in new product development (e.g., Ostrom et al., 2010; Volberda, Foss and Lyles, 2010). Similarly, in the context of tourism, Lee (2012) investigated the factors that lead to visitors' intention to co-create with tourism destinations by formally contributing their creative insights to develop new tourism products and/or to improve existing ones. However, research so far has yet to understand how well destinations can identify and extract tourists' knowledge for tourism innovation. Therefore, in order to provide a foundation for successful co-creation in tourism, the first goal of this study is to conceptualize and measure destinations' capacity for co-creation.

It is argued that a meaningful tourism experience happens through the various encounters among the different actors (i.e., the tourists, the tourism providers, the locals, etc.) in real and virtual environments, where interactions and exchanges of knowledge and services occur. Due to the development in information and communication technology (ICT), social media has been recognized as an integral part of the tourism environments, enabling encounters among tourists and other tourism stakeholders before, during, and after the trips. Tourists use social media to search and exchange information, opinion, and imagination with others (Xiang & Gretzel, 2010). Social media allows destinations and tourism providers to connect directly with consumers and monitor consumer reviews (Hvass & Munar, 2012).Social media, thus, has dramatically transformed the social landscape of tourism and changed the meaning of "participation" (Lewis, Pea & Rosen, 2010). For tourism destinations, social media can serve as a playing field for "crowdsourcing" or "social content creation," in which valuable information from tourists can be extracted. Recent research has documented different social media strategies among tourism destinations (e.g., Schmallegger & Carson, 2008). However, it is important to identify whether their investment in social media actually results in a better capacity to extract knowledge from customers and turn it into product ideas. Consequently, the

second goal of this study is to investigate the influence of social media strategies on destination's capacity for consumer co-creation.

## 2 Literature Review

### 2.1 Social Media and Consumer Co-Creation

Since the introduction of the participative web (collectively known as Web 2.0) in the early 2000s, social media has become the new normal for consumers to search for and share information, opinion and experience with others. Today consumers planning a trip have ample opinion-rich resources such as virtual tourist communities and personal blogs to refer to in addition to information provided by destination marketing organizations (DMOs) or other tourism providers. After the trip, the participatory architecture of social media also allows tourists to post their experience and evaluation of specific destinations and brands to influence others, making social media a perfect ground to foster the spread of electronic word-of-mouth (eWOM) (Bronner & de Hoog, 2010; Litvin, Goldsmith & Pan, 2007). Hence, social media allows consumers to be an active player, to contribute to the provision of information, to transfer knowledge, and to spread social influence online.

The development of social media has critical consequences for the reputation and success of tourism organizations. Social media not only allows consumers to communicate directly with tourism providers, but also enables consumers to create a domain to converse about specific products and services outside of the media typically controlled by the providers. Therefore, it is understood that tourism organizations need to monitor social media (i.e., listening and responding to customers) and harvest consumer generated content online for their competitive advantages (Litvin, Goldsmith & Pan, 2007). Indeed, many tourism organizations use social media as a part of their marketing strategies by fostering consumer participation for promotion and product distribution (e.g., sponsoring blog posts, hiring professional bloggers, posting on discussion boards, etc.). Furthermore, consumer generated content offers potentials for market research, whereby tourism organizations can extract consumer characteristics, opinions, expertise, and sentiments towards tourism destinations and/or products (Pan, MacLaurin & Crotts, 2007). Hence, through its collaborative and participative platform, social media enables consumers to co-create value with tourism organizations.

In essence, social media offers consumer empowerment (Hoyer et al., 2010); it offers affordances for consumers to have a greater access to and participate in the process of value creation together with tourism organizations. Ultimately, social network interactions among consumers in social media may evolve into a networked process of innovation and social production (Potts et al., 2008). Harnessing the benefits and opportunities of social production, however, requires tourism destinations and providers to adapt to and co-exist with social networks of consumers (Banks & Humphreys, 2008; Benkler, 2006). According to Banks and Humphreys (2008), these emerging co-creators cannot be managed and directed as employees; imposing control over them may risk losing their creative participation. In other words, tourism organizations need to develop new capabilities to work together with consumers and co-exist with consumer groups in social media. It is suggested that integrating social

media strategies into the process of new product development may increase the capability of tourism organizations to co-create value with consumers. This suggests:

Hypothesis 1. *Social media strategy has a positive effect on organization's capacity for consumer co-creation.*

## 2.2 Consumer Participation and Co-Creation

In business literature, consumer participation and organizational design have been cited as the two critical dimensions for the realization of co-creation. The level of consumer integration in the tourism co-creation process depends on how tourism organizations empower tourists to play a role in new product development. In other words, for tourism organizations, the success for co-creation depends on their ability to identify, locate, and empower tourists with the right skills and characteristics, and turn them into collaborators. Service-dominant logic (Vargo & Lusch, 2008) suggests that consumers can be seen as co-creators of value. To that end, tourism organizations need to integrate tourists into the value creation process. Indeed, Payne et al. (2008) suggest that consumers need to be strategically integrated at essentially every step along the product and/or service encounter. This provides a series of encounters through which tourism organizations can identify and extract information from tourists. The purposeful setup for learning from consumers not only changes consumers' role, but also alters the relationship between organizations and consumers and, ultimately, the product or service experience (Payne et al., 2008). Thus, from the dimension of consumer integration, the capacity for co-creation among tourism organizations is represented by their ability to identify creative consumers and facilitate them to become co-creators.

Another dimension of co-creation capacity is the capability to integrate the concept of co-creation in the culture of organizations. It is often related with dynamic capability, which is defined as firms' capability to integrate, build, and reconfigure internal and external competence to address changing environments (Benner, 2009), and absorptive capacity (Cohen and Levinthal, 1990), which is the capability of the firms to value, assimilate, and realize new ideas from external sources. For tourism organizations, co-creation capacity is supported by their receptiveness of ideas from consumers and ability to transform these ideas into successful consumer-centric, co-created products and services. The goal of integrating consumer knowledge is the development of new products and services and/or to significantly improve current ones (through increased effectiveness or efficiency) to ultimately create a competitive advantage (Volberda, Foss and Lyles, 2010). This suggests:

Hypothesis 2. *The capacity for consumer co-creation has a positive effect on organization's performance.*

Absorptive capacity is understood as a higher level capacity that consists of several lower level capabilities (Volberda, Foss and Lyles, 2010). Dynamic capabilities literature formulated a process-based concept based on the knowledge flow during the different organizational learning processes. Zahra and George (2002) suggest four dimensions of absorptive capacity (referred to herein as "four-dimension model"): *acquisition* (i.e., the capability to recognize relevant external information), *assimilation* (i.e., organizational processes that allows analysing and understanding

extracted information), *transformation* (i.e., ability to adapt extracted information into knowledge), and *exploitation* (i.e., ability to exploit external information for the benefit of organization). Acquisition and assimilation are labelled potential absorptive capacity (PAC); while transformation and exploitation are labelled realized absorptive capacity (RAC). Further, according to Zahra and George (2002), the ratio between PAC to RAC reflects the organizations' efficiency in leveraging value from the acquired knowledge.

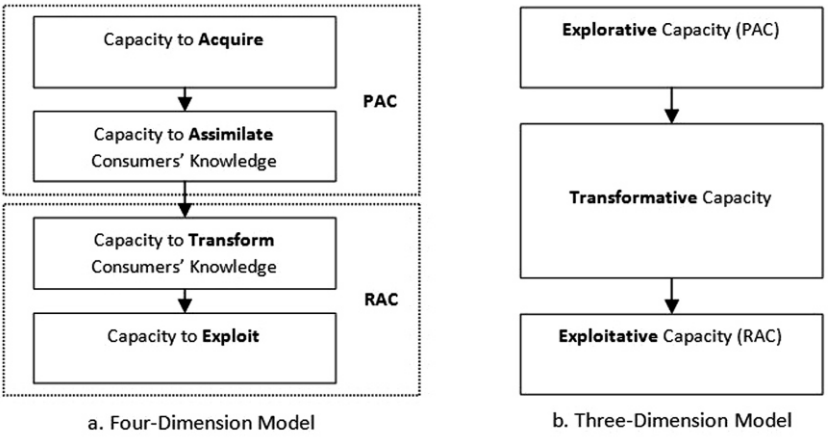



**Fig. 1.** Dimensions of Capacity for Consumer Co-creation

Another stream of literature suggests that PAC corresponds to explorative learning (i.e., knowledge acquisition) and RAC corresponds to exploitative learning (i.e., knowledge exploitation), suggesting transformative learning (i.e., knowledge transformation) as the bridge between PAC and RAC (Lichtenthaler, 2009) instead of an element within RAC (referred to herein as "three-dimension model"). In the case of consumer co-creation, PAC describes how organizations are capable of acquiring new ideas from consumers. That is to say, the capability to integrate consumers in the new product development process is part of PAC, whereby firms are able to acquire and extract consumers' ideas through consumer – company interactions. RAC reflects the ability of the organizations to leverage the absorbed knowledge into profit generation. In the context of co-creation, it is the capacity of tourism organizations to turn the co-created knowledge into co-created products/services. Transformation is seen as a social integration mechanism to bridge between PAC and RAC, implying that organizations that nurture information sharing and collaboration among employees will be more efficient in transforming knowledge into profit. The complementarity of the different dimensions of absorptive capacity has been emphasized recently, due to the increase in inter-organizational knowledge exchange. The capacity to explore, transform and exploit knowledge from consumers are not mutually exclusive, but are likely complementary (Lane et al., 2006; Lichtenthaler, 2009; Zahra & George, 2002), because "their impact on innovation and performance

seems to depend on one another" (Lichtenthaler, 2009: 827). Therefore, the synergy from the different dimensions of absorptive capacity would lead to the benefit that is greater than that of single processes.

## 3 Methodology

The objectives of this study are three-fold: *first,* to measure the capacity for consumer co-creation among tourism organizations, *second*, to assesses the influence of social media strategies (i.e., the integration of social media into destination management processes) on the capacity for consumer co-creation, and, *third*, to estimate the impact of the capacity for consumer co-creation on organization performance in terms of innovation. To measure tourism organizations' capacity for consumer co-creation, measurement items corresponding to the absorptive capacity used in Lichtenthaler's (2009) study that are relevant to the context of consumer integration were adopted and reworded to fit into the study context. After a consultation with four experts in tourism and social media and a back and forth translation from English to German, Italian, and French, items with redundant statements in any of the four languages were excluded. As a result, 11 items were retained for this study. Furthermore, following Marchiori and Cantoni (2012) social media strategies were assessed using 3 items to identify the extent to which tourism organizations integrate social media into their management processes. Organization's performance was measured on 3 items to evaluate the extent of perceived success compared to competitors (development time, number of web marketing activities, development efforts) and overall web marketing success.

Questionnaires were developed and integrated into a survey on a broader theme of destination innovation and technology targeting destination marketing organizations (DMOs). All items are measured on 7-point Likert scales with 1=Strongly Disagree and 7=Strongly Agree. The survey was made available in English, German, Italian, and French, and was distributed to essentially all DMOs in Switzerland (225) and the USA (2,000) in early 2012. A total of 76 (Switzerland) and 183 (USA) complete responses, representing a response rate of 33.7% and 9.1% respectively was achieved.

To assess the multidimensionality of capacity for consumer co-creation, this study tested several alternative models using confirmatory factor analysis based on the number of dimensions (i.e., one, three and four-dimension models). Further, higher-order factor modelling was employed to assess the complementarity of the dimensions of co-creation capacity. Higher order factor modelling has been considered useful to represent the factor structure of measurement items that assess several highly related domains that are hypothesized to comprise a general construct. Further, structural equation modelling using Mplus was employed to test the hypotheses. Several model fit indices were consulted: Comparative Fit Index (CFI) and the Tucker-Lewis Index (TLI) of .90 or higher (Hu & Bentler, 1999), root mean square error of approximation (RMSEA) up to .08 (Bagozzi & Yi, 1988) and standardized root mean square residual (SRMR) of .05 or lower to indicate acceptable model fit.

## 4 Results

A hierarchical comparison with four versions of capacity for consumer co-creation construct was tested to investigate the multidimensionality of this construct. In Model 1, items were loaded into a unidimensional factor. In Version 2, items were loaded into three factors, representing explorative, transformative, and exploitative capacities (three dimension model). In Version 3, items were loaded into four factors: acquisition, assimilation, transformation, and exploitation. Comparison between Version 1 and Version 2 shows that Version 2 has a better fit due to the lower chi-square relative to the degree of freedom (see Table 1). Version 3 is slightly better than Version 2. This result supports the multidimensionality of the capacity for co-creation. The data empirically supports that the specific lower level capacities corresponding to different learning processes are distinguishable in the context of consumer co-creation.

**Table 1.** Hierarchical Comparison for Capacity for Co-Creation Construct

| Version | $\chi^2$ (df) | $\chi^2$/df | CFI | TLI | SRMR |
|---|---|---|---|---|---|
| Version 1: 1 Factor | 273.31 (44) | 6.21 | .869 | .836 | .064 |
| Version 2: 3 Factors | 112.02 (41) | 2.73 | .959 | .945 | .037 |
| Version 3: 4 Factors | 101.53 (38) | 2.67 | .964 | .947 | .035 |
| Version 4: 4 Factors + 1 2nd order | 129.89 (40) | 3.24 | .948 | .929 | .045 |

Note*: N=259. Target coefficient of Model 4 using Model 3 as target model is 0.782.*

To investigate the complementarity of the dimensions of co-creation capacity, Version 4 includes four first order factors and capacity for co-creation as a second order factor that accounts for the relationships between the first order factors. Target coefficient, which is the ratio of the chi-square value of the lower order factor model (Version 3) to the chi-square value of the higher order model (Version 4) was used to test the higher order factor (Marsh & Hocevar, 1985). Version 4 target coefficient of 0.782 indicates that the co-creation capacity explains 78.2% of the variation among the acquisition, assimilation, transformation, and exploitation capacities, which is not indicative of high superiority over the lower factor model. In other words, when counting for positive effects of co-creation on performance, the higher order co-creation capacity may not represent the holistic effect that exceeds the individual effects of each dimension. However, due to the theoretical foundation of complementarity among the co-creation dimensions (Lichtenthaler, 2009), Version 4 is still of theoretical interest. Using Model 3 to estimate the direct effects of the four dimensions of co-creation capacity on performance did not result in a good model fit due to a high correlation between the latent variables. Hence, Versions 2 and 4 were used to test the hypotheses.

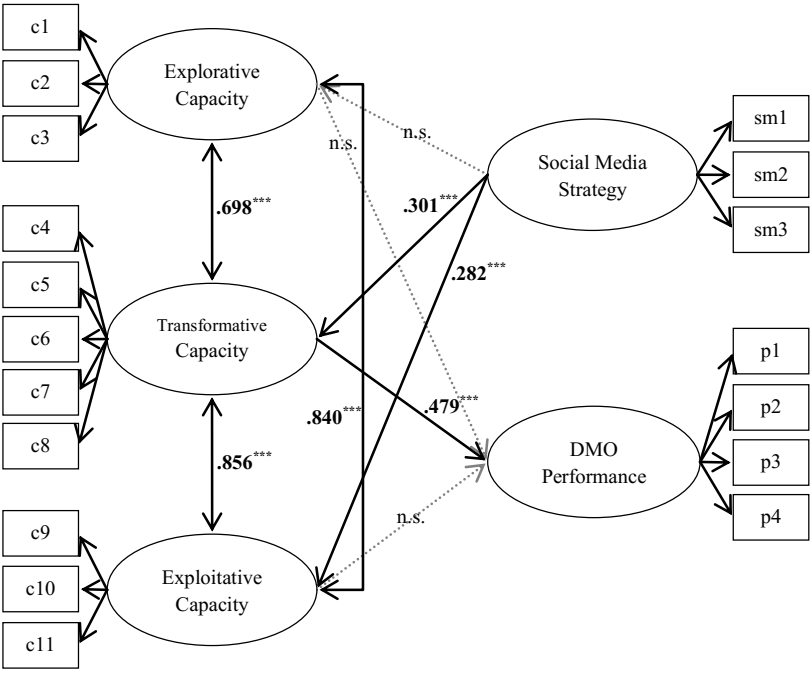
To identify the differences in terms of co-creation dimensions among American and Swiss DMOs, several independent sample t-tests were conducted. Based on Version 2, there were no significant difference in terms of explorative capacity between

American ($M$ = 5.57, $SD$ = 0.89) and Swiss DMOs ($M$ = 5.37, $SD$ = 1.30), but there were significant differences in terms of transformative capacity (US: $M$ = 5.24, $SD$ = 1.30, Swiss: $M$ = 4.84, $SD$ = 0.86; $t(247) = -3.03$, $p < .01$) and exploitative capacity (US: $M$ = 5.12, $SD$ = 1.08, Swiss: $M$ = 4.72, $SD$ = 1.16; $t(255) = -2.99$, $p < .01$). The ratio of explorative capacity (PAC) to exploitative capacity (RAC) among American DMOs was 1.09 and among Swiss DMOs was 1.14, indicating that American DMOs are slightly more efficient in leveraging value from the acquired knowledge from consumers.

Versions 2 and 4 of the co-creation capacity construct were tested in two separate models. Discriminant and divergent validity were tested for both models using AVE and achieved satisfactory results (details not reported here due to space limitation). Using Version 2, the hypotheses were tested based on the direct effects of each of the three factors (explorative, transformative, and exploitative capacities) on DMO performance (Model 1). The model fit was acceptable ($\chi^2$ = 268.878, $df$ = 126, $p$ = .000, $CFI$ = .939, $TLI$ = .926, $RMSEA$ = .066), indicating a moderate fit (see Fig. 2.). The three dimensions of co-creation capacity are highly correlated; explorative capacity is correlated with transformative capacity (.698, $p$ = .000) and exploitative capacity (.840, $p$ = .000), and transformative capacity is highly correlated with exploitative capacity (.856, $p$ = .000).

The result shows that social media strategy has significant direct effects on transformative capacity (.301, $p$ = .000) and exploitative capacity (.282, $p$ = .000), but, surprisingly, has no significant effect on explorative capacity (*Hypothesis 1* was partially supported). This indicates that organizations' investment on social media may not increase their capability to identify and recognize consumers knowledge, but may increase their capability to analyse, understand, and integrate consumers knowledge into the organizations' processes and exploit the knowledge for their benefit. This can be interpreted that having an integrated social media strategy may push the organizations to go beyond listening to consumers, but going further to internalize consumers' ideas and insights into their organizational processes.

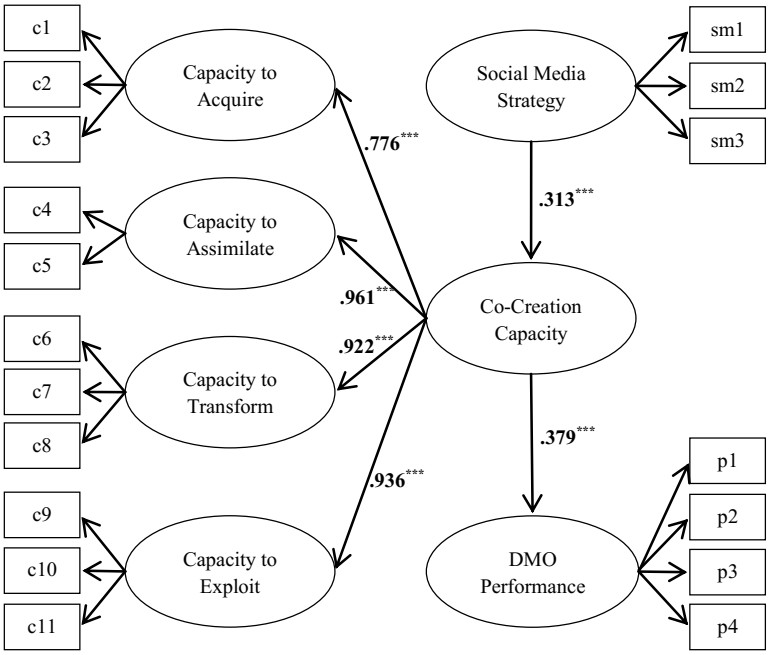
The result also showed the significant positive effect from transformative capacity on DMO performance (.479, $p$ = .000), but no significant direct effects from explorative and exploitative capacities (*Hypothesis 2* was partially supported). Again, this emphasizes the importance of knowledge transformation within the organizations. In other words, the key to successful innovation is the efficient organizational process that bridges the potential and realized capacity for consumer co-creation.




Note: $\chi^2 = 268.878$, $df = 126$, $p = .000$, $CFI = .939$, $TLI = .926$, $RMSEA = .066$, $N = 259$

**Fig. 2.** Model 1: Direct Effects (derived from Version 2)

Using Version 4, the hypothesis testing was estimated based on the complementarity of the dimensions of consumer co-creation on DMO performance (Model 2, see Fig. 3). The model fit was acceptable ($\chi^2 = 297.755$, $df = 129$, $p < .001$, $CFI = .928$, $TLI = .915$, $RMSEA = .071$), indicating a moderate fit. The result showed that social media strategy significantly affects co-creation capacity (.313, $p < .001$), indicating that having an integrated social media strategy increases organizations' capacity to integrate consumers in the process of co-creation (*Hypothesis 1* was supported). Further, the capacity for co-creation was found to significantly affect DMO performance (.379, $p < .001$), indicating that having a combination of four dimensions of co-creation capacity may result in a higher innovation performance (*Hypothesis 2* was supported). However, compared to the previous model, the estimate of the effect on performance is slightly lower. This may be due to the lower T coefficient of co-creation capacity construct Version 4 over Version 3, which may point to a portion of direct effects from the lower order factors that is not captured by the higher order factor.




Note: $\chi^2 = 297.755$, $df = 129$, $p = .000$, $CFI = .928$, $TLI = .915$, $RMSEA = .071$, $N = 259$

**Fig. 3.** Model 2: Complementarity

## 5 Conclusion

As consumer integration has been considered important in the process of innovation, it is imperative for tourism organizations to identify knowledgeable and experienced consumers and create avenues for them to participate in the new product/service development. Consumer co-creation in tourism is particularly important because of the experiential nature of tourism products. Hence, conceptualizing the capability of tourism organizations to integrate consumer for co-creation activities has an important theoretical as well as managerial implication. Drawing from the concept of absorptive capacity, which is the capability of organizations to extract and integrate external knowledge for their benefit, this study conceptualized the concept capacity for consumer co-creation. The results showed that capacity for consumer co-creation is a multidimensional capacity, which consist of lower order capabilities. The three and four dimension versions (Versions 2-4) were identified as better models than the unidimensional model, indicating that the lower order capacities are distinguishable. Therefore, it can be suggested that tourism organization's capacity to work together with consumers in the process of innovation can be measured by their capacity to explore knowledge (i.e., acquire knowledge from consumers), transform knowledge within their organization, and exploit the knowledge for new product/service development.

This study also emphasizes the importance of social media strategies to enhance the co-creation capabilities. As social media has changed the landscape of consumer participation, it is argued that organizations that nurture relationships with consumers in social media have higher capacity to recognize, understand, and analyse consumer information for their benefit. From Model 2, it is shown that making social media as one of the channels where organizations play will impact positively on their capacity for co-creation. Specifically, when taking into account the direct effects to each of the lower order dimensions of co-creation capacity (Model 1), social media strategy significantly affects transformative and exploitative learning. This can be interpreted that organizations who mastered the realms of social media will be better at transforming relevant consumer information into valuable organization knowledge applicable for innovation. Lastly, this study also provided empirical support for a significant positive impact of capacity for consumer co-creation on organization performance, particularly when taking into account the complementarity of all the capacity's dimensions. Specifically, the direct effect model indicated that transformative capacity is particularly significant in impacting the organization performance. That is to say, in order for tourism organizations to be successful at innovating with consumers, they should focus on nurturing the mechanism and culture within the organizations that allow for knowledge to be maintained and transformed into valuable assets. The measurement of organization performance in this research was based on perceived performance, which may limit the interpretation of the results. Future research should address this by measuring the actual innovation performance resulted from consumer insights through social media.

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# Towards an Understanding of Online Travellers' Acceptance of Consumer-Generated Media for Travel Planning: Integrating Technology Acceptance and Source Credibility Factors

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## Abstract

Regardless of the increasing popularity of social media, the use of consumer-generated media for the task of travel planning still meets with scepticism among certain online travel consumers. Hence the need to further explore the psychological factors underlying this aspect of online behaviour. This study proposes a model of CGM acceptance for the purpose of travel planning that integrates the Technology Acceptance Model with the Source Credibility Theory. Using an online survey of 201 valid responses and structural equation modelling, the findings highlight the critical factors relevant to the cognitive processes which determine online travellers' affective and conative responses to the use of CGM for travel planning. The results suggest that integrating technology acceptance factors with that of information adoption can enhance the understanding of CGM usage in the holiday planning context. The study outcome holds implications for theory and practice.

**Keywords:** User-Generated Content, Social Media, Source Credibility, Structural Equation Modelling, *VirtualTourist*.

## 1 Introduction

The travel planning process is often regarded as one of uncertainty. This largely arises from the nature of travel products. The characteristics of tourism as a service product – intangibility, perishability, heterogeneity, and simultaneous production and consumption – often result in higher perceived risks with barely any objectively measurable qualities prior to purchase (Hsu, Kang & Lam, 2006). Hence prospective travellers tend to rely on word-of-mouth from friends and relatives (who have previously experienced the travel product) in making their travel-related choices. In the last decade, however, the emergence of Web 2.0 and the growing interest in social media have led to the transfer of this "word-of-mouth" phenomenon to online domains. Travellers are increasingly resorting to various social media platforms for consumer-generated media (CGM) to inform their travel-related decisions (Yoo & Gretzel, 2011). Consequently, CGM websites have emerged as one of the most prominent platforms for improving travel information accessibility and for enhancing travel decision making. Yet regardless of the growing interest in CGM and social media in general, the use of CGM for travel planning still meets with scepticism from some travellers. The success of any CGM platform, however, depends on the willingness of the target users to employ it for the intended task. Thus, it is important to understand the conditions under which CGM will be embraced and utilised by

L. Cantoni and Z. Xiang (eds.), *Information and Communication Technologies in Tourism 2013*, DOI: 10.1007/978-3-642-36309-2_22,

online travel consumers. The present study therefore seeks to shed light on the psychological and decision making mechanisms underlying the use of CGM for the specific task of travel planning. The study attempts to do this by proposing and empirically testing a theoretical model of factors leading to CGM acceptance for this purpose. The proposed model draws on previous literature that identifies the antecedents of technology acceptance as well as information acceptance.

## 2 Theory and Hypotheses

Several studies have sought to understand online travellers' behaviour regarding CGM and social media in general. Early attempts focused on online community participation (e.g. Wang & Fesenmaier, 2004a, 2004b). Other studies have addressed the implications for travel decisions (e.g. Arsal, Backman, & Baldwin, 2008; Yoo & Gretzel, 2008; Cox, Burgess, Sellitto, & Buultjens, 2009). Recent studies have widened further to address other forms of user-generated content (e.g. Enoch & Grossman, 2009; Huang, Chou, & Lin, 2010). While these studies elucidate the understanding of online travellers' behaviour regarding Web 2.0 platforms within the online travel domain, the determinants of travellers' acceptance of CGM for travel planning still deserve further attention. Building on previous research, the present study investigates how the integration of theories from two distinct disciplines can help to shed light on the factors affecting online travellers' acceptance of the *VirtualTourist* (VT) CGM platform for travel planning. The VT platform can be construed as a travel information system (involving a technological application as well as a source of information). Hence factors which determine technology acceptance and those which influence information acceptance may both be of relevance to the understanding of this phenomenon. The current study therefore proposes a model which integrates Davis' (1986) Technology Acceptance Model (TAM) with Hovland, Janis and Kelley's (1953) Source Credibility Model to explain online travellers' intentions to use CGM from the VT platform for travel planning.

### 2.1 Technology Acceptance Theory

In the existing literature, several theoretical perspectives have been applied in an attempt to understand individuals' acceptance and use of technology-related applications. Of these, the TAM stands out as the most parsimonious and, perhaps, the most influential approach to studying user acceptance. The model was originally proposed by Davis (1986) based on the Theory of Reasoned Action (Ajzen & Fishbein, 1980). The theory postulates that individual's acceptance of information systems are determined by two cognitive factors (i.e. perceptions of usefulness and ease of use). TAM has been widely applied to investigate user-acceptance of various types of technology. In the context of hospitality and tourism research, these include employees' acceptance of IT in upscale hotels (Lam, Cho, & Qu, 2007), hotel front office systems (Kim, Lee, & Law, 2008) and other information systems (Huh, Kim, & Law, 2009), restaurant computing systems (Ham, Kim, & Forsythe, 2008), travel agency computerized reservation systems (Lee, Kim & Lee, 2006), and the adoption of biometric systems in hotels (Morosan, 2012). The findings of these studies demonstrate that perceived usefulness and ease of use are important determinants of user acceptance of technology-related applications. Davis (1989) defines perceived usefulness as "the degree to which a person believes that using a particular system

would enhance his or her job performance" (p. 320). In the present study, perceived usefulness can be construed as the extent to which an online travel consumer believes that using CGM from VT enhances his or her travel planning task. The existing literature suggests that perceived usefulness drives attitude and usage intention (e.g. Ayeh, Au & Law, 2012; Morosan, 2012). Prospective travel consumers who perceive *VirtualTourist* to be useful are more likely to have favourable affective and conative responses towards its use for travel planning than those who do not. Hence the hypotheses,

*Hypothesis 1.* Perceived usefulness has a significant positive effect on attitude.

*Hypothesis 2.* Perceived usefulness has a significant positive effect on usage intention.

Perceived ease of use has been conceptualised by Davis (1989) as "the degree to which a person believes that using a particular system would be free of effort" (1989, p. 320). In the present study, ease of use refers to the extent to which the online travel consumer believes that using CGM from VT for travel planning will be free from effort. Prior research suggests that ease of use influences attitude (Castañeda, Frías, & Rodríguez, 2009). Also, it is generally believed that a system will be regarded as more useful if it is easy to use. For example, studies by Morosan (2012) and Kim *et al*. (2008) among others, offer strong empirical support for a positive relationship between perceived usefulness and ease of use. The present study therefore proposes that

*Hypothesis 3.* Perceived ease of use has a significant positive effect on attitude towards usage.

*Hypothesis 4.* Perceived ease of use has a significant positive effect on perceived usefulness.

### 2.2 Source Credibility Theory

The proposed model also considers the Source Credibility Theory (Hovland *et al*., 1953). While the source credibility perspective is expected to be relevant in the study of individuals' acceptance and use of information sources, it can be expected to be particularly useful in the context of CGM because of the many concerns regarding CGM which largely hinge on credibility (e.g**.** Dellarocas, 2003; Litvin, Goldsmith, & Pan, 2008**).**

Source credibility has received extensive attention in the Marketing and Communication Studies literatures as regards the study of various phenomena (for review, see Metzger Flanagin, Eyal, Lemus, & McCann, 2003; Pornpitakpan, 2004). Of the various theoretical perspectives on source credibility, the closest in relevance to the objective of the current study is Hovland *et al*.'s (1953) model involving the dimensions of trustworthiness and expertise.

In the marketing literature, source credibility theory has often been used to examine the effectiveness of celebrity endorsement. Researchers in Communication Studies also tend to apply this theory to compare the credibility of different media channels. In the online domain, more recently, researchers have studied source credibility in the context of different theories to understand its role in online behaviour. For example,

Sussman and Siegal (2003) examined source credibility within the framework of the Elaboration Likelihood Model (ELM; Petty & Cacioppo, 1986) and found source credibility to be significantly related to information usefulness in the context of knowledge transfer via e-mails. Similarly, Zhang and Watts (2008) employed the source credibility perspective in examining information adoption in online communities.

The most common dimensions of source credibility have been perceived trustworthiness and expertise (Fogg & Tseng, 1999). Ohanian (1991) defines trustworthiness as the "consumer's confidence in the source for providing information in an objective and honest manner" (p. 47). In the present study, the source here refers to travel consumers who post CGM. Perceived expertise, on the other hand, describes the extent to which CGM contributors on VT are perceived to be "a source of valid assertions" (Hovland *et al*., 1953, p. 21). Perceived expertise, in this study's setting, concerns online travellers' perceptions of the CGM contributors' prior experiences with the travel product and their ability to make meaningful evaluations. Early research suggests the importance of source credibility in determining responses towards information sources (Hovland *et al*. 1953). Recent studies in different contexts have also established the importance of source credibility factors in determining attitudes and information adoption/purchase intention (e.g. Sussman & Siegal 2003; Pornpitakpan, 2004; Jin, Cheung, Lee, & Chen 2009). It is therefore expected that the extent of credibility allotted to travel consumers who post CGM on VT will influence online travellers' perception of CGM usefulness, as well as their attitudes and usage intention in the context of travel planning. Hence, the hypotheses:

*Hypothesis 5.* Perceived trustworthiness has a significant positive effect on perceived usefulness.

*Hypothesis 6.* Perceived trustworthiness has a significant positive effect on attitude towards usage.

*Hypothesis 7.* Perceived trustworthiness has a significant positive effect on usage intention.

*Hypothesis 8.* Perceived expertise has a significant positive effect on perceived usefulness.

*Hypothesis 9.* Perceived expertise has a significant positive effect on attitude towards usage.

*Hypothesis 10.* Perceived expertise has a significant positive effect on usage intention.

Attitude is generally held as a prime predictor of usage intention. The TAM, the TPB and many social psychology theories recognise the salience of attitude in determining behavioural intention. In online settings, the influence of attitude on intention has also been found to be valid (e.g. Bruner & Kumar, 2000; Castañeda *et al*., 2009). Therefore, the present study hypothesizes that:

*Hypothesis 11.* Attitude towards usage has a significant positive effect on usage intention.

Behavioural intention is the final endogenous construct in the proposed model. In the current study, it represents online travellers' conative responses to the use of CGM from VT for travel planning. Behavioural intention has generally been regarded as "a person's subjective probability that he will perform some behaviour" (Fishbein & Ajzen, 1975, p. 288). A definition by Warshaw and Davis (1985) emphasised the extent of planning related to performing a particular behaviour; "the degree to which a person has formulated conscious plans to perform or not perform some specified future behaviour" (p. 214). The 'specified future behaviour', in this study's context, is the use of CGM from VT for travel planning.

# 3 Research Design

The unit of analysis in the present study is the individual travel consumer who employs the Internet for travel information search; that is, a potential user of VT. Data to empirically test the specified hypotheses were collected as a pilot study of a much larger research project.

## 3.1 Measurement and Data Collection

New scales were developed on the basis of previous literature and, where possible, existing validated scales were adopted. Scales for *perceived usefulness, ease use* and *usage intention* were modified from existing TAM research (Davis, 1989; Davis, Bagozzi, & Warshaw, 1989; Venkatesh, Morris, Davis, & Davis, 2003) to the context of CGM utilisation for travel planning. To measure source credibility factors, scales were adapted from Ohanian (1991). The *attitude* scale was obtained from Moon and Kim (2001). Seven-point semantic differential scales were employed for the measurement of *perceived expertise*, *trustworthiness* and *attitude towards usage,* whereas the remaining constructs were measured using a seven-point Likert-type scale with anchors ranging from strongly disagree (1) to strongly agree (7). An expert panel review of scholars helped ensure content validity for the adapted scales.

Data were collected by means of a Web-based survey. Respondents were recruited through an online panel research company. The online survey was opened from the 10$^{th}$ to 11$^{th}$ August, 2011. Within this period, 284 travel consumers responded to the survey. From a data quality perspective, steps were taken to ensure that only sample members who have taken a leisure trip in the 12 months preceding the survey and who used the Internet for travel information search could access the survey. In addition, each respondent could complete the survey only once.

## 3.2 Data Analysis

The resulting data were screened and prepared for analysis. Of a total of 284 respondents, 69 were screened out of the survey because they did not meet the sample criteria. The data were further screened for incomplete cases and outliers. After the screening process, a valid sample of 201 cases was retained for measurement analysis**.** For the estimation of the model, the partial least squares (PLS) path modelling technique was applied using the SmartPLS 2.0 (Beta) M3 software application (Ringle, Wende & Will, 2005). PLS was chosen over other alternative techniques due to its advantages – not requiring the distributional assumption of normality, making less demand on measurement scales, and working well with much smaller as well as

much larger samples (Gefen, Straub, & Boudreau, 2000; Hair, Ringle, & Sarstedt, 2011).

# 4 Results

## 4.1 Respondents' Profile

The demographic characteristics of the respondents have been displayed in Table 1. Female respondents (55.7%) were slightly more than their male counterparts (44.3%). The respondents were fairly distributed across the different age groups with the clear majority aged between 20 and 60, which represents the active working age group. Over half of the respondents had a bachelor degree or a higher qualification. Very few respondents were either students (9.0%) or retirees (3.5%) with most study participants working in fields such as sales and office, education, general services, government, among others. The respondents were habitual Internet users with the vast majority using the Internet either several times each day (83.6%) or once daily (11.4%).

**Table 1.** Profile of Study Participants (N=201)

| *Profile category* | | *Frequency (Valid N)* | *Percentage (%)* |
|---|---|---|---|
| Gender | Female | 112 | 55.7 |
| | Male | 89 | 44.3 |
| Age | Less than 20 years | 6 | 3.0 |
| | 21-30 years | 62 | 30.8 |
| | 31-40 years | 46 | 22.9 |
| | 41-50 years | 48 | 23.9 |
| | 51-60 years | 30 | 14.9 |
| | 60+ years | 9 | 4.5 |
| Education | High school/ Secondary school | 43 | 21.4 |
| | Diploma/Associate degree (2 years) | 53 | 26.4 |
| | Bachelor degree | 62 | 30.8 |
| | Graduate/Postgraduate degree | 41 | 20.4 |
| | Other | 2 | 1.0 |
| Occupation | Full-time | 135 | 67.2 |
| | Retired | 7 | 3.5 |
| | Not employed outside home | 19 | 9.5 |
| | Student | 18 | 9.0 |
| | Other | 22 | 10.9 |
| Country of Residence | USA | 100 | 49.8 |
| | Singapore | 98 | 48.8 |
| | Other | 3 | 1.5 |
| Internet use frequency | A few times a month or less | 3 | 1.5 |
| | A few times a week | 7 | 3.5 |
| | About once a day | 23 | 11.4 |
| | Several times each day | 168 | 83.6 |

### 4.2 Evaluation of the Measurement Model

The adequacy of the measurement model was assessed by conducting PLS factorial validity tests. To validate the measures, convergent and discriminant validity were considered. The PLS factorial validity test offered evidence for convergent validity. The standardized factor loadings were all significant and greater than 0.70 (Table 2). The $\rho$ and $\alpha$ of each latent construct exceeded 0.70 whereas the AVEs were all greater than 0.50. Also, discriminant validity of the measurement model was established. As shown in Table 3, the square root of AVE for each construct exceeded the correlations between the construct and other constructs (Fornell & Larcker, 1981). In addition, an examination of the indicators' cross loading revealed that no indicator loads higher on an opposing construct (Hair *et al*., 2011). Thus, the measurement model parameter estimates and diagnostics provide strong evidence for the reliability and validity of construct measures.

**Table 2.** Factor loadings for individual items

| *Construct/Item* | *Loading* | *Cronbach's Alpha (α)* | *Composite Reliability* | *AVE* |
|---|---|---|---|---|
| ***Attitude:*** | | 0.957 | 0.967 | 0.853 |
| Bad / Good | 0.907 | | | |
| Foolish / Wise | 0.928 | | | |
| Unpleasant / Pleasant | 0.910 | | | |
| Negative / Positive | 0.933 | | | |
| Unfavourable/ Favourable | 0.937 | | | |
| ***Ease of use:*** | | 0.959 | 0.968 | 0.858 |
| Easy to learn how to use | 0.913 | | | |
| Easy to use to find the information needed | 0.938 | | | |
| Easy for me to become skilful at using | 0.906 | | | |
| Easy to use content to plan my trips | 0.934 | | | |
| Overall, I find easy to use | 0.940 | | | |
| ***Expertise:*** | | 0.930 | 0.947 | 0.783 |
| Inexperienced / Experienced in travel | 0.846 | | | |
| Not experts / Experts in travel | 0.848 | | | |
| Unknowledgeable / Knowledgeable in travel | 0.911 | | | |
| Unqualified / Qualified to offer travel advice | 0.890 | | | |
| Unskilled / Skilled in travel | 0.926 | | | |
| ***Intention:*** | | 0.965 | 0.975 | 0.906 |
| Will not hesitate to visit | 0.921 | | | |
| Expect to use to plan my future trips | 0.966 | | | |
| Intend to use to inform my travel-related decisions. | 0.952 | | | |

| *Construct/Item* | *Loading* | *Cronbach's Alpha (α)* | *Composite Reliability* | *AVE* |
|---|---|---|---|---|
| Very likely to use for my travel planning | 0.967 | | | |
| ***Trustworthiness:*** | | 0.937 | 0.952 | 0.799 |
| Undependable / Dependable | 0.854 | | | |
| Dishonest / Honest | 0.880 | | | |
| Unreliable / Reliable | 0.916 | | | |
| Insincere / Sincere | 0.904 | | | |
| Untrustworthy / Trustworthy | 0.914 | | | |
| ***Usefulness:*** | | 0.960 | 0.969 | 0.863 |
| Improves my travel planning | 0.918 | | | |
| Helps me plan trips more efficiently | 0.934 | | | |
| Makes my travel planning easier | 0.916 | | | |
| Makes it easier for me to reach travel-related decisions | 0.935 | | | |
| Overall, I find useful for travel planning | 0.942 | | | |

*Note*: All loadings are significant at $p < 0.001$.

### 4.3 Structural Model and Hypotheses Testing

After establishing the validity of the measures, the structural model was assessed. Figure 1 displays the results of the structural model test. The findings indicate that the proposed model could explain up to 60.6 percent of the total variation in usage intention, 60.4 percent of the variance in attitude and 59.3 percent of the total variation in usefulness perception. The Stone–Geisser's $Q^2$ Test was also applied to ascertain the predictive validity of the exogenous latent variables. The resulting $Q^2$ values are significantly above zero (i.e. 0.538, 0.504 and 0.510 for usage intention, attitude and perceived usefulness, respectively), evident of the model's predictive relevance.

Following the procedure suggested by Hair et al. (2011), a bootstrap analysis was carried out. The non-parametric bootstrap analysis of 5,000 samples and 201 cases (using the individual sign change option) revealed that eight out of the eleven proposed relationships were significant. Table 4 displays the results of the hypotheses testing. *Hypothesis 1* which assume a direct positive relationship between perceived usefulness and attitude was supported ($\beta$=0.187, $t$=2.334, $p$< 0.05). Perceived usefulness was also found to have a direct positive effect on usage intention ($\beta$=0.584, $t$=6.970, $p$< 0.01). The perceived ease of using VT was also found to be wielding a positive influence on attitude ($\gamma$=0.174, $t$=2.435, $p$< 0.05) and perception of usefulness ($\gamma$=0.540, $t$=6.326, $p$< 0.01). In addition, the present study found that trustworthiness positively drives perceived usefulness ($\gamma$=0.196, $t$=2.009, $p$< 0.05) and attitude ($\gamma$=0.429, $t$=4.961, $p$< 0.01) but its direct effect on usage intention was not supported ($\gamma$=-0.082, $t$=1.203, $p$>0.05). Perceived expertise was also found to be

directly related to perceived usefulness ($\gamma$=0.155, $t$=2.227, $p$< 0.05) but its relationships with attitude ($\gamma$=0.115, $t$=1.703, $p$>0.05) and usage intention ($\gamma$=-0.035, $t$=0.673, $p$>0.05) were found to be insignificant. Lastly, *hypothesis 11* which posits a direct relationship between attitude and usage intention was also supported ($\beta$=0.357, $t$=4.284, $p$ < 0.01).

**Table 3.** Descriptive data, Inter-construct correlations and the square root of AVE

| *Constructs:* | *Attitude* | *Ease of use* | *Expertise* | *Intention* | *Trustworthiness* | *Usefulness* |
|---|---|---|---|---|---|---|
| Attitude | (0.924) | | | | | |
| Ease of use | 0.587 | (0.926) | | | | |
| Expertise | 0.640 | 0.480 | (0.885) | | | |
| Intention | 0.645 | 0.620 | 0.461 | (0.952) | | |
| Trustworthiness | 0.721 | 0.520 | 0.781 | 0.497 | (0.894) | |
| Usefulness | 0.634 | 0.717 | 0.568 | 0.741 | 0.598 | (0.929) |
| *Mean* | 5.659 | 5.801 | 4.995 | 5.422 | 5.276 | 5.544 |
| *Standard Deviation* | 1.167 | 1.005 | 1.155 | 1.279 | 1.066 | 1.165 |

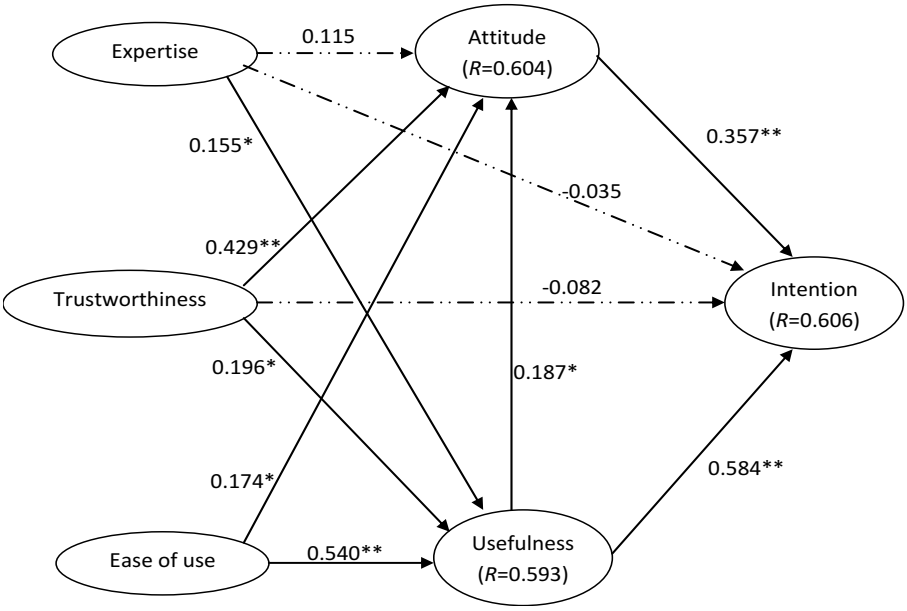
*Note:* The number in parenthesis is the square root of AVE.

**Table 4.** Results of hypothesis testing

| *Hypotheses* | | *Path coefficient* | *t-value* | *Supported?* |
|---|---|---|---|---|
| **H1:** | Usefulness → Attitude | 0.187* | 2.334 | Yes |
| **H2:** | Usefulness → Intention | 0.584** | 6.970 | Yes |
| **H3:** | Ease of use → Attitude | 0.174* | 2.435 | Yes |
| **H4:** | Ease of use → Usefulness | 0.540** | 6.326 | Yes |
| **H5:** | Trustworthiness → Usefulness | 0.196* | 2.009 | Yes |
| **H6:** | Trustworthiness → Attitude | 0.429** | 4.961 | Yes |
| **H7:** | Trustworthiness → Intention | -0.082 | 1.203 | No |
| **H8:** | Expertise → Usefulness | 0.155* | 2.227 | Yes |
| **H9** | Expertise → Attitude | 0.115 | 1.703 | No |
| **H10** | Expertise → Intention | -0.035 | 0.673 | No |
| **H11** | Attitude → Intention | 0.357** | 4.284 | Yes |

*Significant at $p$ < 0.05. **Significant at $p$ < 0.01.

*Note:* These significance levels are determined via bootstrapping analysis (Hair et al., 2011)




*Significant at $p < 0.05$. **Significant at $p < 0.01$

**Fig. 1.** Structural Model Test Results

## 5 Discussion and Conclusions

### 5.1 Key findings

The current study theorized that that source credibility factors and technology acceptance factors would be predictors of online travellers' attitude and intention to use CGM for travel planning. To a large extent, the results of this empirical study lend support to the proposed model.

Several significant findings emerge. Most importantly, the TAM factors proved more salient in determining online travellers' acceptance of CGM from VT for travel planning. The study finds that perceived usefulness has a direct influence as well as an indirect effect on usage intention through attitude towards usage. Online travellers' evaluation of the usefulness of CGM has its strongest direct impact on usage intention, an indication that that travellers' develop their intentions towards the use of CGM for travel planning if they consider it as useful, over and above any positive or negative feelings they may have towards CGM usage for travel planning. This mirrors prior studies in other contexts which have also established a direct relationship between perceived usefulness and usage intention (Venkatesh et al., 2003; Huh *et al*., 2009; Casaló, Flavián, & Guinalíu, 2010)

The findings also highlight the critical role of ease of use perception in CGM contexts. Perceived ease of use drives perceptions about the usefulness of CGM as

well as the affective responses of online travellers towards CGM usage for travel planning. The results further show that perceived usefulness is most impacted by ease of use. This implies that online travellers' assessment of the amount of effort required when using CGM for travel planning considerably determines their attitudes as well as their perceptin of its usefulness.

Also, the findings of the present study demonstrate that source credibility factors are antecedents of CGM usefulness. Both perceived trustworthiness and expertise wield significant influence on usefulness perception. In a study on how knowledge workers are influenced to adopt the advice that they receive in mediated contexts, Sussman and Siegal (2003) also established that perceived credibility influences information usefulness. In addition, the present study finds that trustworthiness substantially determines online travellers' attitude towards the use of CGM on the VT platform for travel planning. This finding is consistent with the results of earlier studies on the relationship between source credibility and disposition toward information (Lafferty & Goldsmith, 1999; Kerstetter & Cho, 2004; Jin *et al*., 2009). This would imply that online travellers are more favourably disposed towards the use of CGM for travel planning when they believe that CGM is from trustworthy travel consumers. The study found that the strongest impact of perceived trustworthiness was on attitude towards using CGM for travel planning. Each standard deviation variation in trustworthiness was associated with a 42.9 percent variation in attitude.

Nonetheless, the model has three insignificant relationships. First, perceived trustworthiness has no direct impact on usage intention. Rather, the effect of trustworthiness on usage intention is mediated through attitude and usefulness. This result suggests that trustworthiness perception decides online travellers' behavioural intention to use CGM for travel planning by driving their perception of usefulness and negative/positive feelings towards this aspect of online behaviour. Also, perceived expertise has direct effect on neither attitude nor usage intention. To a certain degree, this result differs from previous findings in some contexts. Ohanian's (1991) study, for example, reported a significant direct influence of expertise on purchase intention, though the same study did not find the relationship between trustworthiness and purchase intention significant. This inconsistency could be due to the differences in study contexts. For instance, whereas Ohanian's study regarded the source as celebrity endorsers, the present study refers to the source as travel consumers who post CGM on VT platform. Thus the findings may imply that, in the context of VT, the dimensions of source credibility impact usage intention indirectly through their effect on perceived usefulness, and to some extent, attitude. It is also possible that the difficulty in ascertaining the expertise of those who post CGM may have contributed to the construct's failure to play a direct role in online travellers' affective and conative responses to CGM usage. Lastly, the study finds attitude in addition to usefulness as the direct predictors of usage intention. This mirrors previous research which emphasised the important role of attitude in deciding behavioural intention (Bruner & Kumar, 2000; Castañeda *et al*., 2009; Ayeh et al., 2012; Morosan, 2012).

### 5.2 Implications and Limitations

This paper contributes to existing research by shedding light on the cognitive and affective processes underlying online travellers' acceptance of CGM for travel

planning. A primary contribution is in combining technology acceptance and source credibility theories to examine travel consumers' attitudes and intention to use CGM for travel planning. By utilising technology acceptance literature to integrate and add to relevant concepts from the Source Credibility theory, this study offers a deeper understanding of online travellers' acceptance of CGM. In addition to verifying the theoretical validity of Davis' (1989) TAM to the context of CGM, the present study also provides a theoretical extension to explain online behaviour in this specific context. The findings suggest that source credibility factors effectively capture variations in perceived usefulness and attitudes that may not be accounted for by the TAM.

Not only do the source credibility factors explain additional variance, but also, they offer insights that can guide managerial action. Thus, the proposed integrated model has practical value for guiding recommendations aimed at driving online travellers' acceptance of CGM for travel planning. First, practitioners should be aware of the critical effect of usefulness perception on travel consumers' affective and conative responses to the use of CGM for travel planning. Platform designers and managers can attempt to increase perceptions about the usefulness of CGM by enhancing perceptions of ease of use and trustworthiness. To enhance ease of use perception, platform managers may need to focus on making CGM platforms user-friendly and augmenting usability. Platform managers should also aim to enhance trustworthiness by addressing credibility concerns. Thus the insights this study offers can be translated into appropriate social media strategies for system designers.

While the TAM related constructs remain dominant factors in driving online travellers' attitude and intention to use CGM for travel planning, the present study provides support for the inclusion of source credibility factors to better understand the antecedents of perceived usefulness and attitude. Future studies can concentrate on further validation of these factors. Also, it is hoped that future studies might explore additional context-specific factors to better explain the complex relationships among variables in pursuit of understanding the use of CGM in travel planning contexts. Much previous research has also focused on *TripAdvisor* – the largest online travel specific site – with less attention given to other subsidiary sites such as *VirtualTourist*. The present study offers insights in this direction. Nevertheless, additional work is necessary to deepen the understanding of online behaviour regarding the dynamic nature of the varied CGM platforms in the travel domain.

Overall, the present study provides an appropriate theoretical framework for studying the complex phenomenon of CGM use for travel planning and offers insights to practitioners on social media marketing strategies within the travel domain. In concert with the empirical findings, the proposed model can serve as a foundation for future research regarding this important aspect of online behaviour. Nonetheless, the sample drawn for this study and the focus on only one type of CGM may limit the extent to which the results can be generalised to other contexts.

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# A Citation Analysis of ENTER Proceedings in 2005 to 2012

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## Abstract

This paper examines the academic foundations for eTourism research, which is operationalized as the number of citations, in terms of disciplines and publication sources. Harnessing the content analysis on bibliographies of articles published in ENTER proceedings from 2005 to 2012, empirical findings revealed that references from other disciplines were cited more frequent than those from tourism-related channels. This suggests that research on eTourism was generally grounded on knowledge from other fields. The high frequency of citations from journals, books as well as conference proceedings indicates a strong and staying impact of these traditional information sources on researchers in eTourism. Implications, limitations of this study as well as directions for future research are discussed.

**Keywords:** academic foundations; citation analysis; ENTER proceedings.

## 1 Introduction

Ever since the introduction of information and communication technologies (ICTs) to business applications, many researchers have advocated the importance of incorporating ICTs into tourism (Burger, 1997). Indeed, the rapid development of ICTs has dramatically transformed the tourism industry globally, in terms of business practices as well as industry structures (Ho & Lee, 2007). Considering ICTs and tourism are two of the most dynamic motivators of the emerging global economy (Buhalis, 2003), the application of ICTs in tourism has received much attention from tourism scholars. This can be shown by the increasing number of studies on application of ICTs to the tourism industry in recent years. In the research community of eTourism, ENTER conferences are one of the "largest publication channels on technology applications in travel and tourism" (Law, Qi, & Buhalis, 2010, p. 298). The annual ENTER conference, which was firstly held in Innsbruck, Austria in 1994, offers a unique avenue for attendees to be kept current about the latest developments in IT and tourism, and marks the establishment of eTourism community.

Served as an international forum for academic researchers, industry practitioners, educators, and policy makers to exchange the latest knowledge in eTourism, ENTER conferences featured quality research articles published in the proceedings. To some extent, ENTER proceedings can typically serve as the global corpus of state-of-the-art research on IT and tourism. Analysis of publications in ENTER proceedings can thus reveal the progress and development of eTourism research. Such endeavours were undertaken from varied and various perspectives, such as authorship analysis and

L. Cantoni and Z. Xiang (eds.), *Information and Communication Technologies in Tourism 2013*, DOI: 10.1007/978-3-642-36309-2_23,

institutional analysis (Liu, Zhong, Ip, & Leung, 2011). Besides the above analytical methods, citations analysis, which is another quantitative way to evaluate impacts of academic references as well as researchers, has been largely overlooked (Chang & McAleer, 2012).

As suggested by Xiao and Smith (2008), tourism scholars have the tradition to adopt approaches from other fields. Literally, eTourism research is a work cataloguing knowledge from IT and tourism disciplines. The degree to knowledge from which certain disciplines have normally referred, however, remained largely unclear. To fill this research void, the study aims to examine the academic foundations for eTourism research through analyzing citations of full-length articles published in ENTER proceedings from 2005 to 2012. By means of examining the citations in terms of disciplines (e.g., tourism, social science, and business) and publication sources (e.g., journals and books), this study is expected to provide some implications for understanding the diffusion of knowledge in the eTourism community.

## 2 Literature review

### 2.1 Citation analysis

Citation analysis is the examination of references purposing to discover the underlying structures and patterns of citations. Citation analysis was initially developed in the field of information science as a tool to analyze journals of particular fields of interests. This approach has long been utilized by scholars in business-related fields as a mechanism for identifying the basis of, and relationships among, core sets of articles, authors, or publications (Kim, Savage, Howey, & van Hoof, 2009). Kim et al. (2009) proposed that examination of citations in the literature could help determine the evolution of academic literature in tourism and hospitality. In tourism, citation analysis has been used by scholars to obtain varied information. For example, Kim et al. (2009) analyzed citations of articles in three top-tier tourism and three top-tier hospitality journals to illustrate the maturity of the fields of tourism and hospitality. For the purpose of identifying a set of viable criteria for ranking tourism and hospitality journals, Chang and McAleer (2012) used quantifiable Research Assessment Measures (RAMs) to analyze top international tourism and hospitality journals in terms of citations and impacts on academic professions. Based on the idea that the citation number of articles authored by a scholar reflects his or her influence in tourism, McKercher (2008) used citation counting method to rank tourism scholars.

Though analysing citations on referred journals is frequently conducted by tourism scholars (Chang & McAleer, 2012; Kim et al., 2009; Xiao & Smith, 2008), citation analysis on conference proceedings or other publication sources is virtually absent. Since publications in conference proceedings in eTourism has also contributed to the development of knowledge and theory to practitioners and researchers in this field (Zhong, Leung, Law, & Wu, 2012), examining the citation structure of these works would help improve the understanding of intellectual connections of knowledge in eTourism research. Considering ENTER proceedings have been known as the global corpus of state-of-the-art research for IT and tourism, the citation sources of publications in ENTER proceedings between 2005 and 2012 are analyzed in this study to reflect academic foundations for eToursm research.

### 2.2 Progress and development of eTourism

Over the past 30 years, the tourism industry has been dramatically revolutionized by the introduction of ICTs in general and the Internet technology in particular (Buhalis & Law, 2008). Serving as a valuable tool for tourism practitioners (Law, Qi, & Buhalis, 2010), tourism organizations, including tourism suppliers and destination management organizations, utilize the Internet to gain and maintain their competitiveness in the marketplace. In addition, the success of some online travel agents (OTAs) such as Expedia and Travelocity has confirmed the importance of the Internet in tourism. Besides the impacts upon business operation, the advancement of ICTs largely affects tourists' searching and purchasing behaviour. According to a recent report published by PhoCusWright (2012), tourists from the United States and Europe relied more on content on travel review websites to support their decision makings. Another report issued by PhoCusWright exhibited that online travel booking would contribute to one third of the world's travel-related products by the end of 2012 (Travelmole, 2011). This report also projected that the growth rate of online travel booking would be twice as fast as that of the total market by the year 2012.

In view of the prevalence of applying Internet technology in tourism, more scholars have scrutinized and identified the significance of this technology in tourism. Thus, it is not surprised that the number of eTourism-related studies continues to increase in international journals as well as conference proceedings. Take ENTER conferences as an example, 745 full-length articles were published by 1,037 authors from around the world (Liu et al., 2011). After adding another 48 and 44 articles which were published in the ENTER proceedings of 2011 and 2012. In total, in the past 19 years (1994-2012), ENTER proceedings catalogued 837 articles by 1,303 authors from worldwide. Researchers' endeavours are undertaken from different perspectives, including social media (Ayeh, Leung, Au, & Law, 2012; Gretzel & Yoo, 2008), website evaluation and analysis (Law & Cheung, 2005; Qi, Leung, Law, & Buhalis, 2008), as well as online communities (Chung & Buhalis, 2008; Gretzel, Go, Lee, & Jamal, 2009). Comprehensive reviews with regard to the progress of eTourism research have also been made (Buhalis & Law, 2008; Law et al., 2010). While eTourism studies covered various perspectives, the academic foundations for eTourism studies in ENTER proceedings remain largely unknown.

## 3 Methods

Bibliographies of all full-length articles in the ENTER proceedings from 2005 to 2012 were selected as study samples. The selection of this time frame is attributed to the availability of articles on the publisher's website (http://rd.springer.com/). References listed in research notes were excluded owing to the limited contribution to knowledge by these studies (Liu et al., 2011). A total of 9,878 citations were identified, which formed the basis of this study.

Regarding the sources, five categories (i.e., journals, books, conference proceedings, the Internet, and others) were identified and the assignment depends on the origin of the citation. For journal citations and book citations, the title of the journal or book serves as a proxy to determine the assignment of category. If a specific journal does not have a clear relationship with any specific category, more published articles in the

journal were read to determine the right category. If the title was still ambiguous, further examination of journal scope and book content was conducted to ensure the accuracy. The classification of conference citations was made based on the themes of the conference, while title of the webpage determines the classification of citations from the Internet. Pertinent to the disciplines of citation, a classification of citation was firstly compiled according to fields of the references prior to the analysis. Two researchers reviewed one-tenth of all 9,878 citations, and developed a preliminary classification by disciplines. The preliminary classification was then jointly discussed and validated by all four researchers to ensure the accuracy and objectivity of the categorization. After making some minor changes, the classification with seven categories of disciplines, including tourism, information technology and tourism (IT & Tourism), information technology/information systems (IT/IS), social science, business, science and engineering (S&E), and others, was formulated. Table 1 lists the fields that are associated with the seven categories identified in this study. Since publications in ENTER proceedings mainly discuss applications of information technology in tourism, fields relating to IT/IS were listed independently.

To ensure the reliability and validity of the classification, multiple researchers independently reviewed and then assigned the references of each article to one of the seven categories. The classification results were then cross-compared. If there was any discrepancy, the researchers further reviewed the reference and discussed until a consensus was reached. After classifying the citations, frequency analysis on the data collected was then conducted to examine the pattern of citation in the past eight years.

**Table 1.** List of disciplines and associated fields for classification

| **Disciplines** Fields | |
|---|---|
| **C1: Tourism** | |
| **C2: Information technology and tourism (IT & Tourism)** | |
| **C3: Information technology / Information system (IT/IS)** | |
| Computer software & hardware | Radio frequency identification |
| Human computer interaction | Reinforcement learning |
| Telecom equipment | Multimedia |
| Web design | Barcode |
| QR code | Speech recognition |
| Information and communication technologies | Spatial cognition |
| **C4: Social science** | |
| Anthropology | Geography |
| Archaeology | Law |
| Criminology | Psychology |
| History | Architectonics |

| | |
|---|---|
| Linguistics | Customer research |
| Communication studies | Journalism |
| Political science | Education |
| International relations | Political economy |
| Sociology | Heritage studies |
| **C5: Business** | |
| Management | Knowledge management |
| Economics | Operations management |
| Marketing | Logistics |
| System dynamics | Transportation management |
| Accounting | Retailing |
| Operations research | Advertising |
| **C6: Science and engineering (S & E)** | |
| Mathematics | Dietetic |
| Pharmacy | Agricultural science |
| Medicine | Ergonomics |
| **C7: Others** | |
| Library science | Musicology |
| Information science | Information retrieval |

# 4 Findings and discussions

## 4.1 Annual distribution of citations by disciplines and publication sources

Figure 1 exhibits the annual distribution of citations by disciplines in terms of percentage. Generally speaking, the top three disciplines receiving the most number of citations from articles in ENTER proceedings are IT/IS, business, and tourism, which contributed to more than half during the whole period. In contrast, research from science and engineering, and other fields are rarely cited. Some interesting patterns were identified when the citations from the top three citation fields were further compared. First, nearly one third of the citations in 2005 were extracted from the business field. However, the corresponding figures decreased to about 15% and 20% in 2009 and 2012, respectively. Second, ratio of citations from the field of IT/IS was relatively steady during the eight-year period between 2005 and 2012. Third, ratio of citations in tourism experienced high level of fluctuations. The ratio was only 15% in 2006 and then increased steadily to about one third in 2010, but the ratio dropped to 20% two years later. These patterns may imply that contributions of the papers were at the early stage of this period, which mostly referred to knowledge from business field. In contrast, the academic literature in tourism did not receive much attention by authors of those papers published in the early ENTER conferences. However, it was on an upward trend year by year until 2010. Since the early ENTER

conferences focused on business or technology while recent ones concerned more about tourism, this may partly explain the fluctuating pattern of citations in tourism.

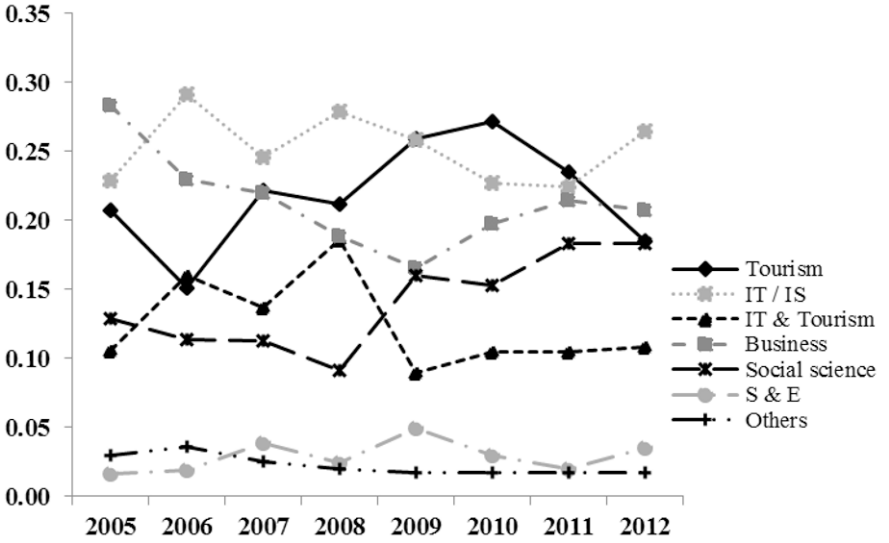


**Fig. 1.** Annual distribution of citations by disciplines, 2005-2012

The findings relating to changes of citation sources by years are presented in Figure 2. In general, ratios of citations in each source remained stable during the eight-year period. The top three sources receiving the highest citation are journals, books and conference proceedings, which are "regular articles" suggested by Szczuka, Janusz, and Herba (2011, p. 397). Among the top three sources, journals ranked the first as around half of the citations were retrieved from journal publications. This finding also supplements Law's (2012) proposition that researchers generally agree publications in journals, especially leading journals, are good in terms of quality and credibility. To other publication sources, books were ranked the second in terms of ratio, followed by conference proceedings, the Internet, and other sources such as magazines, academic dissertations, and reports. Though some dissertations which were neither published in the form of books nor journal papers could be accessed via the electronic databases or some websites, the frequency of citation to this source is very low. This reveals that the importance of other sources has not yet been highly recognized by authors of ENTER papers.

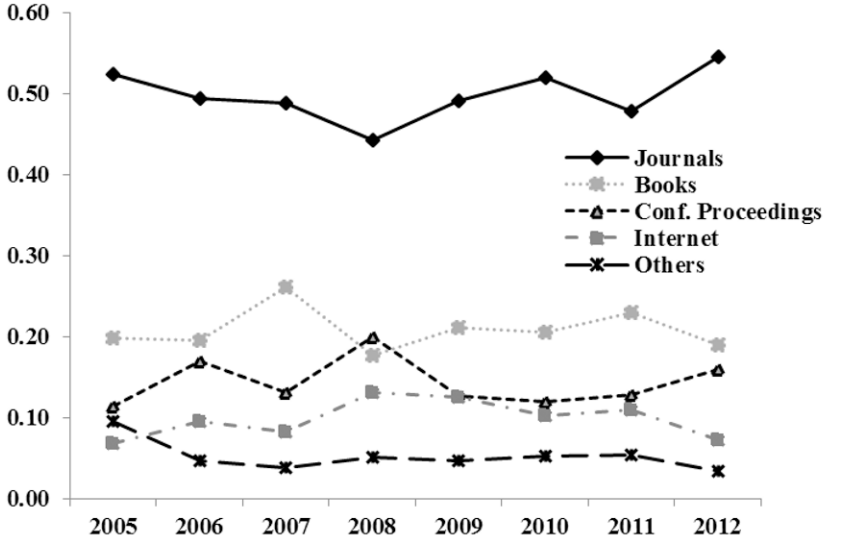


**Fig.2.** Annual distribution of citations by publication sources, 2005-2012

### 4.2 Citations analysis by disciplines

Tables 2 to 6 present the frequency of citations by disciplines in each type of publication source. To the citations from journal publications (see Table 2), the results suggest that nearly one third of the journal citations were from the field of tourism. This suggests that knowledge in tourism journals is mature and has been increasingly realized by ENTER paper contributors. Journal citations in the fields of business (28.42%) and IT/IS (21.94%) comprised more than half of the total journal citations, suggesting the reliance of eTourism scholars on ideas from journals in other disciplines. Regarding to the category "IT & Tourism", denoting the focus of eTourism, less than five percent of journal citations fell into this category. This may be attributed to the few number of speciality journals of eTourism being available at present.

**Table 2.** Frequency table of journal citations

| Journals | 2005 | 2006 | 2007 | 2008 | 2009 | 2010 | 2011 | 2012 | Total | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | Freq. | Per. |
| **Tourism** | 158 | 96 | 191 | 159 | 197 | 294 | 221 | 165 | **1481** | **30.09** |
| **Business** | 238 | 155 | 170 | 156 | 127 | 214 | 163 | 176 | **1399** | **28.42** |
| **IT / IS** | 114 | 145 | 145 | 138 | 140 | 159 | 112 | 127 | **1080** | **21.94** |
| **Social science** | 82 | 54 | 62 | 47 | 64 | 108 | 77 | 112 | **606** | **12.31** |
| **IT & Tourism** | 17 | 37 | 29 | 41 | 18 | 29 | 28 | 26 | **225** | **4.57** |
| **S & E** | 3 | 6 | 20 | 7 | 26 | 19 | 5 | 14 | **100** | **2.03** |
| **Others** | 6 | 6 | 4 | 5 | | 3 | 4 | 3 | **31** | **0.63** |
| **Total** | 618 | 499 | 621 | 553 | 572 | 826 | 610 | 623 | **4922** | **100** |

Table 3 summarizes the findings relating to distribution of book citations by discipline from 2005 to 2012. Taken as a whole, the findings indicated that books in other disciplines were more frequently cited. More specifically, books in the theme of social science (22.14%), IT/IS (21.80%), and business (20.40%) were mostly referred by ENTER paper contributors, with the sum of which was over 60% (64.34%). Books of science and engineering, and other disciplines were rarely cited in the ENTER proceedings. As the focus of eTourism mainly lies on applications of ICTs in tourism, but not the development of technologies, this may contribute to the phenomenon of less book citations from other disciplines like science and engineering.

**Table 3.** Frequency table of book citations

| Books | 2005 | 2006 | 2007 | 2008 | 2009 | 2010 | 2011 | 2012 | Total | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | Freq. | Per. |
| **Social science** | 36 | 32 | 49 | 29 | 72 | 82 | 94 | 63 | **457** | **22.14** |
| **IT / IS** | 67 | 58 | 72 | 49 | 48 | 57 | 51 | 48 | **450** | **21.80** |
| **Business** | 65 | 44 | 80 | 40 | 40 | 52 | 69 | 31 | **421** | **20.40** |
| **Tourism** | 29 | 24 | 62 | 42 | 39 | 64 | 26 | 20 | **306** | **14.83** |
| **IT & Tourism** | 22 | 21 | 38 | 44 | 27 | 40 | 37 | 28 | **257** | **12.45** |
| **S & E** | 11 | 12 | 24 | 12 | 14 | 24 | 14 | 22 | **133** | **6.44** |
| **Others** | 4 | 7 | 6 | 4 | 5 | 7 | 2 | 5 | **40** | **1.94** |
| **Total** | 234 | 198 | 331 | 220 | 245 | 326 | 293 | 217 | **2064** | **100** |

Findings of citations from conference proceedings by fields are presented in Table 4. It can be seen that publications in conference proceedings of eTourism and IT/IS significantly underpinned studies by ENTER authors, with sum of their ratios accounting for more than 80% (82.19%). As the development of eTourism began with applications of ICT in tourism, knowledge on ICTs is a key factor for researchers. As such, it can be argued that the background of some eTourism scholars were from ICTs, a discipline which highly emphasizes on the rapid dissemination of knowledge through conference proceedings. Researchers tend to attend and refer to the conferences that they are familiar with.

**Table 4.** Frequency table of citations from conference proceedings

| Conference proceedings | 2005 | 2006 | 2007 | 2008 | 2009 | 2010 | 2011 | 2012 | Total | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | Freq. | Per. |
| **IT & Tourism** | 67 | 89 | 85 | 120 | 45 | 73 | 54 | 54 | **587** | **41.81** |
| **IT / IS** | 51 | 52 | 52 | 98 | 70 | 73 | 80 | 91 | **567** | **40.38** |
| **Tourism** | 7 | 7 | 11 | 12 | 11 | 21 | 6 | 8 | **83** | **5.91** |
| **Business** | 5 | 13 | 8 | 5 | 6 | 14 | 6 | 11 | **68** | **4.70** |
| **Social science** | 3 | 9 | 5 | 6 | 7 | 8 | 14 | 14 | **66** | **4.70** |
| **S & E** | 2 | | 2 | 6 | 7 | | 3 | 2 | **22** | **1.57** |
| **Others** | | 1 | 3 | 2 | 2 | 1 | | 2 | **11** | **0.78** |
| **Total** | 135 | 171 | 166 | 249 | 148 | 190 | 163 | 182 | **1404** | **100** |

The importance of the Internet as an information source has been increasingly recognized by academics. As a major information searching tool in the present digital age (Buhalis & Law, 2008), contributors of ENTER papers relied heavily on the Internet to search references for their research. Table 5 shows the findings of citations from the Internet. More specifically, more than half of Internet citations concerned the fields of IT/IS, social science, and tourism. The high ratio of Internet citations in the field of IT/IS may be due to the reason that the latest IT/IS information was usually available on the Internet. Considering papers published in ENTER proceedings were mostly done by contributors who are the frontiers of eTourism, their works mainly discussed the application or integration of the latest development of IT/IS in tourism.

**Table 5.** Frequency table of citations from the Internet

| Internet | 2005 | 2006 | 2007 | 2008 | 2009 | 2010 | 2011 | 2012 | Total | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | Freq. | Per. |
| **IT / IS** | 19 | 26 | 30 | 51 | 34 | 47 | 22 | 23 | **252** | **25.90** |
| **Social science** | 14 | 17 | 20 | 24 | 35 | 33 | 36 | 14 | **193** | **19.84** |
| **Tourism** | 15 | 16 | 8 | 27 | 36 | 24 | 28 | 9 | **163** | **16.75** |
| **Business** | 5 | 9 | 12 | 29 | 11 | 27 | 25 | 15 | **133** | **13.67** |
| **Others** | 20 | 18 | 16 | 13 | 13 | 16 | 16 | 10 | **122** | **12.54** |
| **IT & Tourism** | 7 | 9 | 17 | 15 | 7 | 15 | 10 | 9 | **89** | **9.15** |
| **S & E** | 1 | 1 | 1 | 4 | 9 | 1 | 2 | 2 | **21** | **2.16** |
| **Total** | 81 | 96 | 104 | 163 | 145 | 163 | 139 | 82 | **973** | **100** |

Table 6 presents the findings of citations from other sources, like magazines, academic dissertations, and reports. About one third of the "others" citations were on tourism while almost one quarter were about IT/IS.

**Table 6.** Frequency table of citations from others

| Others | 2005 | 2006 | 2007 | 2008 | 2009 | 2010 | 2011 | 2012 | Total | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | Freq. | Per. |
| **Tourism** | 36 | 10 | 10 | 24 | 19 | 28 | 18 | 9 | **154** | **29.90** |
| **IT / IS** | 19 | 13 | 13 | 12 | 9 | 24 | 21 | 13 | **124** | **24.08** |
| **Business** | 21 | 11 | 9 | 5 | 9 | 6 | 10 | 4 | **75** | **14.56** |
| **Social science** | 17 | 3 | 7 | 8 | 8 | 11 | 13 | 6 | **73** | **14.17** |
| **IT & Tourism** | 12 | 6 | 5 | 12 | 7 | 9 | 5 | 7 | **63** | **12.23** |
| **Others** | 5 | 4 | 3 | 1 | | 1 | | | **14** | **2.72** |
| **S & E** | 2 | | 2 | 1 | 2 | 3 | 2 | | **12** | **2.33** |
| **Total** | 112 | 47 | 49 | 63 | 54 | 82 | 69 | 39 | **515** | **100** |

## 5 Conclusions

At present, ICTs have become an inevitable tool for both consumers and suppliers in tourism. Considering its important role, researchers in the field have been conducting a considerable number of studies on their applications in tourism since the early 1990's (Law et al., 2010). Kim et al. (2009) suggested that "both the hospitality and

tourism academic areas are maturing, and not relying as heavily on other disciplines" (p. 752). However, this condition does not seem to apply to eTourism research. In spite of the significant development of eTourism research, citing references from other fields by full-length articles in ENTER proceedings is still the mainstream over the past eight years. This probably suggests that eTourism researchers still not consider tourism research, even eTourism, as a mainstream of information sources. This situation may also contribute to the background of participants. Many eTourism scholars may have a background in other academic disciplines, such as computer science and business management. They may thus apply the knowledge as well as research methods from their background disciplines to tourism research. Xiao and Smith (2008) noted borrowing or adapting the theories and methodological approaches from other disciplines may help foster the knowledge diffusion. As such, in order to further increase the significance of ENTER conferences as well as the status of eTourism, more participants with various knowledge background should be called together.

Another noticeable observation in the current study was the overwhelming amount of regular publications like journals, books, and conference proceedings. In particular, journal citations constituted more than half of the total citations, indicating that a majority of ENTER paper contributors utilized journals when they needed to borrow some information to develop the theoretical framework or justify the phenomenon. The high quality of those works may help justify this observation. The articles published in academic journals are all selected by editors through the rigorous review process. Since all manuscripts submitting to a journal will be reviewed by experts in the field rigorously, the works chosen to be published should be highly recognized with meaningful contributions to the industry as well as academia (Law, 2012). Considering the high quality of the content in journal articles, it is not surprising why journal articles were frequently cited by eTourism researchers.

This study has analyzed 9,878 citations of full-length articles published in ENTER proceedings in the past eight years from the perspectives of disciplines as well as publication sources. To the best of the authors' knowledge, no existing citation analysis studies have been conducted on conference proceedings in the theme of eTourism. Since citation analysis is one of the major assessment criteria for measuring the influence of articles (Law, 2012; Law, Ye, Chen, & Leung, 2009), grasping the updated knowledge of academic foundations for eTourism research can potentially enhance scholars' understanding of how research findings in tourism-related as well as non-tourism-related studies can be utilized in eTourism research. Given the increasing awareness of citation analysis, this assessment is deemed to be a timely methodological contribution to the tourism literature.

## 6 Limitations and future research

Despite the significant implications generated from this work, this study has some limitations. As the classification of citation only includes seven categories of disciplines and some are highly associated (i.e., IT/IS and IT & Tourism), some hidden relationships might not be identified in this study. Furthermore, though more than 9,800 citations in all full-length articles published in ENTER proceedings have been included for analysis in this study, only full-length articles in ENTER

proceedings from 2005 to 2012 were examined. Citations of all articles in other ENTER proceedings should also be examined to provide a more comprehensive picture of citation patterns. On the other hand, though ENTER proceedings are considered to be representative in eTourism research, the exploration of academic foundations for eTourism research should include other relevant studies published in the forms of journals and books. To redress this limitation, the coverage of all eTourism-related articles available in journals, books, conference proceedings as well as other sources can help enhance the generalizability of the findings. Due to the time and resources constraints, this strategy was unfortunately not able to be implemented in the current study. Still, scholars should pursue this endeavour in future research if their resources and supports are sufficient. Future research may further compare the citations of eTourism research with those of studies in other disciplines in order to exhibit the academic foundations across different disciplines. Another direction for future research is to examine the association among citations in eTourism research using network analysis approach. The findings may show the possible groupings or linkages of citation by disciplines.

As a cross-disciplinary field, tourism scholars generally leverage research findings in other fields to carry out their research. Although the limited scope of publications coverage in this study limits the generalization of findings, this study is still able to exhibit the academic foundations for eTourism research. This study illuminates citation analysis of full-length articles in ENTER proceedings over the past eight years. The same approach can be conducted in a longitudinal way in order to reveal trends of citations in eTourism research.

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## 8 Acknowledgements

The authors would like to thank the three anonymous reviewers for their constructive comments on an earlier version of this paper.

# Analysing the Penetration of Web 2.0 in Different Tourism Sectors from 2008 to 2012

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## Abstract

The article "An Exploratory Field Study of Web 2.0 in Tourism (Schegg, Liebrich, Scaglione, & Ahmad, 2008) has received some interest, at least in the academic community. The authors claimed that Web 2.0 was in its early stage of adoption. The aim of the present research is to update those figures in order to show the evolution of this adoption over the last 4 years. Therefore, this paper updates the database from the 2008 study and also includes other sectors of the tourism industry. In total 4,700 websites of tourism enterprises in Europe have been analysed. The Web 2.0 techniques included in the analysis have also been updated and recategorized in light of the last 4 years of technological progress. Finally, the present article shows that, for some techniques, the take-off phase is finished; whereas some new techniques such as RDF are still at the very beginning of the adoption process.

**Keywords:** Web 2.0 penetration, diffusion of innovation, Social Media, external/internal channels

## 1 Introduction

The original research on the diffusion of Web 2.0 technologies carried out in 2008 (Schegg, et al., 2008) showed a low level of adoption of Web 2.0 features across tourism sectors. With the exception of XHTML, all the other technologies had a penetration rate of less than 1%. However, the study did not take into account the new Social Media (SM) which were starting to emerge. Amongst many others, social networks (Facebook, Twitter), online communities, and opinion and evaluation portals (TripAdvisor, HolidayCheck) are included in the list of new players. Technologies that enable content sharing (text, photos, and videos) have grown rapidly in recent years with the volume of user generated content (UGC) subsequently rising also and as stated by Murphy, Centeno Gila, & Schegg (2010, p. 466) "Social networks and social media channels disrupt the influence of marketing when consumers prefer collective expression in video clips, blogs and ratings of their peers to form opinions of products and services and to share experiences post purchase via electronic word of mouth".

Therefore, the analysis framework of Web 2.0 deserves to be updated. In 2007, Web 2.0 generally referred to two main streams of actions: user-generated content (UGC) and collaborative evaluation and technologies that improve user interfaces such as AJAX, RSS, APIs, mashups and tagging (Alby, 2007). Since 2007, new players in the Web 2.0 field have gained in importance and are now part of the marketing strategy

L. Cantoni and Z. Xiang (eds.), *Information and Communication Technologies in Tourism 2013*, DOI: 10.1007/978-3-642-36309-2_24,

of tourism enterprises and organisations. The aim of the present research is thus to update the 2008 figures (Schegg, et al., 2008) by enlarging on the one hand the range of tourism sectors analysed and on the other hand by taking into account the technological and economic changes within the Web 2.0 landscape.

# 2 Literature review

## 2.1 Enlarging Web 2.0 narrow concept

The concepts of UGC and Social Media are related. In the case UGC, it is because the former "can be seen as the sum of all ways in which people make use of SM" (Kaplan & Haenlein, 2010, p. 61). Despite the lack of a formal definition of an SM (Xiang & Gretzel, 2010), SM can be considered as a group of Internet-based applications having as its main characteristic the capacity to build on the ideological and technological foundation of Web 2.0 by allowing the creation, and exchange of UGC (cf. Kaplan & Haenlein, 2010, p. 61).

The literature review reveals different taxonomies of SM. In tourism, one of those classifications characterizes SM as either specialist or generalist media. Generalist media provide information about several providers (i.e. TripAdvisor); whereas specialist media are those that refer to only one provider, e.g. the destination management organization (DMO) of a specific region (Lim & Yoo, 2009). Another classification has as a basis the typology of communication/interaction channels, i.e. whether it is an external or internal channel. Internal channels comprise the use of Web 2.0/SM inside the website of an organisation; whereas external channels include active participation or content sharing on external sites such as Facebook, Flickr, YouTube (Shao, Dávila Rodriguez, & Gretzel, 2012). This research will use the classification proposed by (Shao, et al., 2012) of external channels as an extension of the Web 2.0 concept and it will measure their penetration.

Web 2.0 in the context of this study covers therefore the three following streams of actions: user-generated content (UGC) and collaborative evaluation using internal channels, the same using external channels and finally technologies that improve user interfaces.

## 2.2 Web 2.0 penetration studies

Emerging research in tourism has found progress in the level of penetration of Web 2.0 including Social Networks (SN).

Studies in the Hong Kong hospitality industry (Leung, Lee, & Law, 2011, 2012) covered the followings aspects: Facebook, Twitter, RSS, TripAdvisor, Company Blog, Flickr, guest comments, Bookmark, Google Buzz, Google Maps and finally YouTube. The authors analysed the progress of Web 2.0 penetration and found that the penetration rate within the hospitality sector grew between February 2010 and August 2010 from 28% to 49%. They were also able to illustrate significant differences in the diffusion pattern between independent and chain hotels.

In terms of Facebook usage by DMOs, a study by (Stankov, Lazić, & Dragićević, 2010) showed that only half of National Tourism Organizations in Europe (NTOs) had an official Facebook presence. Related studies in 2008 and in 2010 took 25 top

European DMOs into account. In comparison with the 2008 data, in 2010 external features have been much more present on the DMO websites than *internal ones* (Shao, et al., (2012). In 2008, only seven DMOs had a direct connection with Facebook and only six to content sharing external sites like YouTube and Flickr; in 2010, however, all 25 DMOs had an official presence either on Facebook or Twitter (Shao, et al., 2012).

# 3 Data and methodology

## 3.1 Data

A comprehensive sample across different tourism sectors and geographical regions helped explore the use of Web 2.0 by tourism enterprises. The present study sample was almost 5,000 websites (compared to less than 3'000 in the 2008 study by Schegg et al. 2008) from Swiss and international tourism enterprises. The sample and sources are described in table 1.

**Table 1:** Website sample per sector

| Acronym | Sector | Source | Website age /n (URL) |
|---|---|---|---|
| DMO CH | Swiss DMOs | myswitzerland.ch | 132/132 |
| DMO AU | Austrian DMOs | (Klimek, Scaglione, Schegg, & Matos, 2012) | 89/96 |
| DMO GER | German DMOs | (Klimek, et al., 2012) | 178/204 |
| Rest CH | Swiss restaurants | Swisscom Directories | 1812/1812 |
| Cable CH | Swiss cable car companies | Seilbahnen Schweiz (seilbahnen.org) | 190/190 |
| Hotel Chain | International hotel chains | hotelsmag.com (July 2006) | 262/262 |
| TO Europe | European tour operators | etoa.org, european-travel-market.com | 108/108 |
| Hotel CH | Swiss hotels | (Scaglione, Johnson, & Trabichet, 2011) | 1780/1780 |
| TA CH | Swiss travel agencies | Schweizerischer Reisebüro-verband (www.srv.ch) | 238/238 |
| Total unique URLs | | | 4789/4822 |

## 3.2 Data acquisition and analysis of Web 2.0

The study used a softbot, a software robot with exploratory and parsing capacities that runs automated tasks over the Internet (Steiner, 1999). Over half a century old, softbots are common in information technology (Bradshaw, 1997). A proprietary softbot (O'Rourke, Leclere, & Trabichet, 2012) was specially programmed and

optimized for this research. The softbot ran during June and July 2012 and processed all static and semi-dynamic HTML pages, starting at the top URL and then following all links in that website but ignoring links in graphics or behind dynamic scripting techniques. The softbot then generated a report containing the counts for each criterion. Table 2 lists the features, their definitions and the code searched by the softbot.

In order to update the original data base of (Schegg, et al., 2008), the authors manually checked all the URLs which the softbot failed to scan. The check consisted of a manual search for new domain names for the companies. When this search failed, the authors proceeded in the following way: First, they verified whether the domain name (DN) was available in a domain name registration service (i.e. www.switch.ch in Switzerland). Second, in the case of Swiss companies, the authors consulted the Swiss trade register in order to know if the company had been radiated. If the company had been radiated, the observation was deleted from the database. If the company had not been radiated, the authors analyzed whether the company was present in other places on the web such as in booking portals (Booking.com, TripAdvisor.com, etc.).

In total, the authors failed to find any active website for 157 restaurants and 45 hotels in Switzerland.

### 3.3 Analysis of Web 2.0

Table 2 shows Web 2.0 technologies and softbot search criteria. In comparison with the criteria used in Schegg et al. (2008) some changes were made. RSS and Atom are evaluated no longer separately but in the same category because they provide similar services. XTLM is no longer evaluated but the authors included a HTML5 instead as its use among developers is sharply on the rise and suggested as the sole next-generation HTML standard by W3C (www.w3.org/2009/06/xhtml-faq.html).

As pointed out in the literature review above, there are some news categories included in the present research. The first one is Resource Description Framework (RDF) a semantic web standard which supports the mashing up of data typical for the Web 2.0 (www.w3.org/rdf). The evaluation of links from websites to external channels as defined by Shao et al. (2012), specifically Facebook, Twitter and Google+, sought to measure the adoption of SM by tourism enterprises. Micro-blogging which the reader should not understand as Twitter, is a broadcast medium in the form of blogging, but with smaller file size than a typical blog. Finally, the authors evaluated the inclusion of TripAdvisor, one of the major evaluation portals in the tourism sector.

**Table 2:** Web 2.0 technologies and softbot search criteria

| | Description | search expressions in softb |
|---|---|---|
| RSS, Atom, | Really Simple Syndication (RSS) provides subscribed users with notification, (RSS feeds) when content changes for chosen websites (Hanson & Kalyanam, 2007, p. 80) .<br>The Atom Syndication Format is an XML language for web feeds, while the Atom Publishing Protocol is a simple HTTP-based protocol for creating and updating Web resources. (http://tools.ietf.org/html/rfc4287) | w3.org/2005/Atom;<br>type="application/rss+xml";< |
| RDF | "The Resource Description Framework (RDF) is a framework for representing information on the Web. RDF Concepts and Abstract Syntax define an abstract syntax on which RDF is based, and which serves to link its concrete syntax to its formal semantics. It also includes discussion of design goals, key concepts, datatyping, character normalization and handling of URI references."(http://www.w3.org/standards/techs/rdf#w3c ) | rdf:RDF |
| AJAX | AJAX (Asynchronous Javascript and XML) integrates technologies to make user information retrieval experiences smoother and faster, such as applications in Google Maps and Flickr (Laudon & Traver, 2007, p. 229). | XMLHttpRequest(;Microsof<br>MLHTTP; |
| Wiki | "Collaborative efforts among large number of volunteers rapidly creates useful and free new products"(Hanson & Kalyanam, 2007, p. 383) As a hypertext-based, multiple-cooperated writing system, wiki allows anyone to browse, create and revise, to access the ever-increasing number of texts.(Huang & Yang, 2008) | wiki;mediawiki;content="me<br>wiki;content='mediawiki;con<br>nce;name="confluence;name=<br>nfluence |
| Folksonomy | A neologism from "taxonomy" for a collaborative, spontaneous and decentralized classification. The prefix "folk" signifies that contributors ignore predefined; free to classify resources. It is equivalent to "keyword" or "tag" (O'Reilly, 2005) | /tag;/tagcloud;class="tag;clas<br>ag;id="tag;id='tag |
| Blog | Website (= web log) with frequent postings, often focused on a certain topic, and typically organized chronologically. Blogs may be individual or collaborative (Hanson & Kalyanam, 2007, p. 594) | content='blogger;content="bl<br>er;<br>content='WordPress;content=<br>ordPress;content='Movabl<br>Type;content="Movable<br>Type;content='http://www.ty<br>ad; content="http://www.type |
| Podcast, videocast | A digital audio or video program that is available for download. They are playable through a computer or digital player including Ipod and mp3 players (Hanson & Kalyanam, 2007, p. 600). | .mp4;.flv;.wmv;.ra;.rm;.rv;.m<br>wav;youtube.com;dailymotio<br>om;video.yahoo.com;vimeo.c |

| | Description | search expressions in softb |
|---|---|---|
| Social media | Social media offer a social plugin to external pages to comment posts of the users i.e. Facebook, google+; Twitter (Urueña, Muñoz, & Larrabeiti). | fb-like; fb:like;<g:plusone;apis.googl m/js/plusone.js;twitter.com/i t/follow |
| Micro blogging | Micro-blogs in turn belong to the big family of social media: ‘‘group of Internet-based applications that build on the ideological foundations of Web 2.0, and that allow the creation and exchange of user generated content. On the continuum of social media classification, micro-blogs stand halfway between traditional blogs and social networking sites”. (Kaplan & Haenlein, 2010) | widgets.twimg.com;api.tumb om; |
| syndication (mash-up) - géographiqu e | Mashup is defined as “a Web application that combines data from one or more sources into a single integrated tool” (Wikipedia). Mashup allows users to integrate different kinds of sources together (Junjian, Huajun, & Yu, 2009). | maps.googleapis.com; api.maps.yahoo.com; dev.virtualearth.net; axe.mappy.com; www.mapquestapi.com; api.maps.ovi.com |
| HTML5 | The HTML5 represents extreme simplification of web content creation and by the generality of browsers, alleviation from the needs of complex plug-ins. These new features are ensured by completely new syntactic elements (like <video>, <audio>, <canvas>), by hooks toward other standards or by extending existing elements for recent interaction modes. The <canvas> element is the enabler for real-time drawing of complex graphical content and allows for dynamic updating and creation of the web content on the fly by using JavaScript (Ganji, Mitrea, Joveski, & Preteux, 2012) | <!doctype html> |
| TripAdvisor | Travel social network, which aims to allow tourists to share their experience with others by writing comments of travel destinations such as historical attractions, hotels and restaurants. (Palakvangsa-Na-Ayudhya, Sriarunrungreung, Thongprasan, & Porcharoen, 2011) | href=http://www.tripadvisor.c / |

## 4 Results

Table 3 shows the penetration level on the same data base as in Schegg et al. (2008). In 2008, the level of penetration of all Web 2.0 features tested was less than 1% except for XHTML; in the present research and with the exception of RDF and micro-blogging, all the levels are greater than 1%.

**Table 3.** Levels of penetration of different Web 2.0, the total number of softbot scanned websites is in the first column. The shadowed rows contain percentage of penetration.

| | Podcast / videocast | AJAX | RSS/ Atom | Folk-son-omy | SM | HTLM L5 | Wiki | syndication/ mashup-geo | Blog | TripAdvisor | RDF | Micro messaging |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| p-value | <0.000 | <0.1 | <0.000 | <0.000 | <0.000 | <0.1 | <0.000 | <0.000 | N/S | <0.000 | N/S | <0.1 |
| cable CH | **73** | **37** | **34** | **19** | 16 | 13 | 6 | 4 | **6** | 2 | 1 | 1 |
| N=188 | **38.8** | **19.7** | **18.1** | **10.1** | 8.5 | 6.9 | 3.2 | 2.1 | **3.2** | 1.1 | 0.5 | 0.5 |
| DMO CH | **57** | 25 | **21** | **17** | **19** | **12** | **9** | 6 | 2 | **5** | 0 | 0 |
| N=131 | **43.5** | 19.1 | **16.0** | **13.0** | **14.5** | **9.2** | **6.9** | 4.6 | 1.5 | **3.8** | 0.0 | 0.0 |
| DMO AU | **83** | **30** | **21** | **27** | **38** | **14** | **19** | **19** | 2 | 1 | 0 | 1 |
| N=96 | **42.3** | **15.3** | **10.7** | **13.8** | **19.4** | **7.1** | **9.7** | **9.7** | 1.0 | 0.5 | 0.0 | 0.5 |
| DMO GER | 49 | 17 | **23** | **27** | 14 | 7 | **13** | **10** | 2 | 0 | 2 | 0 |
| N=166 | 29.5 | 10.2 | **13.9** | **16.3** | 8.4 | 4.2 | **7.8** | **6.0** | 1.2 | 0.0 | 1.2 | 0.0 |
| hotel CH | *329* | *201* | *84* | *67* | *58* | *60* | *38* | *37* | 18 | 22 | 3 | *1* |
| N=1709 | *19.3* | *11.8* | *4.9* | *3.9* | *3.4* | *3.5* | *2.2* | *2.2* | 1.1 | 1.3 | 0.2 | *0.1* |
| hotel chain | 92 | **63** | 22 | **25** | **23** | 18 | **16** | **21** | 3 | **13** | 3 | **7** |
| N=259 | 35.5 | **24.3** | 8.5 | **9.7** | **8.9** | 6.9 | **6.2** | **8.1** | 1.2 | **5.0** | 1.2 | **2.7** |
| Rest CH | *366* | 214 | 111 | *72* | *45* | 60 | *32* | *30* | 22 | *6* | 6 | 2 |
| N=1613 | *22.7* | 13.3 | 6.9 | *4.5* | *2.8* | 3.7 | *2.0* | *1.9* | 1.4 | *0.4* | 0.4 | 0.1 |
| TA CH | 57 | 25 | 21 | 10 | 6 | **19** | 4 | 6 | 1 | 0 | 2 | **3** |
| N=236 | 5.0 | 4.0 | 6.0 | 3.6 | 2.5 | **9.0** | 2.8 | 4.3 | 1.7 | 0.0 | 11.8 | **17.6** |
| TO EU | **38** | 16 | 12 | **15** | **20** | 9 | 6 | **7** | 3 | **4** | 0 | 2 |
| N=105 | **36.2** | 15.2 | 11.4 | **14.3** | **19.0** | 8.6 | 5.7 | **6.7** | 2.9 | **3.8** | 0.0 | 1.9 |
| Total | 1144 | 628 | 349 | 279 | 239 | 212 | 143 | 140 | 59 | 53 | 17 | 17 |
| N=4503 | 25.4 | 13.9 | 7.8 | 6.2 | 5.3 | 4.7 | 3.2 | 3.1 | 1.3 | 1.2 | 0.4 | 0.4 |

The $\chi(2)$ test (df=8) shows whether the penetration rates of each web 2.0 feature is significantly higher (in bold in table 3) or lower (in italic in table 3) than expected for each sector. Syndication/mashup-geo, TripAdvisor, RDF and all the others features show significant differences in the percentage of penetration depending on the sectors. Specifically speaking of SM, the percentage of penetration is significantly higher for Swiss, German and Austrian DMOs, hotel chains and European Tour Operators, and significantly lower for Swiss hotels and restaurants.

**Table 4.** Penetration rates (in %) of Web 2.0 features by sector: 2008 and 2012

| Sector | Cable car CH | | DMO CH | | hotel CH | | TA CH | | hotel chain | | TO Europe | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 2008 | 2012 | 2008 | 2012 | 2008 | 2012 | 2008 | 2012 | 2008 | 2012 | 2008 | 2012 |
| Syndication / mashup-geo | 0.0 | 2.1 | 0.0 | 4.6 | 0.0 | 2.2 | 0.0 | 4.3 | 0.0 | 8.1 | 0.0 | 6.7 |
| wiki | 0.0 | 3.2 | 0.0 | 6.9 | 0.0 | 2.2 | 0.0 | 2.8 | 0.0 | 6.2 | 0.0 | 5.7 |
| Podcast/videocast | 5.2 | 38.8 | 1.5 | 43.5 | 0.1 | 19.3 | 0.0 | 5.0 | 0.4 | 35.5 | 3.6 | 36.8 |
| Atom/RSS | 5.2 | 18.1 | 0.0 | 16.0 | 0.0 | 4.9 | 0.0 | 6.0 | 0.0 | 8.5 | 0.0 | 11.4 |
| folksonomy | 0.0 | 10.1 | 0.0 | 13.0 | 0.1 | 3.9 | 0.0 | 3.6 | 0.4 | 9.7 | 0.0 | 14.3 |
| AJAX | 0.0 | 19.7 | 2.2 | 19.1 | 0.1 | 11.8 | 0.0 | 4.0 | 0.7 | 24.3 | 1.8 | 15.2 |
| blog | 2.1 | 3.2 | 4.5 | 1.5 | 0.2 | 1.1 | 0.8 | 1.7 | 1.5 | 1.2 | 5.4 | 2.9 |

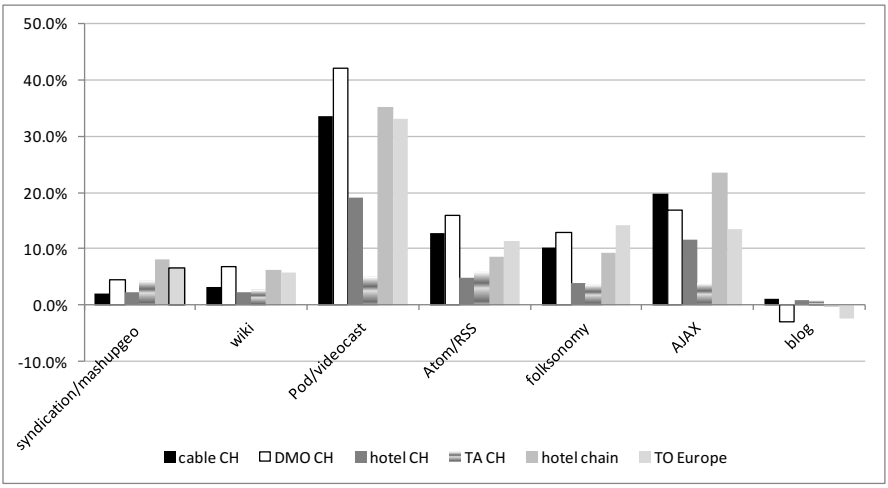


**Fig. 1.** Penetration rate difference (2012 vs. 2008) by sector

Table 4 and figure 1 show that the Web 2.0 feature that has the highest progression is Videocast/Podcast, followed by AJAX and at almost the same level Atom/RSS and folksonomy. The only feature showing a negative difference is blog, probably due to the growth of external social channels such as social networks.

## 5 Discussion and conclusions

As the rapid adoption of smartphones and tablets illustrates, the spread and performance of ICT technologies is still increasing. It can be assumed that with the development of the mobile Internet, tourists will increasingly exchange and share their experiences online already during their journey. Therefore, tourism enterprises,

especially SMEs, which cannot cope with this change and satisfy the needs and wants of today's always-online, always-connected travellers may soon face serious difficulties. Web 2.0 goes beyond pure technological aspects and requires reengineering of marketing paradigms and changes in operational business processes.

As stated by Schegg et al. (2008), the Web 2.0 empowers tourists in unique ways and may open interesting opportunities for tourism enterprises to interact and exchange with travellers during the planning and buying process and to develop services that are really perceived by customers as value-added offerings. Within the framework of the present explorative study, it could be shown that differences exist between the different tourism sectors and that the uptake of these Web 2.0 technologies has rapidly advanced compared to the situation in 2008. Tourism enterprises seem to be aware today that assimilating these technologies is important and can add customer value. Mainly tourism organisations and tour operators seem to be leveraging the opportunities of the Web 2.0, perhaps due to the fact that intermediaries are under strong pressure from suppliers and travellers and have to provide added value to stakeholders.

The present study has several limitations, however. For example, the softbot simply searched pages for the presence of common Web 2.0 technologies and applications. There is, however, no proof that these features are actually used in the sense of the Web 2.0 paradigm. The technologies could be even used by applications unrelated to Web 2.0. Finally, as many of the activities related to social media strategies are operated on company-external platforms (such as YouTube, Facebook, etc.), the sole analysis of Web 2.0 features on the website of the tourism enterprise might underestimate the implementation level in the sector, especially when the linking is missing. Future research should focus on the impact that the higher penetration of Web 2.0 technologies might have on the effectiveness of online marketing strategies. In this context it would be interesting to measure, based on an analysis of longitudinal data from industry case studies, whether the increased use of Web 2.0 technologies is related to the (online) marketing success of tourism organizations.

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# High Tech for High Touch Experiences: A Case Study from the Hospitality Industry

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## Abstract

Experiences represent the core of the tourism and hospitality industry. Companies seek to create unique and personalised experiences by addressing the needs and wants of contemporary consumers who are looking for something new. While the importance of experiences is unquestioned, the understanding of how to use technology to create personalised experiences is limited in tourism theory and practice. Based on this rationale, this paper aims to explore how companies can strategically use technology to create personalised high-touch guest experiences. Following a single case study approach, this paper contributes by developing a process model proposing technology as a platform of co-creation. A two-fold information and experience flow is introduced between companies and consumers throughout multiple experience touch points. This exploratory study suggests high-tech as a critical factor in the co-creation and facilitation of high-touch experiences.

**Keywords:** Tourism experiences; ICTs; best practice; co-creation; touch points; case study;

## 1 Introduction

Information and communication technologies (ICTs) have had a significant impact on the entire tourism industry (Buhalis and Law, 2008). More specifically, technological advances have transformed how tourism products and services are produced and consumed (Prahalad and Ramaswamy, 2003, Stamboulis and Skayannis, 2003) and tourism experiences are created (Tussyadiah and Fesenmaier, 2007). ICTs have become an integral part of the entire journey throughout which tourists use technologies to generate richer experiences (Gretzel and Jamal, 2009) and are empowered to co-create more personal experiences (Prahalad and Ramaswamy, 2004). Recent developments, including an increasing consumer empowerment (Prahalad and Ramaswamy, 2004), the rise of prosumers (Ritzer and Jurgenson, 2010), a growing recognition of co-creation (Prahalad and Ramaswamy, 2004) and a realm of possibilities due to the developments in the field of technology (Wang et al., 2010), have contributed to substantial change in the conventional creation of tourism and hospitality experiences. In addition to exploiting the opportunities of integrating ICTs into experiences, it has become paramount for companies to conjointly create experiences with consumers (Prahalad and Ramaswamy, 2004). Increasingly active and involved consumers are in search of experiences that engage them in a personal way (Pine and Gilmore, 1999) and create value for them (Grönroos, 2000). Yet, it is not clear how the tourism industry can satisfy the continuous quest for meaningful experiences (Gretzel and Jamal, 2009). One way of doing so is to explore the potential of technology for the creation of more appealing tourism experiences. Gretzel et al. (2006) argue that consumers expect marketers to create personal and customised experiences by using the latest technologies available. ICTs are no longer

L. Cantoni and Z. Xiang (eds.), *Information and Communication Technologies in Tourism 2013*, DOI: 10.1007/978-3-642-36309-2_25,

only functional devices but need to be considered as essential features of the creative lifestyle and experiences of contemporary tourist consumers (Gretzel and Jamal, 2009). While there is little question about the importance of technology in experiences, its full role, implementation and implications on the creation of tourism experiences are little understood (Beeton et al., 2006, Tussyadiah and Fesenmaier, 2007). Based on this rationale, the purpose of this research is to explore technology as a possible facilitator of personalised and meaningful experiences. Considering that companies successfully using ICTs to create enhanced experiences are scarce, the industry relies on few existing best practice examples. Hence, this study sets out to undertake an exploratory case study of a unique hospitality example with the aim to empirically explore how *high-tech* can be used to successfully create personalised *high-touch* tourism experiences. The paper firstly discusses the current theoretical background surrounding consumer empowered experiences and the impact of ICTs on experiences. It then outlines the case study approach, describes the case analysed, discusses results and findings and finally develops a process model depicting the creation of high-tech/high-touch tourism experiences as well as suggesting recommendations for future research.

## 2 Theoretical Background

### 2.1 Consumer Empowered Experiences

Experiences have always constituted an important notion in tourism production and research (Uriely, 2005). Pizam (2010) argues that the creation of positive experiences constitutes the very essence of the hospitality industry. While location and price are important factors in the selection of a hotel, a recent study by Market Metrix confirms the factor *experience* as the main influence on determining the choice of a hotel (Barsky and Nash, 2010). However, over the past few years experiences have undergone a significant change. Consumers no longer purchase services but rather seek experiences obtained by the consumption of products and services (Morgan et al., 2010). The idea of companies creating long-lasting experiences has become of critical importance, as mere products have become replicated and commoditised (Morgan et al., 2010). To differentiate the offer and gain competitive advantage, the creation of experiences has been proposed as the key to success (Pine and Gilmore, 1999). With the proliferation of the experience economy (Pine and Gilmore, 1999) and the growing number of businesses offering experiences, it is no longer sufficient to merely design, stage and deliver experiences to consumers. The distribution of power and the roles of and relationships between companies and consumers in the production and consumption of experiences have also changed (Prahalad and Ramaswamy, 2004). With the movement towards a producer/consumer: prosumer-centric society, consumers play an active part in both the production and the consumption of their own experiences (Ritzer and Jurgenson, 2010). Instead of consuming pre-packaged products, services or Disney-type experiences (Gretzel and Jamal, 2009), contemporary consumers demand experiences that allow for an equilibrium of control between the company and their own role in the creation of experiences (Ramaswamy and Gouillart, 2008). In this new process, the main focus is placed on consumers, their inherent needs and wants and the way in which the company can address these to realise meaningful experiences (Ramaswamy and

Gouillart, 2008). Ramaswamy (2009) suggests that the key is to allow for an active dialogue and experience co-creation with consumers. The critical question for companies therefore is how to facilitate processes that allow consumers to co-create meaningful experiences. Gupta and Vajic (2000) explain that personalised experiences can be created by the constant evaluation of consumer preferences while interacting in a particular context. In addition to actively engaging consumers (Prahalad and Ramaswamy, 2004), it is critical to collect, evaluate and respond to relevant information about consumer needs and preferences. In this process, ICTs can play a particular role as useful tools for facilitating interaction (Buhalis and Law, 2008, Egger and Buhalis, 2008) as well as collecting information in an unobtrusive and cost-effective way (Raento et al., 2009).

### 2.2 Technology for Consumer Experiences

The proliferation of ICTs has implied a great potential and numerous opportunities for many industries, including the tourism industry (Wang et al., 2010). In particular, the advent of the Internet and new forms of communication and social interaction technologies (Ramaswamy and Gouillart, 2008) have empowered consumers in determining the way they receive and respond to information (King, 2002). This has fostered the shift in how consumers interact with companies (Buhalis, 2003) by evolving from passive recipients to connected and co-creating prosumers in a technology enabled experience environment (Andersson, 2007, Gretzel et al., 2006). Therefore, Shaw et al. (2011) raise the need to understand how ICTs have influenced the relationship between producers and consumers in interactions and the roles in the conjoint creation of experiences (Prahalad and Ramaswamy, 2004). Recent studies (e.g. Binkhorst and Den Dekker, 2009, Gretzel and Jamal, 2009, Tussyadiah and Fesenmaier, 2007, Tussyadiah and Fesenmaier, 2009) emphasise that ICTs support experience co-creation in a number of different ways. For instance, technology can function as a platform of interaction between companies and consumers (Hultkrantz, 2002), through which they can establish a dialogue (Buhalis and Licata, 2000) and in turn create more meaningful interrelations (Binkhorst and Den Dekker, 2009). Furthermore, the use of Web 2.0 applications, such as blogs, videos, wikis, fora, chat rooms or podcasts, including the prominent examples of Facebook, YouTube or Twitter, have fostered communication, social interaction and co-creation of experiences to an unprecedented extent (Dwivedi et al., 2012, Hays et al., 2012). With a variety of interactive tools available, consumers are enabled to co-create experiences in every part of the business system (Prahalad and Ramaswamy, 2004). Hence, van Limburg (2012) suggests that companies need to embrace the full potential of technology for the creation of more personalised consumer experiences. With technology in place, Piccoli et al. (2003) highlight that companies can collect, consolidate, manipulate and analyse consumer needs and preferences on an unparalleled scale to facilitate tailor-made experiences. Technology is key for encouraging consumer participation, collecting information and treating different consumers differently (Piccoli et al., 2003). By doing so, a more interactive and participatory relationship between companies and consumers is established, needs of consumers are met and enhanced experiences can be created (Ramaswamy and Gouillart, 2008). The notion that consumers increasingly expect highly personalised and customised experiences through ICTs (Gretzel et al., 2006) leads to the rationale

of this study; to develop an understanding of how *high-tech* can be used to create personalised *high-touch* tourism experiences.

# 3 Methodology

## 3.1 Case Study Approach

An exploratory case study was conducted to develop an understanding of the implementation of high-tech for the creation of high-touch guest experiences. The choice of the case study approach is based on the argument by Binkhorst and Den Dekker (2009) who highlight that to date most experience creators rely on a few best practice examples of the industry. The understanding of ICTs in the realisation of experiences is still limited in both theory and practice (Tussyadiah and Fesenmaier, 2007). Hence, a single case study was adopted to assess a leading best practice example from the tourism and hospitality industry in order to develop an understanding of high-tech for high-touch tourism and hospitality experiences. For this particular study, the Hotel Lugano Dante, Switzerland, was selected as a best practice experience example, the evidence for which is supported by being awarded the third place for its overall approach towards excellence in customer service at ENTER2012. The purposive selection of this case was particularly effective, as the goal was to gain an in-depth understanding of what is taking place in the particular context of hospitality experiences. The main focus lies on the "process rather than outcomes, in context rather than a specific variable, in discovery rather than confirmation" (Merriam, 1998, p. 19). Moreover, the selection of a hospitality case provides a particularly suitable research environment as it constitutes the only industry with a high customer service in which it is possible to collect a large amount of information about guests at a multiplicity of touch points (Piccoli et al., 2003). Considering the exploratory nature of this study, a mix of qualitative methods was employed to draw from multiple sources of evidence (Yin, 2003), triangulate the data and strengthen the results. Methods included a) an assessment of documentary information, presentation slides and written notes from a conference presentation which served to comprehend the practical realisation and process of implementing ICTs into the experience; b) an unstructured interview with the General Manager of the hotel aimed at gathering insights into the company-centric perspective, philosophy and principles of experience creation; and c) an examination of guest feedback of the hotel on the online review website TripAdvisor for the purpose of understanding the consumer perspective of the experience. This threefold process was crucial to complement the data in building a comprehensive understanding of the role of high-tech in the creation of personalised high-touch guest experiences.

## 3.2 Case Study Description

Hotel Lugano Dante, a 4 star hotel located in Lugano, Switzerland can be considered as a current best practice example for using technology to enhance guest experiences. Having been recognised for its customer service excellence at ENTER2012, it represents a unique example of high-touch experience creation through a technology called HGRM, Happy Guest Relationship Management. In recognising the fact that experiences constitute the number one reason to choose a hotel (Barsky and Nash, 2010), Hotel Lugano Dante has implemented a digital customer relationship

management tool into all operational structures of the hotel. This system functions as a platform that amalgamates all interactions of staff and guests on one level throughout the entire journey. By including the pre-arrival, hotel stay and post-departure stage, the system enables a consistent engagement at multiple touch points. These points include hotel operations, such as reservations, reception, housekeeping, breakfast, maintenance, bar, marketing, welcome, sales and revenue. Throughout these touch points the hotel and guests are interconnected. While guests are actively involved and empowered to share personal preferences, these are collected by the hotel to transform simple service encounters into co-created personalised experiences.

## 4 Case Study Analysis

In the present case study, technology in the form of the HGRM comes into place as a central platform of interaction that unifies all interactions between staff and guests throughout the pre-stay, in-house and after-stay stage of the journey. This technology provides a comprehensive database that saves all information concerning the guest's stay which can be centrally accessed by both staff (company) and guest (consumer) for a conjoint experience co-creation. All staff members have access to the system through computers and mobile devices, such as iPhones and iPads, in all departments of the entire operation system. Guests can access the system through a personalised guest website (MyPage) to communicate, manage the stay, meet and engage with members of staff and select personal preferences. The high level of interactivity represents the key factor of this system to allow for a co-created guest experience by enabling consumers to participate and share relevant information for a personalised and more valuable experience. Buhalis and Law (2008) underline that the interactivity between companies and consumers has generated great opportunities to maximise value propositions. Hence, the analysis of the case study has the purpose of developing a comprehensive understanding of a) how this platform leads to personalised guest experiences, and b) on a more generic level, how high-tech can be used to create high-touch tourism and hospitality experiences. For this purpose, the case study analysis discusses specific stages, touch points, interactions and processes involved in experience creation.

*Stages and Touch Points*

Touch points in the specific context of hospitality and tourism determine places in which encounters, transactions or consumption take place. As the case shows, there are a vast number of touch points which include all hotel departments, comprising reservations, reception, housekeeping, breakfast, maintenance, bar, marketing, welcome, sales and revenue. According to the Hotel Lugano Dante, the number of touch points in the specific case of a hotel amount to 750,000 interactions per year. Considering the number of departments and encounters involved, the HGRM facilitates experience touch points not only during the physical hotel stay but also includes interactions prior to the guest's arrival as well as after the departure. This is in line with previous research. For example, Gretzel and Jamal (2009) suggest that ICTs can be implemented to enrich travel experiences, not only on-site but throughout different phases of a journey, including pre, during and post travel. In the *pre-stay stage*, guests are contacted for the first time through their personal web page, called MyPage. This initial interaction primarily serves the purpose of engagement and a

two-fold information exchange. First, information exchange occurs in form of an information provision (company to guest) to confirm the booking, provide relevant information regarding check-in time, Internet, travel route and weather conditions. Second, it serves for the collection of guest information (guest to company) to identify questions, special needs, requirements and personal preferences. In addition to exchanging information, personal guest engagement is fostered, which manifests itself in a welcome-soon message and an introduction of individual members of staff (with photos and names) who will be specifically welcoming and undertaking the check-in on the day of the guest's arrival. According to the Hotel Lugano Dante, engaging the guest a few days before the arrival is indispensable as to a) *establish a personal relationship*, b) *engage members of staff* and c) *collect the information needed for a personalised guest experience*. The pre-travel stage proves to be a critical part for both parties to connect, co-create the hotel experience as well as enhance the overall pre-travel experience. Guest reviews from TripAdvisor confirm the importance of pre-travel co-creation by stating: *"We were happy with the service even before we arrived, as they allow us to choose, through an email sent to us a day before the trip, many elements of our stay, from the kind of pillows we wanted to what sort of beverages we would appreciate in our minibar"* (Review TripAdvisor). Another guest adds: "*You can setup your room before arrival. It's really pleasant to feel like home each time we are there"* (Review TripAdvisor).

The *hotel-stay stage* represents the most interaction-intense stage due to the number of personal encounters between guests and members of staff in the physical hotel environment. During the stay, the hotel creates experiences on multiple touch points, including the breakfast room, bar, housekeeping, front office, maintenance or car park. In the hotel setting, the HGRM platform, accessed through computers or mobile devices, functions as a cockpit for all members of staff by centralising all interactions throughout every department of the hotel. By accessing the interactive platform, relevant guest information, based on name or room number, can be easily and instantly retrieved, changed or added, in real time. For instance, these service touch points include managing the guest's room status (ready or not), locating the guest (in room, lobby, restaurant), transferring the luggage (in lobby, room), and managing guest arrivals, requests, as well as already known or newly emerging preferences. By being connected through a synchronised technological platform at all times, information can be exchanged in the hotel anywhere and anytime. This implies that guest experiences are no longer static and passively designed by a hotel provider but are rather personalised, dynamically and proactively co-created between guests and staff at the specific service encounter in real time. The *post-stay stage* determines checking-out and the guest's return to the home environment. In this stage, it is not the collection of information that is central but rather the personal engagement which is of critical importance. Through the guest's personal web page (MyPage), a welcome back home message, invitation to leave a comment and an invitation to the member page is sent to engage guests in order to build a long-lasting relation, enhance the travel remembrance and post-stay experience and create added value.

*Information Flow*

The case analysis indicates that the HGRM, as the technology under investigation, represents a two-fold interaction platform. It unites guests, who access the system

through their personal page and hotel staff, who use the platform as a cockpit in the hotel environment for the facilitation of experiences. For personalised experiences to be created, it seems evident that two distinct flows for experience creation need to take place, including a) an information flow and b) an experience flow. Information flow is critical as to understand tourist behaviours, choices and concerns, which according to Buhalis and Law (2008) tourism organisations need to gather in all stages, before, during and after the travel. The information provided by guests, either prior or during the stay, is collected on the platform where it can be easily accessed by all members of staff in different service touch points. To co-create their personalised experiences, guests are asked to actively share a range of information indicating preferences, such as room comfort, temperature, ideal bed, special requirements for children, settings for business or pleasure, favourite newspapers, drinks or interests. The consumer perspective testifies the active involvement "*You can pick your preferences amongst many choices: pillows, sheets, heating system, car parking, extra towels and stuff like that. This is UNIQUE*" (Review TripAdvisor). The GM of the Hotel Lugano Dante explains that collecting this information is crucial for establishing a better profile, developing a relationship, making guests feel special, anticipating their needs and in turn creating an enhanced experience in multiple touch points of the journey. This is in line with Buhalis and Law (2008) who affirm that consumer profiling leads to improved interaction between consumers and tourism providers, better personalisation and customisation of the tourist experience. As tourists are increasingly willing to share personal information "in exchange for recognition and better services" (Buhalis and Law, 2008, p. 614), *information flow* is suggested as a prerequisite for the co-creation of personalised high-touch experiences.

*Experience Flow*

Given that guests co-create by sharing a high level of information, the second flow, namely the creation of high-touch experiences can occur. All members of staff in different departments can access guest information through the cockpit at a glance. This allows them to interconnect, communicate, retrieve existing information as well as upload new information while co-creating the experience with the guest. Considering the intensity of interactions and encounters within a hotel setting, the adoption of technology proves to be indispensable. It allows members of staff to a) anticipate guest needs throughout multiple touch points, b) address their needs in real time and c) synchronise incoming preferences and needs for future encounters. As a consequence, the interactive platform enabling staff to access the relevant information at the right time in right place, allows them to be proactive and co-create more personal, customised and valuable experiences with the guest. Guest reviews confirm a high value experience, by stating: "*My husband and I had an excellent experience at the Lugano Dante from the moment we booked to the time we checked out*", "*It was an amazing experience staying here - from beginning to end*" (Review TripAdvisor).

*Outcome: High-Tech for High-Touch Experiences*

Given the high level of interaction and exchange of information, the case study demonstrates that the implementation of high-tech is a crucial determinant for high-touch experiences. The analysis of the case study suggests that with the use of technology the personal touch is intensified compared to non-technology supported

experiences. By implementing an engagement platform, such as the HGRM, guests and staff are connected and closer than ever before. The engagement platform not only considers guests but also individual members of staff as central co-creators of the experience. This is demonstrated by providing guests with names of members of staff, job positions and pictures already before the arrival. As every member of staff is equipped with the HGRM cockpit, direct and more personal engagement between guests and single members of staff has become possible. This reduces the anonymity of the conventional service provision and places the focus on meaningful and personal one-to-one relationships. Technology hence needs to be considered key in assisting these personal encounters, making guests feel more recognised in order to lead to a more personal experience at every touch point of the guest's journey. In order to graphically demonstrate the process leading to high-touch experiences on a generic level, this study has developed a process model, as shown in Figure 1.

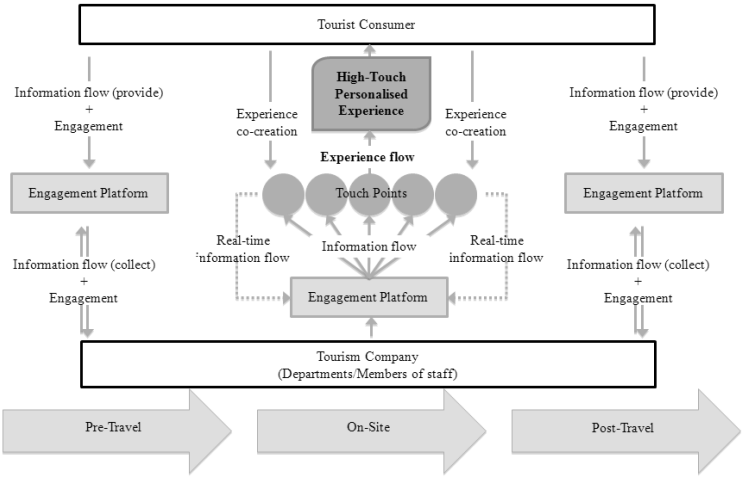


**Fig. 1.** High-Tech High-Touch Experience Process Model

This graphically presents the process of technology use (engagement platform) connecting the tourism company and the tourism consumer at multiple touch points alongside the pre-, on-site, and post-stage of travel, through which they co-create by providing information (consumer) and co-creating a high touch personalised guest experience (company).

## 5 Discussion

Tourism is determined by a high level of interaction between the tourism system, its people and the individual human being as the tourist (Larsen, 2007). The analysis of the case study has revealed a critical insight into how the implementation of high-tech can lead to high-touch guest experiences in the context of the hospitality industry. This study has shown that technology can enhance interrelations between guests and members of staff through integrating single encounters to personalised experiences and co-creation with customer involvement. This research is therefore in line with

previous studies, such as Niininen et al. (2007) who argue that information technologies foster consumer centricity by allowing consumers to customise products and personalise their experiences. In this vein, a number of authors support the notion that technology is an ideal instrument to facilitate richer experiences (Tussyadiah and Fesenmaier, 2007) and enable personalised experiences (Niininen et al., 2007, Sandström et al., 2008). The idea of personal, meaningful experiences *per se* is not new but has been discussed in previous literature (e.g. Benckendorff et al., 2005, Sheldon, 1997, Stipanuk, 1993). However, technology has predominantly been assigned contrasting roles, as a creator, protector, enhancer or destroyer of the tourism experience (Stipanuk, 1993), indicating an existing discrepancy between technology and human experiences. For instance, Sheldon (1997) argues that high-tech travellers value the application of technology for the delivery of better travel experiences, whereas high-touch tourists repute technology as disruptive element in the experience. In this view, it is argued that high-touch tourists escape the modern technology-dominated world in search for human interactions. Sheldon (1997) suggests not to completely neglect technology for these consumers but to apply it only in the background of services. In a similar vein, Benckendorff et al. (2005) emphasise that technology can either be implemented in the backstage, where it is hidden from the tourist, or in the front stage, where it is overtly implemented for the creation and enhancement of tourist experiences.

The analysis of the present case study predominantly contradicts the existing literature proclaiming a contradictory role and detrimental effects of ICTs use on high-touch experiences. Rather, the case study leads to the suggestion that high-tech and high-touch experiences are by no means mutually exclusive but reinforcing. Technology is used in the foreground operations, proactively, together with consumers and constitutes an integral part of the overall guest experience. Technology functions as a platform of interaction requiring active involvement of both the company and the consumer to co-create the experience together. Technology hence plays a central element in adding a more personal touch, enhancing the level of interactions and engagement, building more meaningful relations and adding value to the overall experience. Before guests arrive they have already established the parameters of service delivery and have their expectations managed. The GM of Hotel Lugano Dante underlines that "*the use of technology can add real value to the service. But the service itself must be of high quality as technology on its own does not provide good service but can only be used to enhance good service*". As future tourism products need to be more creative and personalised (Gretzel and Jamal, 2009), technology needs to be considered as a key tool in the co-creation of personal experiences. This study argues that through the effective use of interactive technologies for engagement, co-creation and personalisation, the tourism industry can satisfy the growing quest for meaningful experiences.

## 6 Conclusion

The creation of successful experiences is the essence of the tourism and hospitality industry. This study aimed to provide an understanding on how *high-tech* can be used to create *high-touch* personalised tourism experiences. The Hotel Lugano Dante case study offers a leading hospitality example and provides invaluable insights into

facilitating high-touch experience creation. This study has contradicted the existing literature by arguing that technology must not be understood as mere technological artefact that hinders human interaction. Instead, it constitutes a key tool to facilitate more individual, one-to-one, personalised experiences. High-touch experiences are facilitated through technologies allowing for two-fold information and experience flow. Consumers are interactive, involved and share information while the company and its members of staff are interconnected and using information to facilitate co-created high touch experiences with consumers. Engagement is critical for this co-creation process. Successful organisations of the future will use innovative technology to create innovative, unique, personal high-touch experiences.

The present case study offers a number of implications for tourism theory and practice. In terms of theory, the study contributes to the current understanding of technology in the co-creation of contemporary tourism and hospitality experiences. It provides an integrated high-tech high-touch experience process model demonstrating the underlying technology-enabled processes necessary in the creation of personal experiences. In terms of practical implications this case study provides evidence that technology, instead of being regarded as a destroyer of high-touch experiences, is a key facilitator of personal experiences with a high-touch. This is particularly relevant to the tourism industry, as a sector which is dependent on creating more personal experiences by reducing interchangeability of the tourism product and creating distinct value for the consumer. As any study of an exploratory nature, a number of limitations need to be acknowledged and which could be addressed in the future. Further research is needed to build upon and extend the understanding developed in this study. The single case adopted in this study could be further strengthened by conducting a multiple case study to diversify examples and to allow for a comprehensive cross-case analysis. In addition to the company perspective, consumer studies are needed to complement these findings and lead to a holistic understanding of high-touch experiences from both a company and a consumer perspective.

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## 8 Acknowledgements

The authors would like to thank Carlo Fontana, General Manager of the Hotel Lugano Dante for his contribution and willingness to participate in the case study.

# Interdisciplinary Research on Information Science and Tourism[1]

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## Abstract

Interdisciplinary research on information science and tourism plays an important role in both academic research and industry development. This paper provides a systematic review on publications both in Chinese and English in the interdisciplinary research in the last 12 years. It discusses the source, authorship, numbers of the articles annually, research topics from information science and tourism research perspectives. It examines in detail three key issues: the main tourism related issues in the information science research; the main information science related issues in tourism research; and the trends of the interdisciplinary research on information science and tourism.

**Keywords:** information science; information technology; tourism; interdisciplinary; systematic review.

## 1 Introduction

Interdisciplinary research on information science and tourism can bring synergies for both disciplines and usually needs researchers with rich multi-disciplinary knowledge. It is essential for scholars to get informed about the state-of-the-art knowledge assessment, especially for those with single disciplinary background who want to enter the interdisciplinary domain. Buhalis & Law (2008) bring a wealth of English literature on tourism and technology; Zhong, Leung, Law and Wu (2012) contribute a review of Chinese literature on eTourism. However, these reviews are short of knowledge in an 'interdisciplinary' perspective, especially the tourism related issues in the information science and technology field. With regard to China, introduction of China's research progress to international scholars is a kind of studies (Zhong, et al., 2012). But bringing China's with international research together is more important because in this way China's research can be developing in an international context and scholars around the world can see what China contributes to the international. Currently in China, an emerging "Smart Tourism" concept (Zhang, Li, & Liu, 2012) which involves comprehensive IT application in tourism industry is making the interdisciplinary research on information science and tourism a hot in both academic and practical areas. China's related research in an international context should be known by scholars interested in this interdisciplinary field.

[1] This study was supported by the National Natural Science Foundation of China (No. 41101111) and the Science and Technology Project of Beijing Municipal Education Commission (No. SQKM201211417007).

L. Cantoni and Z. Xiang (eds.), *Information and Communication Technologies in Tourism 2013*, DOI: 10.1007/978-3-642-36309-2_26,

This paper comprehensively explores the 'interdisciplinary property' between information science and tourism research, in an integrated China's with international view. It examines what topics takes tourism as a research subject and solves tourism problems in information science research, and what information science methods and technologies are applied in the tourism field among both China's and international related research. The study uses a systematic review, conducts collection, selection, sorting out, and analysis on both Chinese and English journal and conference literatures issued in the latest 12 years (from 2000 to 2011) in the interdisciplinary field, and presents the statistical analysis results from four aspects: paper source, authorship, annual quantity and research topics. The paper tries to demonstrate major research issues and progress in the interdisciplinary field of information science and tourism, and to provide reference and inspiration for further in-depth research in the future.

## 2 Research Methods

Qualitative systematic review is used as a method to evaluate and explain studies dealing with research issues, subjects or phenomena in qualitative research fields and to provide research appraisal with a credible, strict and auditable method (Kitchenham, 2004). The systematic review research in this paper includes the following steps.

**(1) Determining research issues.** This paper determines three research aims: 1) what are the main tourism related issues in the information science research? 2) what are the main issues relevant to information science in the tourism research? 3) what are the trends of the interdisciplinary research on information science and tourism?

**(2) Determining study search strategies.** According to the research aims the search strategies are designed as follows: 1) Tools and databases: Chinese Google scholar, IEEE Xplore and Science Direct; 2) Key words: ("computer" OR "communication technology") AND "tourism"; 3) Time scope: from 2000 to 2011.

**(3) Searching studies.** Google Scholar provides the top 1,000 of most relevant among total 54,500 results (on December 22, 2011; Chinese Google Scholar's ranking technology considers texts, authors, sources, and reference rates of both English and Chinese literatures); IEEE Xplore (the search field is "abstract") shows 46 results (on December 24, 2011); Science Direct (the search field is "title" or "key words" or "abstract") shows 36 results (on December 24, 2011). In order to avoid missing important and high level literatures, the supplementary articles experts suggest are added to the article list.

**(4) Selecting studies.** Among all the studies above the selection and rejection process was in two steps according to the selection and rejection criteria listed in Table 1.

**Table 1.** Selection and Rejection Criteria

| Step | Selection Criteria | Rejection Criteria |
|---|---|---|
| The first | Relevant to the research questions raised in the step (1) above of this systematic review | Non-journal or non-conference articles |
| The second | 1) have prototypes, or<br>2) have experiments, or<br>3) have examples, or<br>4) have practical or empirical verification<br>5) high quality reviews | 1) short papers and posters without relative long papers published<br>2) the research on information technologies aided education and teaching |

After examining the articles through this process, 262 articles (167 journal and 95 conference articles) are selected for the systematic review.

**(5) Completing analysis.** In order to answer Questions 1 and 2 raised in the (1) step above respectively, this paper divided the selected articles into two perspectives: information science (abbreviated to information) and tourism. The division is based on: 1) the subject scope of the article source; 2) otherwise (for those articles whose perspective cannot be identified directly by their source), the research focus of the articles themselves. According to this division, among the selected 262 articles, there are 152 tourism articles (110 journal and 42 conference articles) and 110 information articles (58 journal and 52 conference articles), respectively. There are 69 Chinese articles, 26% of the total; 33 Chinese tourism articles, 22% of the total tourism articles; 36 Chinese information articles, 33% of the total information articles. Journals and conferences have two types: tourism and information. There are 56 tourism and 51 information journals, 11 tourism and 46 information conferences in the research. Detailed analysis is in the following chapter.

## 3 Results

### 3.1 Sources

***Journals.*** The 168 journal articles (110 tourism and 58 information articles) originated from 107 journals (56 tourism and 51 information journals). 56 tourism journals include 25 Chinese journals; 51 information journals include 31 Chinese journals. 56 tourism journals have 110 selected articles but 51 information journals only include 58. This indicates that tourism journals published more articles on the interdisciplinary research than information journals. Journals including only one article account for 68% of all tourism type journals, and 86% of all the information type journals, indicating that the interdisciplinary research on information science and tourism is scattered and the research results are insufficient in quantity and scale.

***Conferences.*** The 94 conference articles (42 tourism and 52 information articles) cover 57 conferences (11 tourism and 46 information conferences). The number of information conference being nearly 4 times than the tourism conference. Conferences with only one article account for 82% of all tourism conferences whilst this is 89% of information conferences. There are lots of information conferences,

covering wide scope of the interdisciplinary research. It is evident therefore that interdisciplinary research on information science and tourism in the information science field covers multi-theme, multi-layer and multi-object of information research.

### 3.2 Authorship

***Countries and regions.*** 33 countries contribute to the interdisciplinary research. Statistical analysis demonstrates that there is a critical mass of research output generated by China (34.9%), USA (9.13%), Italy (7.61%), UK (7.22%), Australia (6.08%) and Austria (4.18) as these 6 countries generated more than 69% of the total articles concerned. In many other countries just few publications were generated. This may lead to the conclusion that collaborations between the countries of major production with isolated researchers in other many regions support multidisciplinary research in the area.

***Affiliations.*** There are 37 organizations of the authors with at least 2 articles selected, including 16 from China (1 from Hong Kong), 7 in USA, 3 in UK, 3 in Italy, 3 in Australia, 2 in Austria, and 1 in Germany. This demonstrates the research on tourism and information is spread in many universities around the world. The creation of some specialized centres that could bring together different aspects of this specialized area and collaboration between these centres would enable synergies to emerge and the whole area to move forward.

### 3.3 Annual numbers

As a whole, the interdisciplinary research on the information science and tourism is growing rapidly (Fig. 1), demonstrating the importance technology plays in driving developments. This is reflected in the research and the publications as an output.

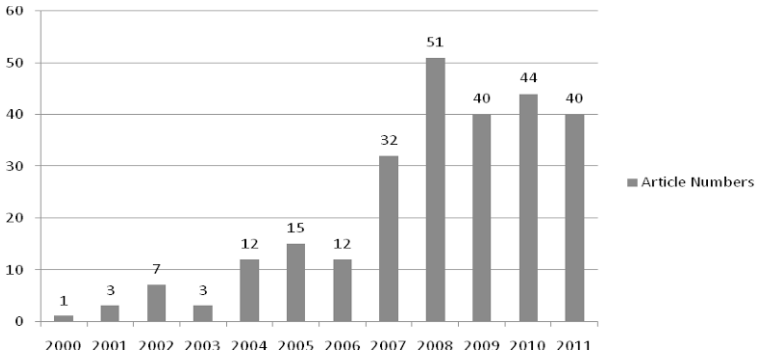


**Fig.1.** Annual Numbers of Articles Included

### 3.4 Research topics

In order to demonstrate the diversity and multi-layer of the interdisciplinary research, some sub-topics are treated as independent topics. For example, Mobile applications are a subtopic of Application systems, but it is treated as an independent topic in the research. An article can be included in multiple topics.

**Table 2.** Information topics

| | Info. Topics | No. |
|---|---|---|
| 1 | Application system | 25 |
| 2 | Artificial intelligent | 21 |
| 3 | Geographic information system | 18 |
| 4 | Mobile application | 18 |
| 5 | Recommender system | 15 |
| 6 | Semantic web and ontology | 12 |
| 7 | Virtual reality | 7 |
| 8 | Web service | 6 |
| 9 | Electronic Commerce | 6 |
| 10 | Pervasive computing | 5 |
| 11 | Computer simulation | 2 |
| 12 | Online tourist behaviors | 2 |
| 13 | Sustainable tourism | 2 |
| 14 | Website assessment | 1 |
| 15 | Review on ICT in tourism | 1 |
| 16 | Human-computer interaction | 1 |
| 17 | Decision making system | 1 |
| 18 | Virtual community | 1 |
| 19 | Tourists' photographic image analysis | 1 |
| 20 | Online Travel Map | 1 |
| 21 | Web 2.0 | 1 |
| 22 | Tourism Information resources | 1 |
| 23 | Web security | 1 |
| 24 | Computer aided translation | 1 |
| 25 | Usage analysis | 1 |
| 26 | Customer relationship management | 1 |
| 27 | System evaluation | 1 |

**Table 3.** Tourism Topics

| | Tourism Topic | No. |
|---|---|---|
| 1 | Website evaluation | 15 |
| 2 | Online tourist behaviors | 15 |
| 3 | Artificial intelligence | 10 |
| 4 | Recommender system | 10 |
| 5 | Electronic commerce | 10 |
| 6 | Application system | 9 |
| 7 | Network marketing | 9 |
| 8 | Mobile application | 8 |
| 9 | Semantic web and ontology | 8 |
| 10 | Geographic information system | 7 |
| 11 | Tourism website space | 7 |
| 12 | System evaluation | 7 |
| 13 | Web 2.0 | 6 |
| 14 | Review on ICT in tourism | 6 |
| 15 | Usage analysis | 5 |
| 16 | Computer simulation | 5 |
| 17 | Informationization planning and suggestion | 4 |
| 18 | Tourism destination marketing | 4 |
| 19 | Virtual reality | 4 |
| 20 | Virtual community | 3 |
| 21 | Virtual tourism | 3 |
| 22 | Web service | 3 |
| 23 | Pervasive computing | 3 |
| 24 | Distribution channel | 2 |
| 25 | Customer relationship management | 2 |
| 26 | Tourism destination management | 2 |
| 27 | Tourist tracing | 2 |
| 28 | Knowledge management | 2 |
| 29 | Web survey method | 2 |
| 30 | Business model | 2 |
| 31 | IT effects | 1 |
| 32 | Peer to peer | 1 |
| 33 | Decision making system | 1 |
| 34 | Visualization | 1 |
| 35 | Tourism information resource | 1 |
| 36 | Sustainable tourism | 1 |
| 37 | Tourism resource evaluation | 1 |
| 38 | Website marketing | 1 |
| 39 | Virtual organization | 1 |
| 40 | Heritage tourism management | 1 |
| 41 | Remote sensing | 1 |

***Question 1: What are the main tourism related issues in the information science research?*** Tourism is often the ideal test bed for application of information systems as it is a very information intensive industry. Table 2 illustrates there are 27 tourism related topics (Column 2) with their article numbers (Column 3) involved in the selected information research articles. They cover almost all aspects of the information science and technology research. Many topics reflect the latest and frontier directions in the information science research field. The state of the art of the top 10 topics illustrated in Table 2 is discussed as follows.

*Application system***.** An application system here refers to a group of related programs designed to perform a specific function and normally consists of a user interface, business logic and a database. The user interface could be various terminal equipments, such as computer, mobile phone, PDA and telephone. Application system research includes two aspects: application suggestions (Buhalis, 2004) and system design (Lin & Du, 2009). The application system research accounts for a large proportion in the tourism related information science research. Mainland China's related research accounts for a large proportion in the whole application system research.

*Artificial intelligence*. Artificial intelligence is the most used method and technology in the tourism related information science research. The relevant research can be divided into several aspects: reasoning (Wang, Zeng, Zhang, et al., 2008), blog data mining (Claster, Cooper & Sallis, 2010), intelligent agents (Yueh, Chiu, Leung, et al., 2007), evaluation (Tang & Hu, 2008a) and decision-making support (Noor, Ahm, Ali, et al., 2010).

*Geographic information system (GIS).*Most of travel related application systems need support by GIS, such as recommender systems, guided systems, position service systems, tourism resource monitoring and early warning systems, and ancient architecture information systems (Guo, Hu, Zhou, et al., 2007; Lin & Du, 2009) .

*Mobile applications.* The rapid development of mobile telecommunication technologies, especially the mobile terminal technology, drives the growing mobile applications for handheld terminals (such as smart phones, tablets and PDAs). Mobile application related research mainly aims at providing dynamic information services for moving tourists (Noor, et al., 2010). They are developing towards pervasive computing (Baldo, Benelli & Pozzebon, 2010). Mobile application research also includes mobile based tourist behaviour data collection methods (Dukic, Ruzic & Katic, 2007). The applications relevant to position information in mobile applications are also called positioning service applications, and support position information services, navigations and real-time route recommendation. Adding geo-location information to all data will be driving location and context based services in the future.

*Recommender systems.* Recommender systems are personalized services to solve the problem of "overload information" of the Internet. They can help users to find resources of interests, such as information, services and commodities, and automatically produce personalized recommendations (Adomavicius & Tuzhilin, 2005). Typical tourism recommender systems include journey planning (Montejo-Rez, Perea-Ortega, Garca-Cumbreras, et al, 2011) and specific tourism facility

recommendation (Guo, et al., 2007). These recommender systems mainly adopt artificial intelligence, semantic web and ontology, mobile application, positioning and GIS technologies.

*Semantic web and ontology.* The tourism field is the problem source and typical application domain of semantic Web and ontology research. This is because tourism is information intensive and is based on many different elements that need to coordinate with each other. Semantic web and ontology based tourism systems (Wang, Zeng, et al., 2008; Yueh, et al., 2007) can use ontology to represent tourism domain knowledge that has identified semantics and relations of the terminologies in web documents and thus automatically process information useful to users or meet their demand; among them, the ontology representation of the tourism domain knowledge and semantic information reasoning in journey planning are key technologies to realizing these systems.

*Web services.* Web services is a information and technology terminology, referring to an effective mechanism of data and information integration on Web and a reasonable solution to solve high cost of maintenance and updating of various application systems on Web. Web services are mainly used for the interoperation of information integration and exchange between systems in the tourism field (Ferreira, Putnik & Cruz-Cunha, 2010).

*Virtual reality.* The virtual reality technology is mainly used for tourism destination and scenic spot marketing (Ma, Hu, Zhao, et al., 2010) and on-site experience of tourists, especially for cultural heritages and relics (Stock, Zancanaro, Busetta, Callaway, Krüger, Kruppa, Kuflik, Not & Rocchi, 2007).

*Electronic Commerce.* The tourism industry is a leading application in electronic commerce. The information research area does not only stay in technology bases of electronic commerce but also explores how electronic commerce profoundly change structures of the tourism industry (Werthner & Ricci, 2004), influence variables on e-commerce usage (Salwani, Marthandan, Norzaidi & Chong, 2009) and impacts of business performance (Verhoest, James, Marais & Van Audenhove, 2007).

*Pervasive computing.* In the pervasive computing mode, people can assess and process information any time, any place and any way. With the rapid developments of mobile terminal equipment and applications, pervasive computing is active in tourism application domain. Related research not only includes technology applications but also technology innovations in tourism (Ballagas, Kuntze & Walz, 2008). Pervasive computing is the foundation technology for the internet of things, which is an emerging research theme both in Mainland China and around the world.

***Question 2: what are the main information science related issues in the tourism research?*** When looking at tourism research, the issues related to information science are very broad. Table 3 shows that there are 41 kinds of topics (Column 2) with their article numbers (Column 3) among the selected articles. These topics can be further classified into the following six research domains.

*The effect of information technologies on Tourism*. The general research on the effect of information technologies (IT) on tourism mainly contains two levels: the tourism industry (Hojeghan & Esfangareh, 2011; Buhalis, 2004) and tourism enterprises

(Cooper, 2006). IT influence factor studies on tourism is more specific comparing to the general research, which has the following aspects: e-commerce (Vadell & Orfila-Sintes, 2007), network marketing (Wu, Wei & Chen, 2008), the attitude of tourism enterprises toward IT application (Vrana & Zafiropoulos, 2006), the attitude of tourists toward the use of IT, (Kaha, Vogtb & MacKayc, 2011) and the influence factors of tourists using Internet to make travel planning (Steinbauer & Werthner, 2007).

*Mode research relevant to IT Applications in Tourism*. Research on modes of how to apply IT applications in tourism mainly includes e-commerce modes (Alford, 2010; Wang, 2007) and network marketing (Lim, 2011; Choi, Lehto & Oleary, 2007). With the development of the Internet technology, Web 2.0 enabled user generated content to be produced on social media. The related research is growing, which can be divided into the following aspects: marketing (Lin & Huang, 2005), tourist behaviors and services (Matloka & Buhalis, 2010) and web 2.0 websites (Bingley, Burgess, Sellitto, et al., 2010).

*Evaluation of the IT Application in Tourism*. Website evaluation is the most important topic in the evaluation research of the IT applications (Law & Bai, 2006), aiming to evaluate different kinds of websites (Li & Wang, 2011a; Hu, Cheung & Law, 2008), and different content (Inversini, Cantoni & Bolchini, 2010; Lu & Li, 2011), using different evaluation methods. With the development of mobile communication technologies, the evaluation on mobile application systems is rising (Raggam & Almer, 2005).

*Tourism research objects under the information society*. In the information society, tourism research objects have been extended, from the change of tourists' geographical spaces and time to the online tourist behaviors (Rong, Vu, Law, et al., 2011) and social networks (Rong, et al., 2011), from the spatial distribution pattern of tourism resources to the network structure of tourism websites (Baggio, Scott & Cooper, 2010). Researchers put strong interests on what factors affecting members' participation, contribution and experiences of virtual travel communities (Wang & Fesenmaier, 2004; Chung & Buhalis, 2008).

*Tourism Research Methods under the Society Informationization*. The research on tourism research methods at the new era of information society have two aspects: the development of traditional tourism research methods with the help of society informationization (Huang & Law, 2011; Illum, Ivanov & Liang, 2010; Zeni, Kiyavitskaya, Barbera, et al., 2009) and the introduction of information science methods and technologies into tourism research (Rong, et al., 2011; Xu, Yao & Mo, 2011).

*Information technology focuses in the tourism field*. In the tourism field there are information technology studies, just like in the information science field. The difference lies on in the information field the focus is science and technology innovations but in the tourism field the focus is how to apply the science methods and technologies to solve real tourism problems. The most tourism scholar interested topics involve destination information systems (Luo, Guo & Jiang, 2010), intelligence systems (Gretzel, 2011), recommender systems (Ricci & Werthner, 2006; Goossen, Meeuwsen & Franke, 2009), semantic web and ontology technologies (Zheng, Gretzel

& Fesenmaier, 2009; Fodor & Werthner, 2005), and mobile application (Höpken, Fuchs, Zanker, et al., 2010).

# 4 Future research developments

The interdisciplinary research on information science and tourism has been developing rapidly during the last 12 years. However, it is still a fairly new interdisciplinary research direction and its development needs broader and more in-depth exploration. A systematic synthesis from the information and tourism research fields demonstrates the future research trends. In particular, the broad research areas emerging will push the knowledge barriers and will generate further synergies between information and tourism. These include:

## 4.1 The in-depth application of artificial intelligence in tourism

Artificial intelligence, the advanced phase of information science and technology development, will investigate and create innovations on how to use computer software and hardware to simulate the behaviour of human beings. Although there are many research papers on artificial intelligence based tourism demand forecasting, its relevant theory, methods and technologies are not fully used in tourism field yet. Research will concentrate on how to make full use of artificial intelligence in tourism to effectively process and use data, information and knowledge of tourism in order to explore the features and problems of tourists. This will improve management and service levels for both the tourism public/government management and tourism enterprises and will give them decision support tools. This is expected to be one of the frontier issues in the interdisciplinary research on information science and tourism.

## 4.2 Tourism recommender systems based on semantic web and ontology

Semantic web and ontology research is at the cutting edge research of information science, and focuses on the mutual understanding and transaction among the huge quantity of data available on the Internet. The development of Internet has expanded the traditional “off-line” services to “on-line” which include traditional computer-centered “on-line” services and all kinds of new mobile-centered services. The quality of the online service is quite important to the experience of tourists in this information era. Recommender systems based on semantic web and ontology technologies are an effective method and tool to improve the quality of internet service through personalization and customization. How to effectively integrate semantic web, ontology technologies and tourism recommender system in terms of the theory, method and real applications is a major challenge for the interdisciplinary research on information science and tourism.

## 4.3 Pervasive Computing for tourism

Pervasive computing is the basis of application of the Internet of things, which has become a key research area in mainland China and around the world. With the development of the mobile terminal equipments, the traditional internet service which centers on computers has extended to use any potential terminal. Based on the pervasive computing mode, the Internet of things, which connects things, things and people, and various mobile application systems, has attained close attention in tourism

research and practice. However, both pervasive computing and the Internet of things are the frontier research directions in information science and still have a lot of problems to be solved. Therefore, taking tourism as problem domain or typical application will help finding answers of the problems in pervasive computing research filed, and thus benefit tourism.

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# Sightsmap:
# Crowd-Sourced Popularity of the World Places

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## Abstract

We analyse and combine a number of world-wide crowd-sourced geotagged databases with the goal to locate, describe and rate potential tourism targets in any area in the world. In particular, we address the problem of finding representative names and top POIs for popular areas, with the main focus on sightseeing. The results are demonstrated on the sightsmap.com site presenting a zoomable and pannable tourism popularity heat map along with popularity-sorted POI markers for concrete objects.

**Keywords:** crowd-sourced mapping; popularity analysis; heat map; entity disambiguation

## 1 Introduction

The goal of this work is to build a world-wide database of the sightseeing popularity of concrete places (POI-s) and wider areas in the world, using purely crowd-sourced data. By sightseeing popularity we mean the estimate of number of people visiting the place and considering it as an interesting place for sightseeing, as opposed to very popular places with no or very little potential for sightseeing, like hospitals, schools, gas stations, bus stops and airports.

Obviously, some of the abovementioned popular non-sightseeing places like schools and railroad stations may in some exceptional cases be sightseeing places as well: famous old colleges, Grand Central Terminal of New York, etc. Two separate extremely important categories of objects in tourism industry – hotels and restaurants – are ambivalent as well: on one hand, utilitarian and not necessarily a target or cause for travelling, on the other hand, an important source of emotions and sometimes also an important partial motivation for travel.

As said, our work is focused on popular sightseeing places regardless of their category. Hence we are not using any data sources like TripAdvisor (http://www.tripadvisor.com/), Expedia (http://www.expedia.com/), UrbanSpoon (http://www.urbanspoon.com) or Zagat (http://www.zagat.com) which are primarily focused on specific categories, typically hotels and/or restaurants. Clearly, the hotels and restaurants are among the best crowd-described, -mapped, -reviewed and -rated tourism objects already.

L. Cantoni and Z. Xiang (eds.), *Information and Communication Technologies in Tourism 2013*, DOI: 10.1007/978-3-642-36309-2_27,


**Fig 1.** A screenshot of the heat map for most of the world on a single picture, with 10 top spots (1. New York, 2. Rome, 3. Barcelona, 4. Paris, 5. Istanbul) marked. Europe, especially the belt from Netherlands to Italy as well as the mountainous areas and the Spanish coastal areas dominate. In U.S. the mountainous areas in Utah and Colorado are well marked, in addition to coastal cities. The original picture is colour-coded as a proper heat map.

The sightseeing popularity database we build is used in the sightsmap.com site for showing a zoomable and pannable touristic popularity heat map for any area in the world as an overlay on the standard Google maps (http://maps.google.com/). Popular areas on the map will be labelled with an appropriate crowd-sourced name. Concrete popular places will be also shown on the map with colour-coded markers in the order of the relative popularity in the currently visible map area.

There are numerous application possibilities for such a database. First, it is already used for showing map overlays geared towards finding interesting POI-s to visit in any region, large or small, in a uniform manner anywhere in the world. Second, the database can be used as an input for a tourism recommender like Sightsplanner (Luberg et al., 2011; Luberg et al., 2012). Third, the database can be used for doing popularity analyses for the tourism industry.

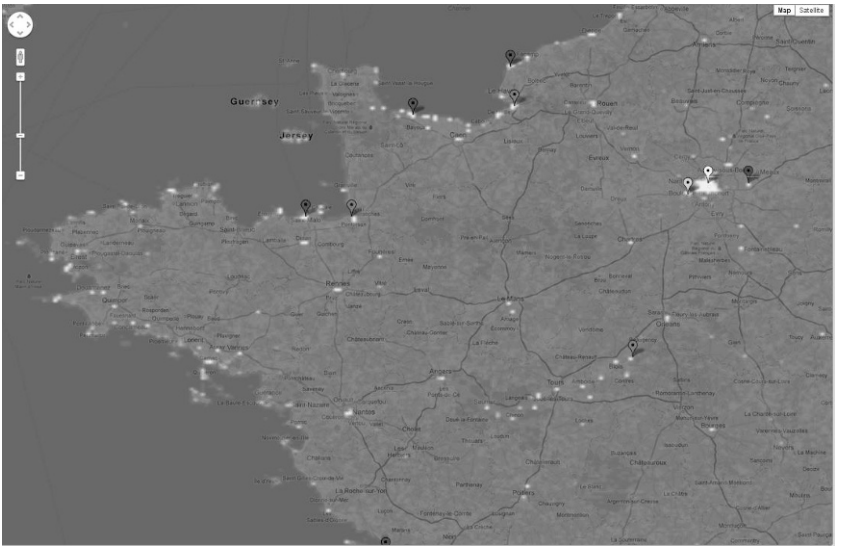


**Fig 2**. A screenshot of the heat map for the north-western France, with 10 top spots (1. Paris. 2. Versailles, 3. Euro Disneyland, 4. Mont Saint Michel, 5. Honfleur) marked. The castles of the Loire Valley form the central belt. The original picture is color-coded as a proper heat map.

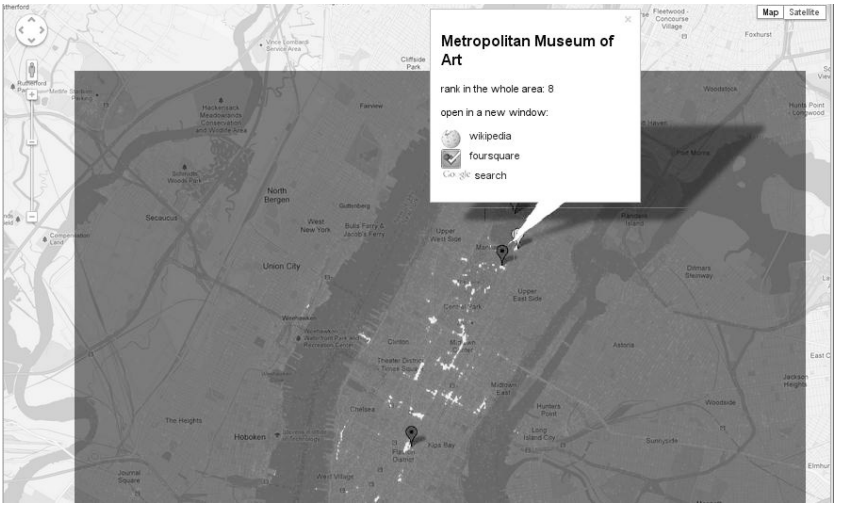


**Fig 3.** A screenshot of the heat map for Manhattan, with 10 top spots marked. The open marker popup window links to the Wikipedia and Foursquare pages of the Metropolitan Museum of Art. The original picture is color-coded as a proper heat map.

There are also several advantages to using crowd sources as contrasted to POI databases and guides already created by experts in the tourism business. The crowd-sourced approach guarantees that there are no significant holes, i.e. interesting places and areas unmarked, and that the popularity estimates are, despite inevitable fluctuations, relatively objective, which is very hard to achieve by a small number of experts. Last not least, the popularity measurements can be done uniformly and comparably all over the world.

In the next section we will provide a brief overview of the data sources and the main algorithms employed in our system. In the section 3 we will describe the relations between the data sources and the aspects of merging and enriching data in more detail. Section 4 will present experimental results and we will end our paper with related work and conclusion.

## 2 Different kinds of popularity and data sources

Although our methods focus on detecting sightseeing popularity, the notion is ambiguous and contains several different subcomponents (visual beauty/interestingness, general public awareness about the place, the number of actual physical visitors etc.). Each of the data sources used covers some components much better than the others; hence they complement each other well. The data sources have been harvested using their public web API-s (Panoramio (www.panoramio.com/) and Foursquare (https://foursquare.com/)) or downloaded in the already converted semantic format (Wikipedia (http://en.wikipedia.org) downloaded in the form of DBpedia RDF database, later complemented with the public Wikipedia logfiles). Harvesting and downloading has been performed during 2012.

- Our main data source Panoramio.com represents the *visual component* of sightseeing: something beautiful or interesting to see. Panoramio contains ca 44 million geotagged photos uploaded by users. For several reasons, the Panoramio photos are dominated by these with touristic and sightseeing interest (in contrast to more private photos on Flickr (http://www.flickr.com/)). Google maps and Google earth (http://www.google.com/earth/) use the Panoramio photos as their photo layer. We have downloaded only the metadata (location, photographer, title), not the actual photo files.
- The second data source Wikipedia represents the *general public awareness* about the place. We could safely say that all the interesting places, historic events, people etc. with public interest above a certain threshold do have a Wikipedia article. Places and historic events are normally geotagged in Wikipedia. The popularity – the exact number of readings in a selected time period – of each Wikipedia article can be obtained from the publicly available logfiles. We are using ca 700 000 geotagged Wikipedia articles with types which do not indicate noninterestingness for touristic purposes (like articles about plants, animals, people). We use full logfiles for two days, one selected from summer, the other from winter.

- The third data source Wikitravel (http://wikitravel.org/) essentially complements Wikipedia: places: above a certain touristic interestingness threshold normally have a Wikitravel article corresponding to some Wikipedia article. We are using the list of existing Wikitravel article names to detect whether a Wikipedia article has a complementing Wikitravel article as well.
- The fourth data source Foursquare gives an estimate of the *number of people actually visiting the place*. A large percentage of visits (and a large percentage of Foursquare places) are done and created by local people visiting offices and eating lunch. Foursquare, differently from all the above sources, has a fairly detailed and well-used system for the crowd-sourced typing of places. We have downloaded not the whole Foursquare places database, but only ca 2 000 000 places, taking the places Foursquare presents when asked for a circle around some of the top hotspots we have previously found out from the analysis of the Sightsmap photos. We harvest several concentric circles around each place previously determined to be visually popular enough: small circles for objects in the cities and large circles outside or around the cities. In the other words, we have only downloaded the more popular Foursquare places in the neighbourhood of the more visually popular (world-wide) places.

## 3 Heat map generation, basic labelling and data merging

The heat map generation has two separate outcomes. First, it generates the visual heat map overlays for the map. We use the browser-based Google maps as the underlying map. Second, it generates a detailed popularity data for each small rectangular area (a pixel on the heat map) for each zoom level, which is later used for labelling, harvesting additional information etc.

The heat map generation is done separately for six different zoom levels of the world, each with each own granularity. Additionally, the seventh layer is a set of high-resolution heat maps, each typically covering one city, created for ca 15000 top spots in the world. The resolution of these high-resolution heat maps depends on the popularity rank of the hotspots: the more photos, the higher the resolution, up to the street level for the top 500.

Our algorithm takes into account both the number of photos and the number of separate photographers in the Panoramio database for each area. The colour of each pixel on the heat map is calculated by a logarithm-like root function, different for each zoom layer. We use one byte for the colour information, with the the top popular places being bright yellow, followed by orange, red, purple and blue hues.

### 3.1 Basic labelling with Wikipedia

The pure visual popularity heat map lacks a clear indication of what exactly is there in a hot area. In short, the top spots in each view have to be marked and the markers should ideally contain the name and the pointers to the most relevant information about the places.

Our basic solution for creating these markers, finding the titles and providing pointers is to look for a most popular geotagged Wikipedia article at or very close to each top hotspot at each heat map grid. Articles with an obviously unsuitable type (like plants, animals, and people) are excluded. This method guarantees that, for example, on the whole-world view where each hotspot pixel corresponds to a relatively large area, we automatically get the Wikipedia city articles as the most popular, but as we zoom in, the area for each pixel becomes smaller and we will start getting markers and articles about villages, beaches, castles etc.

The actual algorithm is the following. First we cluster the heat map dots to avoid showing lots of markers very close to each other. Then we look for the most popular Wikipedia articles near the hotspots: the higher-ranked a heat map spot is, the larger the area to search. If nothing is found or the found article has a much lower popularity than the heat map spot, we do not attach anything to the hotspot. Otherwise we connect a hotspot to the Wikipedia article plus the corresponding Wikitravel article, if available.

As mentioned before, in order to generate the popularity data and a popularity-sorted list of Wikipedia articles we use the logfiles mentioned before plus an additional coefficient giving a significant bonus to Wikipedia articles with a type suitable for sightseeing, for example, world heritage sites.

It is worth noting that knowing a highest-ranked Wikipedia article for an area helps users to google for more, since the article always gives us a title of the place to look for.

### 3.2 Basic merging with Foursquare

The ultra-high-res heat maps for which we do load Foursquare data is populated with the combined Wikipedia and Foursquare markers for top spots in the heat map, using an algorithm which – similarly to the Wikipedia labelling algorithm from the previous chapter – first tries to associate Wikipedia and Foursquare objects to the most popular places on the map and finally interleaves the remaining, unmatched top Wikipedia and Foursquare articles to the mix, even if they are not located near a visually attractive spot.

Foursquare places merging with Wikipedia articles is performed using an algorithm which takes into account both the geographical distance and a similarity of the names of the place vs. the article. In order to be merged, both of these parameters must be sufficiently similar.

Foursquare locations are ordered based on the combination of different users ever checked in and the type of the place. First, we exclude both geotagged Wikipedia articles and Foursquare locations with obviously non-geographic or non-sightseeing type (homes, offices, bus stops etc.). Second, we add bonuses to articles and locations based on the suitability of their type: for example, castles, churches and public squares get different bonuses.

In most cases the geographical coordinates of the underlying visually popular spot, the closest popular Wikipedia article and the corresponding Foursquare location (close both by coordinates and the name), as well as the name of the article/location

are noticeably different. We use a relatively complex heuristic algorithm to determine the most suitable name and coordinate to present for the user as a marker. The percentage of errors our algorithm makes varies a lot for different zoom levels and regions and has not been measured with a sufficient quality to present it in the paper.

## 4 Labelling areas and merging objects: issues and improvements

The general idea behind labelling visual hotspots was briefly described above. Here we will present some main problems we have encountered and propose ways to improve our system.

For every visual hotspot we try to to find a matching Wikipedia article. A significant percentage of popular hotspots will get a match from Wikipedia. We try to find the name for non-matching objects by looking at Panoramio pictures nearby. We take a certain area around the hotspot (for example, 1 km radius) and look at the titles of pictures within that area. Based on this information we try to get the name of the object in the hotspot.

**Table 1**. An example of candidate list for pictures near Cliffs of Moher. The best match is has rank 1 and *n* 3 (marked with italics). Some less frequent candidates are omitted.

| Candidate | n | Rank | Pos | Total | % |
|---|---|---|---|---|---|
| moher | 1 | 1 | 656 | 859 | 76.4 |
| of | 1 | 2 | 631 | 859 | 73.5 |
| cliffs | 1 | 3 | 587 | 859 | 68.3 |
| of moher | 2 | 1 | 595 | 859 | 69.3 |
| cliffs of | 2 | 2 | 559 | 859 | 65.1 |
| moher ireland | 2 | 3 | 67 | 859 | 7.8 |
| *cliffs of moher* | *3* | *1* | *534* | *859* | *62.2* |
| of moher ireland | 3 | 2 | 64 | 859 | 7.5 |
| cliffs of moher ireland | 4 | 1 | 60 | 859 | 7.0 |

The title of the picture is tokenised into lower case words. We ignore commas, full-stops etc. For every tokenised title we will find the word *n-grams* for *n* being from 1 to 4. An *n-gram* is combined by taking *n* consecutive words from the title. A simple example: given a title "A picture of Big Ben", we will end up with tokens: "a", "picture", "of", "big", "ben". All *1-grams* are: "a", "picture", "of", "big", "ben". And all *4-grams* are: "a picture of big", "picture of big ben".

After finding *n-grams* for every picture in the area of interest, we take the 5 most frequent *n-grams* for every *n*. We will end up having up to 20 *n-grams* (5 most frequent for every *n=1..4)* for a hotspot which we consider name candidates.

An example candidate list for "Cliffs of Moher" (pictures near Lahinch, Galway in Ireland) is presented in Table 1. The column *n* stands for *n* used in *n-gram* (how many tokens is used to form up a candidate), *Rank* stands for rank in current *n* (1 being the most frequent *n-gram*), *Pos* ("positive" pictures) is a number of pictures which contain the given *n-gram*, *Total* represents the total number of pictures near by and *%*

shows the percentage of "positive" pictures. We have marked the correct candidate in the table.

The given example illustrates already some problems we have with this methodology. After generating a list of candidates, we have to pick the correct candidate. Finding the correct one is not so straightforward. It is obvious that we cannot use the most frequent candidate as the final name, because it may-be just part of our final name. If our final name consists of 3 words, then every word alone in this name has at least the same or even higher frequency. This is very clear in the example: “cliffs”, “of” and “moher” all have higher frequency than “cliffs of moher” together.

The idea we have with the candidate selection is to find the longest candidate which has frequency above a certain threshold. For example, if the threshold is 30%, then we would find “cliffs of moher” to be the best candidate. To improve the precision, we are planning to apply machine learning to find the best threshold (or may-be even have additional indicators for the best pick in addition to frequency and term count).

Another problem is more related to the concept of taking pictures. It often happens that bigger (high) objects can be captured only from distance. It is very hard to take a picture of Eiffel Tower when being right in front of it. The same applies for our example “Cliffs of Moher”. The candidate list we presented earlier is actually taken from about 2 kilometres from the object itself (object location based on Wikipedia). Wikipedia location for the cliffs has about 400 pictures and 267 mention “Cliffs of Moher”, while 2 kilometres away the count of pictures is about 800 and 534 of those mention the correct object.

For our system, we actually need both those places. If later we want to have a recommendation of the best sightseeing places, we can prefer the distant location to take pictures. The 2 kilometre gap between the objects makes it harder to merge them into one. Currently we will have two separate objects (even though the name of two places could be the same).

In the next section we will present some experiments with Panoramio picture titles. All the work presented is based on the methodology described in the current section.

## 5 Experiments and Results

We use two different datasets for our tests: pictures from United Kingdom and pictures from France. For every popular place we have found up to 20 possible candidate titles. In order to evaluate our simple approach, we use Wikipedia to extract titles of popular objects. For every popular object we find a Wikipedia article with the same or close geocoordinates. In case there are several Wikipedia pages for one location, we try to take the most appropriate (popular and type-wise suitable). Obviously, not all visually popular locations have a Wikipedia entry. In our evaluation we only consider those locations which have a linked Wikipedia article. After generating all the *n-gram* candidates for a location we will see whether the Wikipedia name is within those candidates. Statistics about the datasets can be found in Table 2.

**Table 2.** Statistics about the datasets for UK and France.

| **Property** | **UK** | **France** |
|---|---|---|
| Hotspots | 14 768 | 13 621 |
| Wikipedia objects | 9753 | 9931 |
| Panoramio picture count | 1.4M | 1.5M |
| Wikipedia object match | 5458 | 5531 |
| Match % | 56% | 56% |

As shown in the Table 2, we were able to find about 56% Wikipedia objects from the Panoramio pictures. This means that the Wikipedia name matches (we allowed *Levenshtein distance* (Levenshtein distance, edit distance, http://en.wikipedia.org/wiki/Levenshtein_distance) up to 3) with one candidate. We outline several reasons why some objects are not found/matched:

- The number of pictures in the close vicinity is very low (or even zero). If we have an object and only 3 pictures mention that object, we want to look at pictures from the bigger area. We can extend the search area, and end up with 20 new pictures, but none of those mention the object we were looking for (all the new pictures mention some other object).
- Wikipedia and Panoramio coordinates do not match. We look only those matches which are close to each other. For our matching evaluation we need Wikipedia and Panoramio pictures to be very close. It may happen that the source data has somewhat rounded coordinates (0.01 difference in latitude or longitude number can mean 1 km distance). Another possibility is that some objects are usually pictured from a distance. A good example was given in the previous section about Cliffs of Moher.
- Different name variants. In Wikipedia, some objects have additional information like county or country in their titles. For the Wikipedia place "Lincoln, England" we have found an n-gram "Lincoln", which is a correct match. These kinds of matches are not counted in our "match" number.
- The Panoramio title is too general. For some objects, there are a lot of pictures which indicate the name of the city or county where the object is located. For example, the case where there are 100 pictures near a certain Wikipedia object and only 3 mention the object itself. Other pictures mention the city, the county etc. It can easily happen that more general n-grams push the correct object out.

Our dataset for the described experiments has about 14 000 "hotspot" objects and about 10 000 Wikipedia objects. For the objects with Wikipedia articles, we could combine Panoramio and Wikipedia data to validate the title of the object. For the rest, we have to rely on Panoramio pictures (or on some additional external data source). Usually the title generated from the Panoramio title *n-grams* is not wrong, but it might be too general or a slightly different variation than Wikipedia article would have. We

estimate that the Panoramio based object titles are correct in at least 56% of cases. If we add different name variations and more general objects, we might end up with 70-80 %.

## 6 Related Work

Heatmaps are used in various domains in order to visualise intensity of a certain values. We mention few which are also related to tourism. Fisher (2007) uses tile download statistics from Microsoft map server to present popular areas. He calls the system Hotmap. Every time a user looks a map, she downloads visible tiles from the server. Objects (and tiles) which are watched more often, have higher download numbers and they will become more popular for Hotmap. They present different ways to use heatmaps mentioning also a possibility to draw users' attention to prominent objects.

Kurata (2012) presents a potential-of-interest map based on Flickr pictures in Yokohoma. He present an interesting approach for finding popularity of objects where only pictures from non-local users are taken into account. Users who live in the city, are considered as non-tourists and their pictures do not add popularity. In our case, to find the name and the type of the object, we have to use pictures from local people. And it may happen, that those are even more accurate than tourist pictures, as a tourist may not know the exact name of the object. Kurata presents user evaluation which is very valuable and something we still have to organise for our recommender system.

Crandall et al. (2009) describe their system which uses image textual and visual features to group pictures into popular objects. They find a name and a descriptive picture for every popular object. Processing image textual information is very close to what we have presented in our paper. They use distinctiveness to order name candidates instead of using candidate name ratio to all pictures near-by the object. They present a machine learning technique usage for solving the problem of naming the objects (where the photo is taken). Although they present that combining textual and visual features yield the best results, we keep our focus on using only textual information.

Alves et al. (2009) present KUSCO system which deals with enriching POI data. They extract information from search engine to gather web pages about a certain POI. Then they use natural language processing to extract concepts for objects. An interesting idea is to use WordNet (http://wordnet.princeton.edu/) concepts matched with words from the web pages. We have started working on something similar: we try to extract words from Panoramio picture titles and find similarity or distance between found words and WordNet concepts. We only consider certain concepts from WordNet which represent categories of POI: museum, restaurant, hotel, church etc.

Popescu et al. (2008) present a system which integrates Wikipedia and Panoramio in order to identify geographical names, categorise objects, find geographical coordinates and rank objects. They use Panoramio picture count as one possible rank for objects (more pictures means higher rank). They also try to find categories for objects where they use language processing from the first sentence of Wikipedia and

web search. They compare their system with Geonames (http://www.geonames.org/), but they do not use Geonames as a source for their data. A lot of our ideas align with their proposed solutions: using Panoramio for ranking objects, merge objects with Wikipedia, try detecting categories from web search (something we are currently working on).

Popescu et al. (2009) present a multilingual geographical gazetteer creation based on Flickr, Panoramio, Wikipedia and web search. They detect place names using a vocabulary with geographical concepts. They also present object ranking and categorisation. They have improved some of the methods compared to their paper from 2008. They use Flickr instead of Panoramio. They have also published their gazetteer which can be downloaded (http://georama-project.labs.exalead.com/gazetiki.htm). We could evaluate our system against this dataset. However, we need to implement some additional functionality before doing the evaluation, in order to perform full range comparison.

Zheng et al. (2009) describe a system for building a world-wide landmark database. They use pictures from Picasa (http://picasa.google.com) and Panoramio along with Google Image Search (http://images.google.com) to download picture files. They also use textual information from Wikitravel to complement objects which are not present in pictures. They use picture and Wikitravel text information to find the name for the popular object. Image processing helps to detect different pictures about the same object which can be clustered into one group. In addition to image processing they use picture title word n-grams – the most frequent n-gram is used as the title for the group.

## 7 Conclusions and Future Work

We have presented the Sightsmap system with a goal to build a world-wide database of the sightseeing popularity of concrete POI-s. We are using purely crowd-sourced data: Panoramio, Wikipedia, Wikitravel, Foursquare. While the main goal is to detect popularity, first we have to tackle different data extraction and integration problems. We have presented experiments on finding an object name from the Panoramio picture titles. We have also described the way to gather information and to use different sources to calculate popularity for objects in the world. We have presented a heat map solution sightsmap.com, where all our data is put to use.

One of the future plans is to be able to recommend objects all over the world. The recommendation should be based on the interests of the tourist, hence we need to find a category for every object in the world. We have already started working on this goal and have briefly mentioned our ideas on the subject.

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## 9 Acknowledgements

This research has been supported by European Regional Development Fund.

# Sources of Customer Role Learning During Self-Service Technology Encounters

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## Abstract

The advance of self-service technologies (SSTs) in the tourism industry has highlighted the role of the customer as co-producer during service encounters. Customer usage of SSTs requires that they have acquired the needed skills and knowledge towards operating the SST efficiently. Despite the recognition of the importance of customer role clarity and ability for successful SST encounters, there is a dearth of knowledge into the process of customer SST role learning. Therefore, this research contributes to knowledge by exploring the sources of customer SST role learning and how customers learn from them. The employed research method is short interviews with airline passengers at an international airport. The results identify six sources of customer learning, namely the SST interface, other customers, company employees, mass media and service environment, negative service outcomes and the customer's workplace.

**Keywords:** self-service technologies; customer roles; customer learning; customer participation

## 1 Introduction

The rapid development of technology in the past decade has been paralleled by the infusion of technology in services and particularly self-service technologies (Castro, Atkinson & Ezell, 2010). The term 'self-service technologies' (SSTs) is defined by Meuter, Ostrom, Roundtree & Bitner (2000, p.50) as 'technological interfaces that enable customers to produce a service independent of direct service employee involvement'. Examples of SSTs include online reservation web sites, online banking, kiosk technologies at airports and train stations, retail self check-outs in shops and mobile telephone service applications. This customer service production presupposes the requirement of the appropriate skills and knowledge on the part of the customer to operate the SST (Walker & Johnson, 2006). Therefore, the aim of this paper is to explore the sources of customer role learning in SST encounters. The employed research method was short interviews with 133 passengers at an international airport. The analysis revealed six sources of customer learning, which are discussed in light of the way customers utilise them in shaping their production role during SST encounters. Those sources of customer learning include the SST interface, other customers, company employees, mass media and the service environment, negative service outcomes and the customer's workplace. The paper concludes with the limitations and suggestions for further research.

L. Cantoni and Z. Xiang (eds.), *Information and Communication Technologies in Tourism 2013*, DOI: 10.1007/978-3-642-36309-2_28,

## 2 Literature Review

When companies manage to engage customers in service production in an efficient manner, this may bring significant savings in production costs and customer satisfaction (Mills & Morris, 1986). The central role of customers in service production is further emphasised by the service-dominant logic (Vargo & Lusch, 2004), which advocates that customers are the primary creators of value in services and service companies facilitate the process of value creation. In this process of value creation, customers integrate resources to create value (Vargo & Lusch, 2004). Those resources include company resources and offerings, together with customer skills and knowledge. Furthermore, customers need to have knowledge of how to integrate those resources in order to produce optimal value (Hibbert, Winklhofer & Temerak, 2012). The service-dominant logic suggests that the role of the service provider is to facilitate value creation with the provision of resources to the customer (Vargo & Lusch, 2004). In this facilitator role, the service provider needs to provide conditions for customer learning of skills and knowledge in terms of how to integrate production resources (Hibbert *et al*., 2012).

Following the recognition of the central role of customers in services, researchers have suggested that consumer role clarity is essential for successful service completion (Bowen, 1986; Meuter, Bitner, Ostrom & Brown, 2005). Role clarity is defined as customers' knowledge of what is expected of them during SST encounters (Meuter *et al*., 2005). In an SST context, research has found that detailed role clarity and successful completion of self-service gives the consumer a sense of achievement and control and reduces technology anxiety, while poor role clarity can be detrimental, not only for the service that the particular consumer receives, but also for the quality of service received by other customers of the company (Bateson, 1985). Meuter *et al*.'s (2005) research into SST initial trial by customers confirmed the importance of consumer role clarity as a predictor of SST adoption. Similarly, Kim, Christodoulidou and Brewer (2012) found that role clarity is one of the strongest predictors of customers' likelihood to use SSTs in a hospitality context. Meuter *et al*. (2005) recommends as an avenue for further research the exploration of the effects of customer socialization on the formation of better role clarity.

Another term which is often used interchangeably with role clarity in SST research is customer self-efficacy (e.g. Oyedele & Simpson, 2007; Zhao, Mattila & Tao, 2008; van Beuningen, Ruyter, Wetzels & Streukens, 2009). Self-efficacy reflects the customer's belief that they have the ability to produce a service as required (van Beuningen *et al*., 2009). The formation of customer self-efficacy has been recognised as a research gap in SST research by Zhao *et al*. (2008) and van Beuningen *et al*. (2009). Zhao *et al*. (2008) found that customer training by the service organisation increases the customer perceptions of self-efficacy and affects usage intentions. Furthermore, van Beuningen *et al*. (2009) researched how customers form self-efficacy through information searches online. The study included novice customers and their formation of self-efficacy through online sources of the service company, peers and third party sources (van Beuningen *et al*., 2009). Zhao *et al.* (2008) suggested that there are other unexplored sources of building customer self-efficacy, such as providing written instructions and simulations. Furthermore, many SSTs are

now past their initial adoption, and customers have accumulated experience (Wang, Harris & Patterson, 2012) which may be transferred to similar SST encounters.

A method for introducing customers to their service production roles is customer socialization, which draws on similar practices like employee organizational socialization (Mills & Morris, 1986; Goodwin, 1988; Kelley, Donnelly & Skinner, 1990). Customer socialization includes the acquiring of abilities, values and self-perception needed to perform as a 'partial employee' (Goodwin, 1988). There are a number of tested methods for customer socialization including distributing of service company marketing literature, incorporating cues in the service environment, formal customer introduction to the organization, reinforcement of desired behaviour, and observation of other customers (Kelley *et al*., 1990). Cues in the design of the service environment can be utilized by companies to indirectly manage customers' participation (Ford & Bowen, 2003).

With the democratisation of the information on the internet, customer learning is becoming more independent from the sole efforts of the service company (Pires, Staunton & Rita, 2006). Customer learning has been further facilitated by websites, online forums, frequently asked questions (FAQ) pages and social networks (Temerak, Winklhofer & Hibbert, 2009). The service-dominant logic in services marketing (Vargo & Lusch, 2004) suggests the adoption of a customer centric view and recognises the value creating power of customers as self-initiating resource integrators towards achieving their goals. In this light, socialization and training as concepts in customer learning have been criticized by Hibbert *et al*. (2012) as these concepts imply a company centric view. Hibbert *et al.* (2012) advocate the 'agentic role' of the customer in self-initiating learning. The democratisation of customer learning necessitates the customer perspective to be studied as the full process of customer learning is not accessible to service provider observations or management (Hibbert *et al*., 2012). Hibbert *et al*. (2012) propose that customer learning should be regarded as a self-directed learning process depending on personal factors (e.g. learning autonomy and personal resources), learning environment (e.g. learning resources, learning support and opportunities to learn) and learning trigger events (e.g. expectation of required learning, external and internal drivers, and multiple versus single learning episodes). There appears to be a gap in the knowledge regarding the sources of customer role learning, and how customers respond to different sources in terms of learning outcomes (Temerak *et al*., 2009; Hibbert *et al*., 2012). The present research aims to build on Hibbert *et al*.'s (2012) model by exploring the sources of customer SST role learning. A further contribution is the exploration of other sources of customer role learning in an SST context in addition to training (Zhao *et al*., 2008) and information sources online (Beuningen *et al*., 2009).

On the basis of the review of literature on customer learning in services and the arising gaps, the objective of this research is to explore from a customer perspective the sources of customer SST role learning and how customers transform this information into learning outcomes. Similarly to Hibbert *et al*. (2012) this research adopts the view that SST customers are the central agent in the decision as to which learning sources to consider and how to learn from them.

# 3 Methodology

This study into customer role learning was part of a larger research project into customer usage of SSTs. The limited knowledge on actual customer usage behaviour during SST encounters (Wang *et al*., 2012) and the numerous calls for qualitative research (Baron, Patterson & Harris, 2006; Lin & Chang, 2011) justified the employment of short interviews as a data collection instrument. This instrument of data collection was suggested as appropriate for gaining of broad understanding of the issues in a marketing area where little prior research is available (Carson, Gilmore, Gronhaug & Perry, 2001). The short interviews may be applied as a standalone data collection instrument, but with limitations regarding the depth of the gained understandings (Carson *et al*., 2001). Wang *et al*. (2012) successfully employed short semi-structured interviews of 10-15 minutes at supermarket check-outs.

The interviews were conducted by the principle researcher with 133 airline passengers in the departure lounge of an international airport. With a view to avoiding any preconceptions, the research included a broad sample in terms of ages, gender, professional backgrounds and education. The average length of an interview was 5-10 minutes, this being a feature of the dynamic nature of the airport environment. The participants were asked to talk about their general SST usage, and were encouraged to discuss examples, or particularly memorable experiences (positive or negative) with an SST. The interviews were transcribed and analysed using an interpretive method of data analysis (Miles & Huberman, 1994). This method of data analysis is not seeking to uncover laws of causality, but rather to capture the essence of a participant's account and to understand the meaning of actions (Goulding, 2005). The interpretive analysis included reading and re-reading of each transcript until the researchers understood the essence of the participant's views. The following section will present the findings regarding the sources of customer role learning and how customers learned from them.

# 4 Findings

When reflecting on their usage of SSTs, customers often revealed their sources of learning in terms of how to engage with an SST. Those reflections were interpreted by the researchers in view of the way customers employ the various sources to learn their SST usage role. The interpretive analysis revealed six main sources of customer learning namely the SST interface, other customers, company employees, mass media and service environment, negative service outcomes and the customer's workplace. Those sources will be examined below in turn, supported by selected illustrative quotes from the data. The presented quotes are labelled with unique codes that correspond to interview participants. The codes appear after each quote in the following way: (Int.28.M). This identifies interviewee number 28 who was a male participant.

## 4.1 The SST Interface

The SST interface emerged as the major source of customer learning. The SST interface may encourage or discourage customers from engaging with self-service, i.e. some may find it complicated. There is an expectation by some customers that the

SST interface is the primary communicator of usage instructions. A participant, who had an unsatisfactory experience in trying to purchase printer ink cartridges using the self check-outs in the supermarket, suggested that it was the SST interface which should have informed him to remove the packaging before getting out of the shop: 'I didn't realise the packaging had to be removed before I went out of the shop. So, when I scanned it through, it didn't make it clear to me that it needed to be removed.' (Int.28.M) Customers responded in a variety of ways to the information and instructions on the SST interface. Some customers learned from the interface about the customer skill requirements for participation in the SST encounter. For example, an elderly lady suggested that she has learned to try and complete the booking process as fast as she can: 'I am always afraid because when you are booking tickets online, for security reasons, they only give you a certain amount of time, don't they? You have to do it fairly quickly.' (Int.109.F)

The marketing and advertising on SST interfaces invoked a response on the part of customers by making them more alert and vigilant, because this was sometimes viewed as an attempt by the service provider to sell extra services that they may not need. The following is a participant's comment about an airline's website: 'So, they build the website to entice you into buying all these extra services that you don't need. So, you have to have your wits about you.' (Int.15.M) If there were inconsistencies on the SST interface, some customers even responded by contacting the service provider:

> I went to the baggage allowance section and it told you any sports equipment can be a maximum of 20kg. And when I was actually booking the ticket I went into it separately, there was a different clause which said that sports equipment is generally 20kg, mountain bikes exception is 30kg...So, I had to ring them. (Int.21.M)

Other customers perceived the SST interface as offering standardized services and learned to contact the service provider to negotiate for further inclusions. Similarly, to the customers who are afraid that they may purchase unwanted extra services, those customers fear that the technology may not give them the best deal, so they double check with a personal agent:

> I look up my specification on the computer, ring up Dell, and say this is what I want, and I am talking to a person. And I say: 'Can you do better?', and last time the person at the other end said that they couldn't give me any money off but they doubled the memory. (Int.23.M)

It appears that the SST interface may be a direct source of customer learning through the provided operational instructions, or an indirect source through cues and reminders or stimuli in the design.

### 4.2 Other Customers

Many customers learned aspects of their role during SST encounters by observing other customers' performance. Depending on their observations, some customers concluded that they lack sufficient knowledge and may need to ask for help from more experienced customers, whilst others learned that they may offer help to less experienced friends and family, and indeed, on occasion to strangers. The following quote illustrates how an elderly lady learned that she needs to seek help from other customers when engaging with SSTs by observing that other customers are more

knowledgeable, willing and able to help her: ‘there is always someone around that will help you if you just ask. My age group, really, isn't into a lot of technology.’ (Int.109.F). Some customers responded in a more proactive manner by learning from fellow customers. An elderly lady stated: ‘I have learned from my grandson, from my children. They showed me and then I try and I am much better than I used to be.’ (Int.33.F)

The observation of other customers may not only lead to learning how to operate an SST, but also learn a lead user role in helping and tutoring less knowledgeable customers:

> They were struggling with the online check-in kiosk...he was German, himself and his wife and two kids and I helped them check-in. (Int.35.F)

Within the role of helping other customers, some participants learned the finer aspects of judging when their help was needed:

> I mean, family is one thing, like my parents would not be great with computers, so I have to book things for them...But I find that if it is somebody I don't know, they are stressing out, you are nearly better off not trying to help them, because they are already highly sensitive... Well, like, you might gage a bit... Some people if they need help, like, they will be throwing up eyes: 'Somebody come help me!' And other people they will just be [expletive] screaming and shouting and, like, you know, if you do go near them, they will be like: 'Get away!' (Int.38.M)

When observing other SST users, customers may judge whether they have the skills and knowledge to help and tutor other customers, or they should be the ones in the 'help-seeker' role. This in turn determines how customers will engage with other customers during SST encounters.

### 4.3 Company Employees

Even though SSTs presuppose no employee involvement, employees were still a source of customer learning. Company employees promoted awareness of the SST option. Furthermore, company employees were often available to assist and teach inexperienced SST customers on-site or over online chat and customer lines. Company employees may be a source of promotion of the SST option, although customers may not respond favourably initially:

> Yeah, sometime if you go into the tax office, there is a big queue and they'd say to you: 'Why don't you pay online?' And, you are working here, it's a job for you. So, I find in the tax office, they try get you to pay online. So, I've started to do that now. (Int.116.F)

Company employees may further emphasise the notion that customers are ‘on their own’ with SSTs, i.e. they have to teach themselves, and it is up to them how they learn to use the SST:

> There is a counter beside the ticket machines, so, there are personnel there, but they are often less friendly than the machines, you know. Even though you mightn't know to use the machine, they will just point you. (Int.63.F)

Even when company employees were available for assistance, this was not always perceived as helpful by some novice customers. A participant who was assisted with

an airport kiosk stated: ‘I got the impression like they showed you one time, and you are supposed to remember that forever.’ (Int.9.F)

Although the company may train their staff to promote awareness of the SST option and assist inexperienced customers in learning their production role, the learning response was sometimes that of resistance. When employees are present on-site, some customers perceived that as an indication that the service would be delivered for them, rather than being directed to use an SST.

### 4.4 Mass media and Service Environment

Customer learning was also facilitated by mass media stories relating to SSTs. Some customers reacted to media information by incorporating into their role actions which may prevent possible service failures that they have heard about. The general customer observations of the developments in service technology further contributed learning outcomes towards the customer usage role. Some customers, who follow the latest developments in SSTs on the market, may demand those from companies. While others, when observing the general developments in the service landscape and the introduction of more SSTs, felt forced to learn how to use them.

A participant heard in the media about a booking company which closed for business and customers' reservations were not honoured when they arrived at hotels they pre-booked. This made the participant wary and he pro-actively sent a confirmation email to a hotel he booked online ‘just to be sure, to be sure, to be sure’(Int.101.M).

Some participants displayed knowledge of the service landscape, which resulted in expectations for their SST role. The excerpt below illustrates how this participant's awareness of the service landscape and current developments, enabled this customer to play a consulting role to the company:

> I think, you could benefit more if the companies like [name of airline company], who I booked for today, they do an online check-in system. I think, they need to start incorporating it into your phone because everyone has got these smart phones nowadays, and you should be able to use your boarding pass, I find, on your phone instead of printing it off. (Int.79.M)

The learning outcome from observation of the technological developments in services for another participant was that engaging with SSTs is close to compulsory, i.e. customers are obliged to invest the effort into learning how to use them:

> I just feel that you have to use it now because everything is more difficult if you have not got your internet... I am forced, as I am older, I felt a bit forced into learning it...And I know the banking, it is going to be, everybody is on the internet now...and you have to, you have to like it, you have to move with the times. (Int.33.F)

SST customers appear to utilise the media stories featuring consequences from SST usage as a learning source to optimise their actions and ensure satisfactory service outcomes. Similarly observing the developments of SSTs in services could convey messages to the customer as to what their role should be.

### 4.5 Negative Service Outcomes

Customer role learning occurred when reflecting on the outcomes from SST encounters. The positive outcomes often served as an affirmation of their existing production role, while negative outcomes had a more dramatic effect on customer role learning. Therefore, the attention here is on negative service incidents and the outcomes for customer learning. The quote below illustrates how an SST failure made this customer realise an element of his role as a customer:

> [When] We have been abroad on holiday, any time we use an ATM and we can't get any cash. But normally that's our own fault. Now we make a point of... we send a quick email to the bank to say that we are going abroad. (Int.15.M)

Another participant learned from an SST failure that if customers are given more power to engage in service recovery, this will improve the service. The learning outcome prepared this customer for undertaking a role in recovering service failures, such as in this example of discussing failures of self-service photocopiers in universities:

> There is less, you know, self-service stuff for repairing stuff. See you have to call somebody in then and that's labour intensive and time, people don't rely on time. So that's the only thing that I see with, because people could fix printing machines and credit machines easily if there was like step-by-step stuff. (Int.121.M)

Another customer had a different reaction to SST failures. The experience that SSTs often fail, and assistance from an employee is needed, paradoxically has made this participant use the SST option only if an employee is around, because 'I am trying to do something, [it] is going to go wrong, and I am going to waste time trying to find somebody to get my change out for me.' (Int.22.F) Alternatively, the notion that there may be a failure when using SSTs has taught one participant that he should not rely on SSTs for last minute transactions: 'Sometimes when you are relying on technology for last minute and it does not work, you've got to pay the price.' (Int.3.M) Similarly, another participant (Int.36.F) learned to be more vigilant when booking online after getting 'caught out' once to pay double what they expected for a room because of confusion with price per room and price per person.

Some SST customers have learned another lesson from their experiences, i.e. that if something goes wrong they should expect frustration when trying to resolve the problem:

> I think if we had a downside to all this, it's simply you often can't speak to people. There is no, you can't find a telephone line, or if you do find a telephone line, you go through a number of menus on the telephone. Ahh, and that's, I think frustrating, very frustrating. Or alternatively, if you do get through, and it's someone who has difficulty understanding what you are saying or is not familiar with the goods, or then they say we'll email you back and that doesn't happen. (Int.73.M)

The above quotes suggest that SST failure incidents are very important learning experiences for customers. Some customers may learn how to prevent failures, while others learned how to deal and cope with negative service outcomes when they occur.

### 4.6 The Workplace

Another source of customer learning was their professional occupation, especially if it was connected with using technologies. The technology usage at their workplace could contribute towards the technical skill required to use SSTs:

> When I was younger, I used to work in a supermarket, so I know how to use all the [self-service check-outs]...so... I can do it fast. (Int.117.F)

A participant, who indicated that she worked as a teacher commented:

> I was a teacher. I retired a couple of years ago and it was all technology in the school, I had to teach with technology and I found it very difficult to teach. I had to ask for a lot of advice from the younger teachers, because I had to practice it. (Int.33.F)

Alternatively, participants who worked in IT already knew a lot about how SSTs should function which introduced an element of judgement to their SST customer role:

> But I get frustrated if you are looking for more information, and since I work in technology, I have no patience for any self-service online systems, whether it is bank, car rental, whatever it is if they frustrate me at all, too many clicks, you know, any of that. (Int.50.M)

> I used to be in the technology industry, so when I see something that I think is ridiculous or redundant, I would usually shoot them up a quick note saying... this stuff doesn't work right, you should do it this other way. (Int.58.M)

The technological proficiency that customers developed at their workplace contributed to the technological skills to operate an SST. For customers, whose jobs required higher levels of technological knowledge, it was observed that there was an element of judging the SST service process as part of their role.

## 5 Discussion

The contribution of this research is to add to the theoretical knowledge about the process of customer role learning in SST encounters. The objective was to explore the sources of SST customer role learning and how customers learn their production role from them. It is important to emphasize that channels of customer socialization should not be treated interchangeably with sources of customer learning. As Hibbert *et al*. (2012, p.2) suggested contemporary customers should not be regarded as passive recipients of company training and communications, but rather as independent 'agentic actors' who are exposed to various sources of information.

In line with prior research (Kelley *et al*., 1990; van Beuningen *et al*., 2009) this study found that the information provided by the service company on the SST interface is a major source of customer learning. While most participants had little problem with following the SST instructions, some customers have learned to be vigilant for any stimuli for purchasing additional services that they may mistakenly fall for. Furthermore, the customer ‘agentic role’ during learning, as suggested by Hibbert *et al*. (2012), is revealed by customers not just learning passively from the instructions, but also applying their previous knowledge and experience in shaping their role. Our findings suggest that companies should be extra careful how the webpage design is

perceived by their customers, and that customer feedback should be sought and valued.

There is still an existing problem that customers appear to socialise themselves in line with the preconception that SSTs are for the younger, technologically proficient customers. It may be reasonable to conclude that SST interfaces have not yet reached an accessible design and delivery process acceptable to all users. Some SST usage challenges include unclear instructions and the speed at which customers need to complete the transaction. The perception of irreversibility of customer mistakes when using SSTs, together with difficult access to customer service, may create anxiety in the customer role. This anxiety may even turn some customers into passive SST users through asking other customers to operate the SST for them. Fellow customers have been suggested as instrumental in socialising novelty service users (Kelley *et al*., 1990), or as a source of customer role learning (Mills & Morris, 1986; Temerak *et al*., 2009), and this paper advances the knowledge on customer learning from this source by exploring how fellow customers may affect the role learning process. When observing, or interacting with other customers, SST users may decide that they possess insufficient skills to complete an SST transaction and leave or ask another customer to do that for them. Another group of customers learned how to undertake the role of a 'student' and a 'teacher' during SST encounters. Their interaction helped the 'student' to acquire more skills towards operating SSTs, and the 'teacher' learned how to optimise the tutoring.

Company employees, although a good source of SST awareness promotion and learning, were not always perceived as benevolent in their position. If customers were directed to an SST, when they were already at the personal service counters, they often rebelled and judged the employee service negatively. Furthermore, although Zhao *et al*.'s (2008) research confirmed that training increases SST usage, our findings suggest that training customers by onsite employees may not always provide the desired positive usage results. Therefore, service providers should be very strategic when trying to promote the SST option, and very patient in training customers. For example, the SST option could be suggested to the customer for their next transaction and the employee may explain the procedure if the customer displays interest.

While mass media has been identified as a provider of customer role learning information (Mills & Morris, 1986; Hibbert *et al*., 2012), this paper introduces the general service environment as another learning source. The service environment includes all services and service delivery channels available to customers. Much of the customer learning has happened before they approached the specific company's SST. This learning has been accumulated from previous usage of other SSTs, or from stories in the media and from peer experiences. Furthermore, companies should be vigilant and use campaigns to combat strong media stories which may have a detrimental effect on SST usage. For example, the ash crisis from 2010 turned some people away from booking trips online because it highlighted the risks of the online channel. The directly experienced negative outcomes from previous SST encounters were found to have a learning value for customers. Wang *et al*. (2012) found that service failures may be tolerated by customers to an extent, but ultimately they made customers avoid the SST option. The present research adds to the debate on the

effects of previous SST usage with the finding that negative service outcomes may have a learning effect on customer participation. While negative outcomes may have a positive learning effect, companies should not rely on this source to teach their customers, because frequent failures make customers avoid the SST.

Finally, this research introduces the customer's workplace as another source of technical skill learning in operating SSTs. This source of customer learning, while independent from direct service company efforts, is a very valuable source as often customers may be forced to learn skills at the workplace which otherwise they may avoid during service encounters. It appears that even though customers have resorted to many sources of role learning, some of which are independent of the direct service firm's control, i.e. other customers, the workplace, media stories and the service landscape, the most desired learning source for both customers and service providers is the well-built SST interface. So even though contemporary service customers have the option of learning from independent sources, companies should implement the knowledge from this research and aim to preserve their facilitating role when it comes to customer learning.

## 6 Conclusion

In order to contribute more knowledge towards understanding how customers learn their SST production role, this research explored the sources of customer role learning from a customer perspective. The findings from the short interviews with airline passengers revealed six main sources of customer learning, i.e. the SST interface, other customers, company employees, mass media and the service environment, negative service outcomes and the customer's work environment. Those sources were analysed in terms of the various ways in which customers may interpret the information and transform it into a role learning outcome. Those findings contribute towards the understanding of customer learning from a customer's perspective and aim to provide insights for service providers towards creating better strategies for customer training and socialization. Although many SST customers proactively learn from various information sources, our findings reveal that there could be mixed learning outcomes in terms of production role learning. This suggests that service providers should carefully monitor the customer learning process and tailor-make their marketing communications to facilitate the successful performance of all customer segments.

When applying the findings from this research, its limitations should be considered. While the interviewed participants represented a diversity of demographic and social backgrounds, the data was collected from a convenience sample of airline travellers in one location. Therefore, variations in findings may be observed in different settings and with other participants. Further limitation of this research constitutes the insufficient depth in questioning during the short interviews. The aim of this research was to gain initial understanding of customer SST behavioural patterns and should be followed by a more comprehensive data collection instrument, such as in-depth interviews or focus groups. Furthermore, it was beyond the scope of this research to investigate the interplay between the various learning sources and the effect of customer differences on the way those sources are employed for role learning. Such

an investigation may provide useful information for marketers in understanding how different learning sources may be interpreted by different customer segments.

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# The Development of an Evaluation Framework for Determining the Economic Value and Effectiveness of Internet Room Diagramming Solutions

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## Abstract

Through the application of Global Distribution Systems and Computer-Aided Design, Internet Room Diagramming Solutions (RDS) facilitates bilateral communication in virtual site inspection within complex meeting and event planning processes. RDS has been regarded as not only one of the most innovative ICT marketing media for raising the properties' profiles of hotels and convention centres, but also as a practical tool to try out and to communicate planners' ideas on meeting and event designs. However, there is little research specific to RDS in the hospitality management domain. A modified Delphi technique was employed with an expert panel to generate, validate and prioritise a comprehensive set of dimensions and criteria for measuring the economic value and effectiveness of a leading RDS in the marketplace, and a hierarchical structure of these criteria is presented. Interactive service quality and satisfaction of business partners were identified as the most critical criteria used for the measurement.

**Keywords:** ICT impact; meetings and events; room diagrams; ICT effectiveness

## 1 Introduction

The ever-increasing use of Information and Communication Technologies (ICT) in the day-to-day operational activities for stakeholders within the hospitality sector has led to a situation where its effective use and measurable productivity require to be monitored and justified. However, as Fuchs, Höpken, Föger and Kunz (2010) argue, the significant contribution of ICT to the companies' business success in the hospitality sector may be difficult to justify precisely without considering the adoption behaviour, the usage of supporting technologies and the external environment of the companies. It has, therefore, been suggested that comprehensive evaluation frameworks should be used to monitor the economic value and effectiveness of ICT applications (O'Connor & Frew, 2004). Furthermore, research shows that the different items of ICT investment may be associated with different degrees of productivity, and even similar items of ICT investment used in different geographic areas and organisations seem to result in varied productivity (Brynjolfsson & Adam, 2010; Ham, Kim, & Joeng, 2005; Scholochow, Fuchs, & Höpken, 2010; Shan, Hung, Lo, & Wang, 2008). This paper proposes an approach which demonstrates processes for the development of an evaluation framework for determining the economic value and effectiveness of a specific ICT application, Internet Room Diagramming Solutions (RDS), in the meeting and event segment of the hospitality sector. Inspired by the research of Fuchs, Witting and Höpken (2009) and of Zhu, Dong, Xu and Kraemer (2006), the Innovation Diffusion Theory (Rogers, 2003) and the Technology–Organization–Environment (TOE) framework (Tornatzky & Fleischer, 1990) are used to form the ground theories of this research and have

L. Cantoni and Z. Xiang (eds.), *Information and Communication Technologies in Tourism 2013*, DOI: 10.1007/978-3-642-36309-2_29,

been tested and rated by an expert panel through the implementation of the modified Delphi technique in 2012.

## 2 Internet Room Diagramming Solutions

With the development of computer technologies, an accurate diagram of event space can be created and edited using simple graphics software or dedicated Computer-Aided Design (CAD) programs (Silvers, 2012). It is claimed that the first commercial room diagramming and drawing application product which assisted meeting and event planning in the hospitality industry was made available in the 1980s (Ball, 2007). Room diagramming solutions typically assist in the generation of digital graphic room layouts for both the meeting and event venue organisations and their clients. This computer software which provides the same functionality as conventional CAD programs also allows meeting and event planners to try out their ideas on event designs (McCormick, 2004). Some of the applications provide certified room diagrams showing the accurate size and shape of each event room and the objects in the rooms such as tables and chairs. The capability of the accurate RDS ensures that whatever the meeting and event professionals design on screen can work on the ground (O'Connor, 2004).

The use of RDS in the meeting and event industry and in the hospitality industry has changed greatly over the past decades. Accompanied by the continuous development of ICT, rich functionality has continued to grow in RDS. Meeting and event professionals can now download room diagrams and floor plans directly from the venues' websites allowing the time-consuming jobs of the past to be completed with ease. Some packages, equipped with the technologies of three-dimensional (3D) virtual reality and space rendering, even allow users to walk through the 3D rooms they have designed on the screen. The users can take advantage of search engines to conduct meeting and event venue research and to identify ideal venues for their events without traditional costly site inspections (Bowdin, Allen, O'Toole, Harris, & McDonnell, 2010). With the support of cloud computing technology, users can directly design the event setups on the web pages of the targeted venues ignoring the complicated software downloading processes of the past. This digital Internet demonstration approach showcases the properties and space of a venue in a brand new way: for example, users can now modify meeting and event room layouts on a web-based interactive map (Haley, 2006). As a result, apart from the original design functionality, more and more meeting and event professionals regard RDS as a communication and marketing tool (Bowdin et al., 2010; Collins & Cobanoglu, 2008; Goldblatt, 2011; Jones & Baloglu, 2006).

In the hotel sector, one of the major locations hosting meetings and events, some efforts have been made to analyse the value provided by RDS to property management and to categorize RDS in diverse systematic ways. Collins and Cobanoglu (2008) emphasise the ability of RDS to increase sales and then categorise RDS in one of the sales and catering systems in property management. However, considering the fact that meeting/event rooms usually belong to specific sub-units which differ from other divisions of properties, RDS is also classified as one of the conference and banqueting systems (O'Connor, 2004). In Jones and Baloglu's research (2006) the focus on RDS is on its ability to expand properties' exposure

promoted by Internet marketing endeavour, and they, therefore, describe RDS as a sales and marketing tool.

The Internet interactive CAD room diagramming solutions not only take advantage of the conventional CAD software for design drawing but also extend the capabilities of varied key stakeholders who use it to attend, to be involved with or to produce better meetings and events. It is claimed that the use of Internet interactive CAD, a new form of communication, transforms both the substance of literacy and the means by which the content is communicated and learned (McCormick & Scrimshaw, 2001). This platform, which allows more creative approaches for collaboration, accommodates both traditional individual creativity and 'collective generativity' (Sandes, 2000, p.11). Maher, Simoff and Cicognani (2000, p.103) describe the characteristics of the collaborative design development in a virtual environment as "a process of construction of individual and shared understanding and the mapping of this understanding onto a shared design representation". The result of the collective intelligence generated by this approach goes beyond simply having a team of event planners and designers: it could embrace the involvement of clients, suppliers and consumers. As a result, the use of Internet interactive CAD room diagramming solutions may add tangible and intangible values to complex projects such as meeting and event planning (Collins & Cobanoglu, 2008; McCormick, 2004).

## 3 Assessment of the Economic Value and Effectiveness of Internet Room Diagramming Solutions

There is a gap in the assessment studies of the adoption of Internet RDS within both meeting and event and e-tourism literature. To the authors' best knowledge, only limited previous studies include RDS within their research on eBusiness applications (Jones & Baloglu, 2006; UNLV, 2001). For instance, Jones and Baloglu (2006) surveyed the hotel sales members from the Hotel Sales and Marketing Association International and several hotel companies by using a list of twenty technological tools used in hotel sales. The survey asked for ratings on a five-point Likert scale measuring both the importance and performance of those technological applications which they use for daily sales responsibilities including RDS. RDS was rated with a mean of 3.6 (3=neutral, 4=fairly important) in the importance score; however, the mean was 2.9 (2=dissatisfied; 3=neither dissatisfied/satisfied) in the performance score. RDS was well below average on the performance score in the list of technological applications rated by the hotel salespersons in this research. It was argued that the lack of follow-up training sessions could be one of the reasons causing this result, and the need for constant monitoring and updating of the systems has also been advised.

However, previous general eBusiness/ICT evaluation research has provided models by which to explore the outcome and effectiveness of RDS usage. In Fuchs et al.'s research (2009) in the hospitality sector a designed indicator framework for eBusiness adoption measurement with an extended impact measurement has been developed according to the Innovation Diffusion Theory (Rogers, 2003) and the eBusiness impact model (Zhu & Kraemer, 2005). This framework considers that ICT's economic value comes from: 1. impact on sales; 2. impact on efficiency; 3. impact on business partner relationships; 4. impact on customer satisfaction. These categories

show similarities with other relevant literature on ICT value/impacts to successful corporate performance (Bacheldor, 1999; Brynjolfsson & Hitt, 1996; Buhalis, 1998; Go, 1992; Ham et al., 2005; Huo, 1998; Shapiro & Varian, 1999; Sweat & Hibbard, 1999; Wu, Mahajan, & Balasubramanian, 2003).

O'Connor and Frew (2004) argue that ICT evaluation in the hospitality sector is complex and multi-faceted and suggest that a broad range of factors should be taken into account in an evaluation process. It is claimed that there is a degree of correlation between the effectiveness of ICT and the extent of ICT being used to conduct value chain activities (Fuchs et al., 2010; Scholochow et al., 2010; Wu et al., 2003; Zhu & Kraemer, 2005). Rogers (2003) suggests that the major characteristics of an innovation in organisations could be evaluated in five categories: 1. relative advantage; 2. compatibility; 3. complexity; 4. observability; 5. trialability. Zhu and Kraemer (2005, p.67) then use Rogers' Innovation Diffusion Theory as a key basis to measure eBusiness usage which is defined as "the extent to which eBusiness is being used to conduct value chain activities" including those in the frontend (selling) and in the backend (procurement). In addition, Tornatzky and Fleischer (1990) believe that organisational usage of a technological innovation may be influenced by three aspects: Technological context; Organisational context, and Environmental context, the so-called TOE framework. Zhu et al. (2006) and many scholars such as Grandon and Pearson (2004) have integrated this TOE framework into the measurement of ICT usage as supplements for their research. It is claimed that the TOE framework, to some extent, supports and strengthens the Innovation Diffusion Theory especially in the perspectives of technological and or organizational circumstances of a potential ICT adopter and its industry (Zhu et al. 2006). Thus, through monitoring the effective usage of ICT adoption, ICT value could be realised (Fichman & Kemerer, 1997; Zhu & Kraemer, 2005).

## 4 Methods

A range of performance indicators, which reflect variation in service quality and illustrate the gaps between expected and actual performance, could be used to monitor the quality of the use of ICT technologies (Parmenter, 2010; Sirirak, Islam, & Khang, 2011). Performance indicators which could be qualitative or quantitative ensure variable performances within acceptable limits and help managers to maintain a high level of satisfaction among the clients who receive the services (Scholtes, 1998). The performance-related indicators may also help managers, such as meeting and event venue operators, to plot adaptive and innovative strategies (Espejo, Bowling, & Hoverstadt, 2003). Therefore, considering the above previous research results and the characteristics of RDS, a list of potential Key Performance Indicators (KPIs) for determining the economic value and effectiveness of RDS was drafted as shown in Table 1. An expert panel was recruited to validate and to provide feedback to this KPIs list which is mainly grounded in Innovation Diffusion Theory, the TOE framework and the eBusiness impact model through the use of modified Delphi technique.

In order to ensure that the members of the expert panel have sufficient knowledge and experience of RDS, three criteria were used to select potential panellists: 1. the key persons who are in charge of the investment decision of RDS in meeting and event venues (i.e. hotels or convention centres); 2. educators in higher education institutes

who include RDS in their teaching courses; 3. industrial consultants recognised by RDS industry. The research received assistance from a leading RDS service supplier, MeetingMatrix (www.meetingmatrix.com), to provide a list of contacts from its database based on the three criteria.

In the first round of this modified Delphi research, the potential KPIs list was distributed to 33 panellists through an electronic survey. A five-point Likert scale (1: Strongly Disagree; 2: Disagree; 3: Neutral; 4: Agree; 5: Strongly Agree) was used to detect how strongly the experts agreed or disagreed with the KPIs that should be included in an evaluation framework to monitor the effectiveness of the RDS in value creation processes at meeting/event venues. Each member of the Delphi expert panel then answered the questionnaire individually. After the first round, an anonymised summary of the experts' views from the previous round was provided. In this way, experts could refer to their earlier answers and consider revision in the light of the replies of other members of this expert panel (Keeney, Hasson, & McKenna, 2011). It was hoped that a degree of consensus could be reached through this process. In addition, the experts were also asked to provide their comments or if there were any amendments/additions that they would like to make to the framework and the KPIs.

The aim of the second round survey was to attempt to refine and revalidate the list of KPIs tested and generated from the previous round. The KPIs in the second round of this research were carefully revised based on the comments and suggestions from the previous round of the expert panel.

## 5 Results

In the first round of this modified Delphi research, some of the contacts had asked to be removed from the "expert" panel as they did not feel qualified to answer the survey after reviewing the questions.

**Table 1.** A Hierarchical Structure of the Proposed Key Performance Indicators

| Category | Factor Tier | Key Performance Indicator |
|---|---|---|
| *Category One: Room Diagramming Solutions Value* | **Factor Tier A_ Impact on Sales** | A1_Increased number of new clients (i.e. meeting/event planners who use the venue for the first time because of the availability of Internet room diagramming solutions) |
| | | A2_Booking rate at the meeting/event venue |
| | | A3_Regional market share (i.e. within a city) |
| | | A4_Sales per labour hour |
| | **Factor Tier B_ Impact on Efficiency** | B1_Costs of internal processes and labour costs |
| | | B2_Total labour working hours for making meeting and event spaces set up ready |
| | | B3_Costs of coordinating business partners (i.e. meeting/event planners or decoration service suppliers) |
| | | B4_Marketing costs (i.e. conducting marketing campaigns for the promotion of meeting/event room spaces) |

| Category | Factor Tier | Key Performance Indicator |
|---|---|---|
| | **Factor Tier C_ Impact on Business Partner Relationships** | C1_Interactive service quality with meeting/event service suppliers (e.g. catering or decoration service suppliers) |
| | | C2_Interactive service quality with meeting/event planners (e.g. wedding or exhibition planners) |
| | **Factor Tier D_ Impact on Customer Satisfaction** | D1_Satisfaction level of meeting/event guests directly attributable to functionality of meeting/event room's set up |
| | | D2_Interactive service quality with meeting/event guests (e.g. with accessibility of meeting/event room's set up and utilization of space) |
| | | D3_Satisfaction of meeting/event planners |
| *Category Two: Room Diagramming Solution Innovation Diffusion Characteristics* | **Factor Tier E_ Compatibility: the degree to which an innovation is consistent with existing business processes, practice and value systems** | E1_RDS products and services are compatible with the meeting/event venues' current selling processes (i.e. catering program) |
| | | E2_RDS products and services are compatible with the existing distribution channels (i.e. the venues' websites) |
| | | E3_Adopting RDS products and services is compatible with the meeting/event venues' corporate innovation culture and value systems |
| | **Factor Tier F_ Complexity: the degree to which an innovation is difficult to use** | F1_Cost of integrating RDS products and services to the venues' sales (including hardware, measuring the rooms, creating scaled diagrams, software, training, organisational restructuring and business process reengineering) |
| | | F2_Training hours to the operators in the meeting/event venues for the application of RDS products and services |
| | | F3_The degree to which RDS products and services are complex and difficult to use in the perceptions of meeting/event venue staff |
| | | F4_The degree to which RDS products and services are complex and difficult to use in the perceptions of meeting/event planners |
| *Category Two: Room Diagramming Solution Innovation Diffusion Characteristics (continued)* | **Factor Tier G_ Observability: the degree to which the results of an innovation are visible to others** | G1_The degree to which the meeting/event planners perceive RDS products and services in the targeted venues' websites as visible and easy to find (i.e. how many transferring web pages needed from the venue's web front page to the page hosting RDS products and services) |
| | **Factor Tier H_ Trialability: the degree to which an innovation may be experimented with** | H1_The degree to which the meeting/event planners perceive RDS products and services in the targeted venues' websites as easy to experiment with and try (i.e. what waiting time is needed to install or log into the trial version of RDS products and services from the hosting downloadable page) |

| Category | Factor Tier | Key Performance Indicator |
|---|---|---|
| *Category Three: Information and Communication Technologies Usage* | **Factor Tier I_ Technology Competence: the existing technologies in use and relevant technical skills available in the organisation** | I1_ICT Infrastructure: the strength of existing ICT infrastructure, as measured by related technologies that the meeting/event venue has in place, including electronic data interchange(EDI), intranet, extranet, local area network (LAN), wide area network (WAN) |
| | | I2_ICT Skills: the extent to which the majority of the employees in the meeting/event venue are capable of using the following applications-web browser, intranet, online Request for Proposal (RFP) processing and the existence of in-house IT department or support |
| | | I3_Skill Development: the extent to which the meeting/event venue has implemented the following in order to help employees develop eBusiness skills such as (a) in-house training; (b) participation in ICT training such as courses and seminars run by third parties; (c) designating certain work time for ICT learning/training; (d) establishing self-learning or e-learning programs; (e) recruiting staff with special ICT skills |
| | **Factor Tier J_ Organisational Context: internal measures of the organisation** | J1_Organisation Size: number of employees in the meeting/event venue |
| | | J2_Financial Commitment: ICT operating, software and space measurement budget, as percentage of total revenue |
| | | J3_Organisational Scope: amount and size of diagramable spaces in the venue |
| | | J4_International Scope: the extent of conducting business in international markets (i.e. the extent to which clients come from different countries) |
| | **Factor Tier K_ External Environmental Context: the external arena in which a company conducts its business** | K1_Perceived Competitive Pressure: percentage of competitors in the city of the meeting/event venue that have adopted ICT room diagramming solutions and the predicted ICT room diagramming solutions forthcoming investments of important competitors |
| | | K2_Perceived Stakeholder and Social Pressure: the extent to which downstream customers (meeting/event planners) expect ICT room diagramming solutions to be used and have eBusiness systems ready to support the services |

As a result, 18 (54.5%) contacts effectively responded to the survey. They were classified into three categories: Venue (9), Academic (6) and Consultant (3) for further comparative analyses. From the result of this initial round survey, “Satisfaction of meeting/event planners”, “Interactive service quality with meeting/event service suppliers” and “Interactive service quality with meeting/event planners” were rated by the 18 panellists as the top three KPIs among the 30 candidate KPIs when evaluating the economic value and effectiveness of RDS products and services for venue operators, as can be seen from Table 2. The factor tier of the impact on business partner relationships within the category of the RDS value

in particular was rated as being most essential when monitoring the economic value and effectiveness of RDS, a specific ICT application at meeting/event venues. There were two factor tiers which were also rated highly: the factor tier of compatibility (the degree to which an innovation is consistent with existing business processes, practice and value systems) and the factor tier of the impact on customer satisfaction. However, the factor tier of the external environmental context (the external arena in which a company conducts its business) was rated as being the least important.
RDS was identified as typically assisting in the generation of digital graphic room layouts for both the meeting and event venue operators and their clients, meeting and event planners. The findings confirm with previous literature, where RDS was regarded as an important communication platform for business partners (Bowdin et al., 2010; Silvers, 2012). The findings also suggest that the compatibility of RDS with the existing business processes, systems (e.g. sales and catering systems) and culture is a critical factor for detecting the effectiveness of RDS usage. This result is close to that discussed in contemporary ICT adoption research. Furthermore, on average there are no proposed KPIs below the mid-point of the set Likert scale (3: Neutral), which suggests that the adoption of the Innovation Diffusion Theory, the Technological-Organisational-Environmental framework and the eBusiness impact model was a helpful starting point when developing an evaluation framework for determining the economic value and effectiveness of the specific ICT application, RDS.
In the first round survey results, reliability analysis (Cronbach's Alpha) was 0.85 suggesting the internal consistency was high (Hair, Anderson, Tatham, & Black, 1998). Over fifty comments and feedback items for the drafted indicators were received. The majority of these suggestions, nevertheless, focus on clarifications of the wording and practical phases used in the industry when defining the indicators. Therefore, only one additional KPI was suggested to add to the framework. In order to confirm a correct set of these identified proposed indicators, it was necessary to revalidate the proposed indicators which had been carefully revised based on the suggestions from the previous round of the Delphi panel.

In the second round survey, an anonymous summary table of the first round findings, including the average score of importance, the standard deviation and cumulative percentage for each indicator, was presented to the panel members (Keeney, Hasson, & McKenna, 2011). The cumulative percentage reveals that the degree of consensus on the KPI has been reached (i.e. 70% indicates that 70% of the members of the Delphi panel voted either 'Agree' or 'Strongly Agree').

**Table 2.** A Comparison of Second and First Round Delphi Survey Results

| Key Performance Indicator | Round Two Importance Rating N= 11 (Delphi Panel Size) | | | | Round One Importance Rating N= 18 (Delphi Panel Size) | | | |
|---|---|---|---|---|---|---|---|---|
| | *Mean* | *SD* | *CP* | *R* | *Mean* | *SD* | *CP* | *R* |
| C2_Interactive service quality with event planners | 4.73 | 0.47 | 100.0% | 1 | 4.44 | 0.71 | 88.9% | 3 |
| D3_Satisfaction of meeting/event planners | 4.64 | 0.67 | 90.9% | 2 | 4.67 | 0.59 | 94.4% | 1 |
| C1_Interactive service quality with event service suppliers | 4.36 | 0.67 | 91.0% | 3 | 4.44 | 0.71 | 88.9% | 2 |
| B2_Total labour working hours | 4.18 | 1.08 | 72.7% | 4 | 3.89 | 1.41 | 66.7% | 9 |
| D2_Interactive service quality with event guests | 4.18 | 0.75 | 81.9% | 5 | 3.78 | 0.94 | 55.6% | 12 |
| I2_ICT Skills | 4.18 | 0.41 | 100.0% | 6 | 3.89 | 0.96 | 72.2% | 10 |
| B1_Costs of internal processes and labour costs | 4.00 | 1.00 | 72.8% | 7 | 3.72 | 1.27 | 61.1% | 15 |
| B3_Costs of coordinating business partners | 4.00 | 0.89 | 81.8% | 8 | 3.44 | 1.10 | 66.7% | 21 |
| D1_Satisfaction level of meeting/event guests | 4.00 | 0.89 | 63.7% | 9 | 4 | 0.97 | 66.7% | 7 |
| E2_RDS products and services are compatible with the existing distribution channels | 4.00 | 0.89 | 63.7% | 10 | 3.78 | 0.81 | 66.7% | 13 |
| E3_Adopting RDS products and services is compatible with the meeting/event venues' corporate innovation culture and value systems | 4.00 | 1.00 | 72.8% | 11 | 4.11 | 0.76 | 77.7% | 5 |
| I1_ICT Infrastructure | 4.00 | 0.78 | 72.8% | 12 | 3.83 | 0.92 | 72.2% | 11 |
| A2_Booking rate at the meeting/event venue | 3.91 | 0.70 | 72.2% | 13 | 3.89 | 1.23 | 72.2% | 8 |
| E1_RDS products and services are compatible with the event venues' current selling processes | 3.91 | 0.54 | 81.8% | 14 | 4.11 | 1.02 | 77.7% | 4 |
| A4_Sales per labour hour | 3.73 | 0.91 | 63.7% | 15 | 3.33 | 1.24 | 50.0% | 27 |
| I3_Skill Development | 3.73 | 1.10 | 63.7% | 16 | 4.11 | 0.68 | 83.4% | 6 |
| J3_Organisational Scope: amount and size of diagramable spaces in the venue | 3.73 | 0.79 | 72.7% | 17 | 3.56 | 1.20 | 50.0% | 19 |
| B4_Marketing costs | 3.55 | 1.04 | 54.6% | 18 | 3.44 | 0.92 | 44.4% | 22 |

| Key Performance Indicator | Round Two Importance Rating | | | | Round One Importance Rating | | | |
|---|---|---|---|---|---|---|---|---|
| G1_Observability | 3.55 | 1.04 | 54.6% | 19 | 3.39 | 1.15 | 38.9% | 25 |
| K1_Perceived Competitive Pressure | 3.55 | 1.04 | 54.6% | 20 | 3.33 | 1.24 | 50.0% | 29 |
| K2_Perceived Stakeholder and Social Pressure | 3.55 | 0.69 | 63.6% | 21 | 3.33 | 1.09 | 50.0% | 30 |
| A1_Increased number of new clients | 3.45 | 1.21 | 54.6% | 22 | 3.5 | 1.10 | 55.6% | 20 |
| J1_Organisation Size | 3.45 | 0.82 | 45.5% | 23 | 3.33 | 1.19 | 38.9% | 28 |
| A3_Regional market share | 3.36 | 0.51 | 36.4% | 24 | 3.33 | 0.97 | 50.0% | 26 |
| H1_Trialability | 3.36 | 0.92 | 63.6% | 25 | 3.61 | 0.98 | 50.0% | 17 |
| J2_Financial Commitment | 3.36 | 0.81 | 54.5% | 26 | 3.78 | 1.06 | 66.7% | 14 |
| J4_International Scope | 3.36 | 1.03 | 36.4% | 27 | - | - | - | - |
| F1_Cost of integrating RDS products and services to the venues' sales | 3.18 | 0.98 | 36.4% | 28 | 3.72 | 0.96 | 50.0% | 16 |
| F2_Training hours to the operators in the meeting/event venues for the application of RDS products and services | 3.18 | 1.17 | 36.4% | 29 | 3.56 | 1.20 | 44.4% | 18 |
| F3_The degree to which RDS products and services are complex and difficult to use in the perceptions of meeting/event venue staff | 3.09 | 1.14 | 45.5% | 30 | 3.44 | 1.10 | 38.9% | 23 |
| F4_The degree to which RDS products and services are complex and difficult to use in the perceptions of meeting/event planners | 2.82 | 1.47 | 27.3% | 31 | 3.39 | 1.29 | 50.0% | 24 |

*SD=Stand Deviation; CP= Cumulative Percentage; R= Ranking*

In addition, the individual result for each indicator from the previous round was also embedded along with the research questions of the second round electronic questionnaire for the Delphi panellists' reference when revalidating these revised indicators. The previous round results had also been supplied with instructions that the Delphi panellists may consider taking these findings into account in their revalidated responses or ignore them (Keeney, Hasson, & McKenna, 2011). The results of the second round Delphi survey, which can be seen in Table 2, reconfirm and strengthen the findings from the first round. The improved standard deviations and decreased number of comments for the majority of the indicators suggest that the Delphi panellists tended to reach a level of consensus on the proposed revised KPIs which could be used in the evaluation of RDS effectiveness. In the two surveys, the three categorised panellists (Venue; Academic; Consultant) show slightly different preferences in their priorities for these proposed KPIs. However, in terms of the top

three rated KPIs, there was a common focus on the “Interactive service quality with meeting/event planners”, “Satisfaction of meeting/event planners” and “Interactive service quality with meeting/event service suppliers” in both rounds.

## 6 Conclusions and Outlook

To summarise, through a two-round modified Delphi study this paper has presented the validated and prioritised hierarchical portfolio of evaluation factors for meeting and event venue operators’ potential use in monitoring the economic value and effectiveness of RDS. Although the research findings, which stem from the opinions of a group of the users, investment decision makers and stakeholders of RDS application, must be viewed as indicative and perception-based (Babbie, 1995; O’Connor & Frew, 2004), a practical set of indicators for consideration of the RDS evaluation process has been provided for further development and exploration. Furthermore, the adapted Innovation Diffusion Theory, the Technological-Organisational-Environmental framework and the eBusiness impact model appear to be highly useful as the starting point of the development of an ICT application evaluation framework in hospitality sector, which echoes Fuchs et al.’s research (2009). A promising further approach, the Analytical Hierarchy Process (AHP) will be used on the validated indicator framework generated from this research (Khorramshahgol & Moustakis, 1988). The results of this Delphi study could help on the selecting process of the factors used in the future AHP research. Through the use of pairwise comparison technique of AHP, not only the priorities of the indicators in this Delphi study could be validated and compared, but the indicators could also be given weightings within the framework for the construction of a potential index system. By taking the advanced research results, RDS service providers could develop and provide a practical framework and products to its venue clients for monitoring the sustainable economic value and effectiveness of RDS in use (Chang & Yu, 2001; Hsieh, Chin, & Wu, 2006).

Additionally, research methods such as focus groups may be employed for revalidation of the proposed indicators in this paper and further cross validation of the results, which concern the economic value and effectiveness and based purely on subjective data may benefit from work with additional objective data. (Sigala, Airey, Jones, & Lockwood, 2004).

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# Examining Perceptions of the Importance of Travel Websites' Value-Added Services: Age, Gender, and Travel Motivations

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## Abstract

Travel motivations have been regarded as essential in understanding customer behaviour in travel and tourism. As the importance of Internet has grown in tourism marketing, it is important to understand customers' online behaviour. This study aims to examine the little researched field in connecting travel motivations to online behaviour. Quantitative data is collected on three Finnish rural tourism websites during summer 2011. In the examination of tourists' perceptions of the importance of value-added services on travel websites it is found that age, gender, and travel motivations have an effect on which value-added services people regard as important. Theoretical and managerial contributions of the study are discussed.

**Keywords:** value-added services, travel motivations, Internet, website design

## 1 Introduction

Travel websites are an important part of their Internet marketing strategy for many tourism companies. Websites are a key part of Internet marketing in creating and maintaining an online presence (Chaffey et al. 2006) and an effective website delivers relevance and experiences to its audience. According to Turban and Gehrke (2000), the success of electronic commerce, especially for less well-known companies, is largely dependent on the appropriate design of its website. Chaffey et al. (2006) quote Alison Lancaster, head of marketing and catalogues at John Lewis Direct, when stating that a good website should begin with the user and understanding the customer and how they use the channel to shop. Analysing the needs of the website audience helps to answer such questions as (Chaffey et al. 2006, pp. 312):

- Who are the key audience for the site?
- Why should they use the site (what will appeal to them)?
- What should the content of the site be and which services will be provided?
- What are the main marketing outcomes the site should deliver (registrations, leads, sales)?

This analysis can be conducted by using different marketing research techniques. In tourism marketing research travel motivations have been regarded as one of the main explanations for travel behaviour. According to Pearce and Caltabiano (1983), travel motivations are the widely accepted as the significant push factors for travel behaviour. Travel motivations have been used especially to segment tourists in several earlier studies (e.g. Park & Yoon, 2009; Boksberger & Laesser, 2009).

L. Cantoni and Z. Xiang (eds.), *Information and Communication Technologies in Tourism 2013*, DOI: 10.1007/978-3-642-36309-2_30,

Tourism has been adapted as a growth tool in many rural areas (Park & Yoon, 2009). Modern market mechanisms are dominated by communication and promotion strategies and techniques, also in rural tourism (Park & Yoon, 2009). Value-added services on travel websites add value to the process of searching for and purchasing tourism products on the Internet. Earlier research suggests that providing value-added services at travel websites increases their competitiveness in different parts of the search and purchase process (Lexhagen, 2005).

Despite the importance of website design and usefulness in understanding travel motivations, these two topics are very rarely discussed together in the academic literature. In this study the effects of travel motivations on the tourists' perceptions of the importance of travel websites' value-added services are examined. The results will help rural tourism companies in their efforts to design and target their websites for tourists motivated by different push factors.

This study is structured into four parts after the introductions. In the first part the major principles of segmentation theory and earlier studies, and also the three research questions are presented. In the next part data and research methods are introduced. In the third part of the study, the segmentation results and a comparison of segments are presented. Finally, the results and limitations of this study are discussed and ideas for future research proposed.

## 2 Background of the study

Earlier research has shown that travel motivations seem to explain many choices tourists make before and during their holidays. In the market segmentation literature in particular travel motivations have often been used. For example, Park and Yoon (2009) found four segments of rural tourists based on motivation factors of Relaxation, Socialization, Learning, Family Togetherness, Novelty, and Excitement. Boksberger and Laesser (2009) segmented the senior travel market by means of travel motivations using 25 different motivation statements measured on a 4-point Likert scale. Bieger and Laesser (2002) clustered the Swiss travel market into four motivation-based segments (Compulsory Travel, Cultural Hedonism, Family Travel and Me(e/a)t Marketing) using 10 distinct motivation factors. Beh & Bruyere (2007) found three visitor segments in three Kenyan national reserves based on motivations factors of Escape, Culture, Personal Growth, Mega-fauna, Adventure, Learning, Nature, and General Viewing. Pesonen (2012) found four motivation-based rural tourism segments in Finland: Social Travellers, Wellbeing Travellers, Home Region Travellers, and Family Travellers. As can be seen from these studies, travel motivations have an irrefutable connection to tourist behaviour. People motivated by different motivations differ from each other in many ways.

The examples above also demonstrate the wide variety of travel motivations used in the tourism literature. Most of these are mainly or partly based on the Leisure Motivation Scale (Beard & Ragheb, 1980, 1983) and its application to tourism (Ryan & Glendon, 1998). Based on 14 items, Ryan and Glendon (1998) found four components of travel motivations: Relaxation, Social, Intellectual, and Mastery. Pearce and Lee (2005) found that a core of travel motivation factors including escape, relaxation, relationship enhancement, and self-development seem to comprise the

central backbone of motivation for all travellers. However, despite extensive research on the topic, there is no best way or items to measure travel motivations. Countless numbers of different motivation items have been used in the tourism literature, varying from one study to another. Some authors have divided travel motivations into two categories, namely push and pull motivations. According to Baloglu and Uysal (1996) push motivation pushes people to make a travel decision and then destinations attract people with pull motivations. Dann (1981) also states that tourists are pushed by their own needs and pulled by the destination itself. Most studies measure travel motivations using a Likert scale, making them susceptible to response style effects (Dolnicar & Grün, 2007).

Bieger and Laesser (2002) used lifecycle theory to introduce depth into travel motivation segmentation. According to lifecycle theory, as people get older and as their needs and social roles change, so too does their travel motivation change over time (Horna, 1994). For example, young people without children are hardly motivated to spend time with children during their holiday. As lifecycle affects travel motivations it is also important to understand age as an underlying factor when examining the effects of travel motivations.

However, research on the connections between travel motivation and ICT usage and/or eTourism is not common. For example, in studies profiling motivation based segments the Internet is rarely included or examined at all, despite the importance of electronic channels in tourism marketing. It is not enough just to segment and profile tourists. Gommans et al. (2001) argue that a website has to be designed for a targeted customer segment, and, according to Chaffey et al. (2006) the information usage behaviour of each segment needs to be known, especially in order to be able to create value for the customers in the Internet.

Website design in travel and tourism has been studied in numerous scientific papers. Well-designed websites provide tourism companies with an inexpensive and effective platform for marketing and advertising, thus increasing their competitive advantage in the marketplace (Parets, 2002). Effective website design engages and attracts online consumers (Cyr & Bonanni, 2005). According to Garrett (2003), there are six classifications for user experience in website design: visual design, information architecture, information design, navigation design, content and interaction design. According to Huizingh (2000) there are two components in website design. *Content* refers to the information, features, or services that are offered in a website and *design* refers to the way the content is made available to the users of a website.

In this study the focus is on website content, especially value-added services. There are several studies that examine value-added services in the tourism industry (see e.g. Lexhagen, 2005). Value-added services provide information, applications for communication and other kinds of support that make it easier for a customer to search for, make decisions about, and buy tourism products (Lexhagen, 2005).

Lexhagen (2005) lists altogether 18 value-added services in her study: address, telephone/fax, e-mail address, multimedia, search engine, FAQ (Frequently Asked Questions), availability in different languages, links to other sites, community (such as a forum), map, decision support (such as currency converters and different types of automatic agents), price comparison, personalization, push-based services (sending

information on request, for example e-mail, SMS, printed information etc.), mobile access, SMS services, booking form, and on-line booking.

Earlier studies have not been interested in a potential connection between travel motivations and tourists' perceptions of the importance of travel website attributes, not to mention value-added services. There has, however, been research on the effects of socio-demographics on importance of website attributes. For example, Turban and Gherke (2000) found that men and women differ from each other regarding certain website design elements. Women, for example, seem to consistently feel that certain issues are significantly more important than do men. They also reported that age affects the opinions of website attributes. Younger participants in their study valued determinants such as browser compatibility and security more than others. Cyr and Bonanni (2005) likewise found significant differences between genders regarding perceptions of website design and website satisfaction.

The connection between travel motivations and value-added website attributes has not been studied before. Thus, based on the literature review, the goal of this study is to examine if there are differences between travel motivations, age and gender regarding perceptions of value-added services on travel. For managers this study provides important information on which value-added services on travel websites are important for potential rural tourists. Theoretically this study contributes to travel motivations as an explanation for customer behaviour and website design and enhances the understanding of value-added services regarding age and gender.

Based on the literature review this study poses three research questions. Research questions are formulated as follows:

1) What are the differences between men and women regarding the perceptions of importance of value-added services on travel websites?

2) What are the differences between different age groups regarding the perceptions of importance of value-added services on travel websites?

3) What is the connection between travel motivations and perception of importance of value-added services on travel websites?

## 3 Data and Methods

To answer these research questions quantitative data on potential Finnish rural tourists was collected. A banner advertisement for the questionnaire was placed on three different Finnish tourism web sites. Data was collected during a six-month period, from 4 March to 3 August 2011. The banner advertisements were clicked altogether 3,684 times, resulting in 2,131 responses. After deleting empty responses and duplicated responses from the same user altogether 1,967 usable questionnaires were obtained.

To measure travel motivations a list of ten items from a study by Bieger and Laesser (2002) was used. To avoid response style effects caused by Likert scales (Dolnicar & Grün, 2007) respondents were asked to select up to three most important travel motivations for them. These ten statements are general travel motivations found in many other tourism studies (abbreviations in parentheses):

- Participating in nightlife (nightlife)
- Enjoying comfort, spoiling myself (comfort)
- Taking and having time for my partner (partner)
- Taking and having time for my family (family)
- Enjoying landscape and nature (nature)
- Broadening my mind, enjoying sightseeing (culture)
- Being able to make flexible and spontaneous decisions (liberty)
- Doing something for my looks and well-being (body)
- Sports activities (sports)
- Enjoying the sun and water (sun)

To measure the importance of the value-added services of a travel website, a list of 17 items adapted from Lexhagen's (2005) study was used. One item, languages, was omitted because for managerial reasons this study was conducted among Finnish customers only. Respondents were asked to rate the importance of different value-added services on a travel website using a 7-point Likert scale (1=Not at all important, 7= Extremely important) A complete list of the value-added services used in this study can be found in Table 1.

Data analysis is done in three parts. First, the respondents' socio-demographic profiles are examined. Second, importance of value-added services for men and for women is compared. Third, the importance of value-added services for different age groups is examined. In the final part of the analysis the connection between value-added website services and travel motivations is examined using ANOVA. Respondents who rated a motivation as one of the three most important motivations to travel are compared to those who did not choose that motivation. As one respondent can belong to several motivation groups, it is not feasible to compare motivations against each other. Those website users who rated the motivation among three most important motivations are compared to those who did not.

# 4 Results

## 4.1 Sample profile and largest age/gender groups

In total 1,967 respondents are included in the sample for this article. Of the responses 1,776 came from the site www.lomarengas.fi, 150 from www.savonlinna.travel and 41 from www.tahko.com. Of the respondents 26 percent were men and 24 percent of all respondents were between 40-49 years of age. The rest of the sample was distributed as follows: 5 percent under 20 years of age, 23 percent 20-29 years of age, 23 percent 30-39 years of age, 16 50-59 years of age and 8 percent over 59 years of age. The three largest age/gender groups were 40 to 49 year-old women (19%), 20 to 29 year-old women (19%), and 30 to 39 year-old women (17%).

### 4.2 Gender and importance of value-added services

Table 1 describes the differences between men and women regarding their opinions of the importance of value-added services on a travel website. As can be seen from Table 1, there are several statistical differences between men and women. Women seem to rate several different services, including FAQ, links to other websites, map, booking and contact information more important than men. Men on the other hand regard mobile access as a significantly more important attribute than women.

**Table 1.** Gender differences in importance of value-added services on a travel website

| | Men | Women |
|---|---|---|
| Address | 6.12 | **6.53** |
| Telephone/fax | 6.13 | **6.56** |
| E-mail | 5.23 | **5.49** |
| Search engine | 5.23 | **5.49** |
| Multimedia | 4.04 | 3.93 |
| FAQ | 4.98 | **5.21** |
| Links | 4.61 | **4.86** |
| Community | 3.79 | 3.73 |
| Map | 5.87 | **6.07** |
| User reviews | 4.92 | 4.96 |
| Price comparison | 5.48 | 5.51 |
| Personalization | 5.04 | **5.21** |
| Push-based services | 4.09 | 4.01 |
| Mobile access | **3.84** | 3.56 |
| SMS confirmation | 4.58 | 4.61 |
| Booking form | 5.62 | **6.01** |
| On-line booking | 5.84 | **6.11** |

*Bold face denotes higher mean ($p<0.05$)

### 4.3 Age and importance of value-added services

As can be seen from Table 2, there are many differences between age groups regarding the perceptions of the importance of value-added services on a travel website. It seems that young people under 20 do not consider contact information as important as do other age groups. For them, however, multimedia and user reviews are more important than for other age groups. Generally, for all age groups, contact information was the most important value-added service. A search engine seems to be less important for people between 20-29 years of age than for other respondents. A map is more important for older users than for young users, likewise push-based services.

**Table 2.** Age differences in importance of value-added services on a travel website

| | <20 | 20-29 | 30-39 | 40-49 | 50-59 | >59 | F | Sig. |
|---|---|---|---|---|---|---|---|---|
| Address | 6.07 | 6.38 | 6.45 | 6.49 | 6.55 | 6.50 | 3.43 | p=0.004 |
| Telephone/fax | 6.17 | 6.37 | 6.49 | 6.54 | 6.53 | 6.46 | 2.84 | p=0.015 |
| E-mail | 5.87 | 6.24 | 6.37 | 6.33 | 6.36 | 6.40 | 3.18 | p=0.007 |
| Search engine | 5.43 | 5.13 | 5.36 | 5.49 | 5.66 | 5.64 | 4.96 | p<0.001 |
| Multimedia | 4.40 | 3.97 | 3.87 | 4.01 | 4.03 | 3.43 | 3.77 | p=0.002 |
| FAQ | 5.59 | 5.19 | 5.14 | 5.11 | 5.06 | 5.02 | 1.79 | p=0.113 |
| Links | 4.73 | 4.66 | 4.85 | 4.86 | 4.89 | 4.59 | 1.64 | p=0.146 |
| Community | 4.04 | 3.83 | 3.73 | 3.58 | 3.66 | 3.69 | 1.71 | p=0.129 |
| Map | 5.71 | 5.82 | 5.91 | 6.07 | 6.36 | 6.22 | 10.13 | p<0.001 |
| User reviews | 5.24 | 5.08 | 4.98 | 4.80 | 4.90 | 4.76 | 2.85 | p=0.014 |
| Price comparison | 5.65 | 5.41 | 5.44 | 5.50 | 5.55 | 5.65 | 1.10 | p=0.359 |
| Personalization | 5.16 | 5.11 | 5.00 | 5.17 | 5.34 | 5.37 | 2.74 | p=0.180 |
| Push-based services | 3.83 | 3.54 | 3.84 | 4.16 | 4.54 | 4.49 | 14.93 | p<0.001 |
| Mobile access | 3.68 | 3.51 | 3.59 | 3.63 | 3.72 | 3.64 | 0.44 | p=0.820 |
| SMS confirmation | 4.63 | 4.35 | 4.57 | 4.65 | 4.76 | 4.84 | 2.34 | p=0.040 |
| Booking form | 5.90 | 5.96 | 5.94 | 5.93 | 5.83 | 5.74 | 0.89 | p=0.485 |
| On-line booking | 6.08 | 6.08 | 6.10 | 6.07 | 5.96 | 5.92 | 0.67 | p=0.650 |

### 4.4 Travel motivations and importance of value-added services

In Tables 3 and 4 travel motivations and importance of value-added services are compared. According to the results presented in Tables 3 and 4, some travel motivations seem to have a clear connection to perceptions of the importance of value-added services.

**Table 3.** Travel motivations and value-added services on a travel website

| Motivation | Nightlife (N=133) | | Comfort (N=615) | | Partner (N=713) | | Family (N=721) | | Nature (N=1141) | |
|---|---|---|---|---|---|---|---|---|---|---|
| Is the motivation item important for the respondent? | Yes | No | Yes | No | Yes | No | Yes | No | Yes | No |
| Address | 6.29 | 6.43 | 6.47 | 6.40 | **6.49** | 6.39 | **6.49** | 6.38 | **6.52** | 6.29 |
| Telephone/fax | 6.40 | 6.45 | 6.50 | 6.42 | **6.53** | 6.40 | 6.50 | 6.41 | **6.53** | 6.33 |
| E-mail | 6.15 | 6.31 | 6.34 | 6.28 | 6.34 | 6.28 | 6.34 | 6.28 | **6.37** | 6.20 |
| Search engine | 5.45 | 5.42 | 5.52 | 5.38 | 5.50 | **5.38** | 5.48 | 5.39 | 5.46 | 5.38 |
| Multimedia | **4.29** | 3.93 | **4.21** | 3.83 | 3.84 | **4.02** | **4.10** | 3.87 | 3.86 | **4.09** |
| FAQ | **5.41** | 5.12 | **5.33** | 5.05 | 5.11 | 5.17 | 5.19 | 5.12 | 5.11 | 5.19 |
| Links | 4.97 | 4.79 | 4.88 | 4.76 | 4.72 | 4.84 | **4.94** | 4.71 | 4.83 | 4.76 |
| Community | **4.18** | 3.71 | **4.03** | 3.61 | 3.66 | 3.79 | 3.74 | 3.74 | 3.64 | **3.89** |
| Map | 5.80 | **6.04** | 6.06 | 6.01 | 6.07 | 6.00 | 6.04 | 6.01 | **6.14** | 5.85 |
| User reviews | **5.27** | 4.92 | **5.16** | 4.85 | 4.98 | 4.93 | 4.94 | 4.95 | 4.84 | **5.11** |
| Price comparison | 5.67 | 5.49 | **5.62** | 5.45 | 5.49 | 5.51 | 5.57 | 5.46 | 5.48 | 5.54 |
| Personalization | 5.30 | 5.16 | **5.37** | 5.08 | 5.20 | 5.15 | **5.29** | 5.10 | 5.13 | 5.23 |
| Push-based services | 4.16 | 4.03 | 4.27 | 3.93 | 3.93 | **4.10** | **4.15** | 3.97 | 4.00 | 4.08 |
| Mobile access | 3.88 | 3.60 | **3.90** | 3.49 | 3.59 | 3.64 | 3.66 | 3.60 | 3.57 | 3.70 |

| | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| SMS confirmation | 4.74 | 4.59 | **4.75** | 4.53 | 4.53 | 4.64 | 4.66 | 4.56 | 4.57 | 4.63 |
| Booking form | 5.82 | 5.91 | 5.99 | 5.87 | 5.95 | 5.88 | **5.98** | 5.86 | 5.92 | 5.89 |
| On-line booking | 6.12 | 6.04 | 6.12 | 6.01 | 6.10 | 6.01 | 6.05 | 6.04 | 6.07 | 6.00 |

*Bold face denotes higher mean than the other option ($p<0.05$)

**Table 4.** Travel motivations and value-added services on a travel website

| Motivation | Culture (N=713) | | Liberty (N=399) | | Body (N=63) | | Sports (N=138) | | Sun (N=539) | |
|---|---|---|---|---|---|---|---|---|---|---|
| Is the motivation item important for the respondent? | Yes | No | Yes | No | Yes | No | Yes | No | Yes | No |
| Address | **6.49** | 6.39 | 6.50 | 6.40 | 6.43 | 6.42 | 6.33 | 6.43 | 6.38 | 6.44 |
| Telephone/fax | 6.46 | 6.44 | 6.51 | 6.43 | 6.48 | 6.45 | 6.33 | 6.46 | 6.48 | 6.43 |
| E-mail | 6.35 | 6.27 | 6.38 | 6.28 | 6.35 | 6.30 | 6.43 | 6.29 | 6.25 | 6.32 |
| Search engine | 5.33 | **5.49** | 5.46 | 5.42 | 5.35 | 5.43 | 5.43 | 5.43 | 5.48 | 5.41 |
| Multimedia | 3.95 | 3.96 | 3.79 | **4.00** | 3.72 | 3.96 | 3.80 | 3.97 | 4.06 | 3.91 |
| FAQ | 5.10 | 5.17 | 5.18 | 5.13 | 5.29 | 5.14 | 5.27 | 5.13 | 5.19 | 5.12 |
| Links | 4.80 | 4.80 | 4.91 | 4.77 | 4.45 | 4.81 | 4.69 | 4.81 | 4.75 | 4.82 |
| Community | 3.71 | 3.76 | 3.57 | **3.79** | 3.82 | 3.74 | 3.55 | 3.76 | 3.81 | 3.72 |
| Map | **6.17** | 5.94 | 5.96 | 6.04 | 6.13 | 6.02 | 6.04 | 6.02 | 5.89 | **6.08** |
| User reviews | 4.92 | 4.96 | 4.87 | 4.97 | 5.05 | 4.94 | 4.75 | 4.96 | **5.09** | 4.89 |
| Price comparison | 5.49 | 5.51 | 5.55 | 5.49 | 5.60 | 5.50 | 5.57 | 5.50 | 5.56 | 5.48 |
| Personalization | 5.12 | 5.20 | 5.04 | **5.21** | 5.27 | 5.17 | 5.22 | 5.17 | 5.23 | 5.15 |
| Push-based services | 3.90 | **4.12** | 3.85 | **4.09** | 4.02 | 4.04 | 4.01 | 4.04 | 4.11 | 4.01 |
| Mobile access | 3.45 | **3.72** | 3.68 | 3.61 | 3.53 | 3.63 | 3.63 | 3.62 | 3.54 | 3.66 |
| SMS confirmation | 4.53 | 4.64 | 4.74 | 4.56 | 4.85 | 4.59 | 4.54 | 4.60 | 4.60 | 4.60 |
| Booking form | 5.92 | 5.90 | 5.99 | 5.89 | 5.95 | 5.91 | 5.79 | 5.92 | 5.93 | 5.90 |
| On-line booking | 6.09 | 6.02 | 6.15 | 6.01 | 6.15 | 6.04 | 5.96 | 6.05 | 6.06 | 6.03 |

*Bold face denotes higher mean than the other option ($p<0.05$)

From Tables 3 and 4 we can see that people motivated by Nightlife value multimedia content more than do other respondents, likewise FAQ, community, and user reviews. People motivated by Comfort are very similar to those motivated by Nightlife except that they also think that price comparison, personalization, comfort, mobile access and SMS confirmation are more important than for people not motivated by Comfort.

People who want to spend time with their family regard links to other websites as more important than do other respondents, likewise push-based services. Also, a booking form is more important for them than for other respondents. For respondents motivated by Nature, contact information is very important. Culture and nature motivated people regard maps as more important than do other tourists.

There are hardly any statistical differences in importance regarding value-added services among Liberty, Body, Sports, and Sun motivated respondents and those not

regarding those motivations as important. Statistical differences are mostly found in the motivations Nightlife, Comfort, Partner, Family, Nature, and Culture.

## 5 Conclusions, limitations and further research

There seems to be a strong connection between travel motivations and perceptions of the importance of value-added services on travel websites. However, it is still unknown whether this connection is because of what people need (and what motivates them) or because of who they are. This topic needs further research and more complex analysis. Theoretically this study does not prove whether travel motivations directly affect the perceptions of importance of value-added services, but only that a clear and important connection between some travel motivations and value-added services would indeed appear to exist. This contributes to the earlier literature, meaning that travel motivations may have an even larger role in travel decision-making than has been previously assumed. By examining age and gender effects regarding the topic together with travel motivations, it is possible to draw a more precise picture of this connection. This study also confirms the results of Turban and Gherke (2000) and Cyr and Bonanni (2005) in that there seem to be several differences in Internet usage between men and women.

For managers the results are extremely relevant. Especially in terms of website content, many rural tourism companies may benefit from the results, as they help rural tourism companies to develop their websites in a direction that creates value for the users (Chaffey et al. 2006). The results also support the notion that a website has to be designed for a specific market segment or segments (Gommans, 2001).

Generally speaking, women seem to regard value-added services on travel websites as more important than men. This is an interesting result, as most of the respondents in this study are women and women are very keen Internet users in Finland. For example, women use social media more than men (Statistics Finland, 2011). The results also concur with Statistics Finland (2011) in terms of mobile usage, which is more important for men because of wider adoption of mobile technologies. According to the results of this study it seems that women need more detailed information than men to make purchasing decisions. The more female users a website has, the more important it is to develop value-added services.

Age also has an effect on perceptions of different value-added services. Companies targeting younger users should focus on multimedia content such as videos and pictures. User reviews are also useful in pushing young people to purchase online. It is also interesting to note that the older people get, the more interested they are in push-based services. Companies targeting older customers especially should explore how they could utilize push-based services.

Companies offering services connected to Nightlife should have a great deal of multimedia on their websites. Focusing on community and user reviews would also benefit the users. Family destinations on the other hand would do well to provide links to other websites that would interest their users. Providing more information as well as personalization and push-based services would also benefit family destinations. Companies offering these value-added services to their target groups

could gain potential competitive advantage over competitors without these value-added services.

The results also demonstrate the importance of customer research for tourism companies. It is possible to collect a wide range of information on customers using, for example, click stream analysis and programs such as Google Analytics, but it is very difficult to get information on why customers behave the way they do without market research. Understanding travel motivations, for example, seems to provide tourism companies ways to improve their website design and focus on the value-added services that benefit their customers most.

Several motivations, such as Liberty, Body and Sports, have almost no connection to push-based services whereas some, such as Nightlife, Comfort and Family have a decisive effect on the importance of push-based services. Future studies could examine why some motivation items are connected to push-based services and Internet use whereas others are not. The motivations items used in this study are primarily push-motivations (Baloglu & Uysal, 1996) but similar study could also be conducted using pull-motivations. More detailed data analysis is also required. Clustering of users to motivation segments could provide additional information on the topic.

There are some limitations to this study. A self-selecting data collection method was utilized which may be a reason why there are more women respondents than men. Based on an interview with marketing manager of Lomarengas there are indeed more women visitors to their website than men, but not quite so markedly as in this study. Lomarengas.fi is the largest Finnish rural tourism website and most tourists seeking information about rural holidays in Finland will at some point of their information search process visit the website.

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## 7 Acknowledgements

This study was funded by the Council of South Savo / the European Regional Development Fund (ERDF) Operational Programme for Eastern Finland.

# Online Motor Magazines: an Opportunity for eTourism?

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## Abstract

In this paper, digital hybridization of motor magazines is studied, displaying how they are using online presence to extend their reach and widen their business. Thanks to a grid, designed to cluster all content- and functionality-types offered online by 40 motor magazines, a picture of their current use of the Internet is been offered and discussed. Online motor magazines gain elements that are not affordable on paper, while they lose other elements. But this process is not just a matter of adding or removing contents and features, rather, it requires a re-consideration of communication itself. Since many online motor magazines deal with tourism destinations, new opportunities are emerging for them, in terms of co-branding, new business models, and new ways to listen to their readers, have an actual dialogue with them, shape the offer, and get benefit of the Internet as a means of collective production of knowledge.

**Keywords:** online motor magazines, magazines' business model, co-branding, eTourism, collective intelligence.

## 1 Introduction

Magazines are the most successful media format ever to have existed. They are so ubiquitous and their consumption so engrained in habit that their importance almost ceases to register and is thus overlooked. Since the birth of the Internet, a process of digital hybridization has involved magazines – as well as newspapers, radio, television, and other "old" media. When going online, magazines get many elements that are not affordable on paper, while at the same time losing other elements. But this process is not just a matter of adding or removing features, rather, it requires a deep re-consideration of communication itself. Although information on the web tends to take a "liquid" form (Bauman, 2007), there is still a need for editorial formats, such as online magazines, containing a selection of articles about a specific issue. Even though magazine websites have been regarded for a long time as electronic supplements and seen by most publishers primarily as a means to protect their franchises and build circulation for their printed editions, they are evolving into something quite different. In fact, Internet publications have acquired a journalistic status at least equivalent to that of other conventional media, such as the press, the radio and the television (Palacios and Diaz Noci, 2007). According to the Annual Report on American Journalism (stateofthemedia.org), in 2011, most sectors of the news media managed to stop the audience losses they suffered earlier, though for some the gain was minimal. News websites saw the greatest growth, while print audiences stood out for their continued decline, which nearly matched the previous year's 5% drop (PEJ, 2012). In fact, communication companies consider Internet as a strategic factor for their future (Angwin and Hallinan, 2005). More significant than the increase in the number of digital publications is their qualitative consolidation on the media market (Cornella, 2002; Aguado, 2004). Online magazines' business model

L. Cantoni and Z. Xiang (eds.), *Information and Communication Technologies in Tourism 2013*, DOI: 10.1007/978-3-642-36309-2_31,

relies on (a) selling magazine issues and subscriptions to the readers, (b) selling contextualized advertising spaces to the related companies, and (c) other kinds of sponsorship from the tourism industry. If many on-line travel magazines adopt a business model based on contextualized advertising banners, some other ones adopt a new business model, based on built-in booking engines (Lizzi et al., 2011). In fact, some on-line magazines offer to the readers an archive of articles covering a large range of topics and destinations and leave free to choose his preferred path, to compare possibilities and prices, to discover unexpected content and travel suggestions adopting sort of serendipitous approach (Spagnolo et al., 2010), and finally buy a service or product. As the reader is free to choose between a large number of suggestions, even drawing a trip solution based on his own preferences, that new business model could work as a basis for a new ethical model in travel journalism.

## 2 Literature Review

As much of the existing empirical research on journalism focuses largely on hard-news journalism, there is still need for vertical analysis concerning niche areas and soft-news areas of lifestyle and entertainment journalism. In this paper, the digital hybridization of motor magazines is studied, in order to give a contribution in an under-researched field. Since many online motor magazines deal with tourism destinations, new opportunities are emerging for them, in terms of co-branding, and new business models. This research aims to investigate how co-branding between motor magazines and eTourism works. The term “co-branding” is relatively new to the business vocabulary and is used to encompass a wide range of marketing activities involving the use of two or more brands (Blackett, T., Boad B., 2000). Co-branding, or “brand partnership” is an alliance between two companies which aim to work together and create a marketing synergy. It is an arrangement that associates a single product or service with more than one brand name, or otherwise associates a product with someone other than the principal producer. The typical co-branding agreement involves two or more companies acting in cooperation to associate any of various logos, color schemes, or brand identifiers to a specific product that is contractually designated for this purpose. The object for this is to combine the strength of two brands, in order to increase the premium consumers are willing to pay, make the product or service more resistant to copying by private label manufacturers, or to combine the different perceived properties associated with these brands with a single product. Ultimately, co-branding is a strategy built upon a sharing of brand equity; two partners each contributing some aspect of their brand (permissions, expertise, distribution, status, etc.) to create an offering that neither could develop as effectively on their own (Paisner J., 2005). The tourism field is being strongly affected by new media, which give to companies the opportunity of spreading business and communication at low cost in the whole world and the chance to well targeting a world-wide audience, trying to catch the “long tail”. Furthermore, in the tourism industry the web allows small businesses to aggregate and sell affordable and personalized packet solutions. Many online motor magazine deal with tourism issues, and offer new ways to listen to their readers, have an actual dialogue with them, shape the offer and get benefit of the Internet as a means of collective production of knowledge.

## 3 Research Design

This paper focuses on how motor magazines are using their online presence to extend their reach and widen their business. Thanks to a grid, designed to cluster the types of content and functionalities offered online by 40 motor magazines in four languages, a picture of their actual use of the Internet has been taken and discussed. This study aims to describe the domain of online motor magazines and to understand how the websites are organized in order to find design patterns and business model patterns. Particularly the study investigates four aspects: (i) the most complete websites, (ii) the most frequent design patterns, (iii) the business model of the online motor magazines, and (iv) co-branding between online motor magazines and online travel magazines.

In this research, a quantitative methodology has been adopted, in order to find and rank content and functionalities of a large number of websites. This methodology investigates the presence of a given type of content or functionality in a set of given websites (Cantoni et al., 2007). Being a quantitative approach, it does not provide information about the quality of the information or communication. The procedure is standardized: after choosing the domain and the sample of websites, the inspector should create an analysis grid based on indicators. One indicator is a type of content or functionality given by a website; a type of content or functionality to be chosen as indicator must be relevant both for the domain and for the end users (Cantoni et al., 2007). The inspector accomplishes an explorative analysis browsing the sample websites annotating all the features of each website taking into account the most important features for the given website or domain. A feature is listed as "content" when it defines an information published as a text, image, audio, video; it is listed as a "functionality" when it defines an action that readers can do on the website, such as acquiring, sharing, producing information. When the indicator grid is complete, the group of websites is ready to be analysed. The inspector goes through the websites giving marks to them with respect to the indicators given in the grid; the grades are 1 and 0. Value 1 simply indicates that the object represented by the indicator is present; there is not any evaluation of the quality of the information. Particularly the creation of the analysis instrument and the data collection is based on a five step indicator-based methodology.

*Domain identification*: The selection of the motor magazines was suggested by recent studies concerning the increasing relevance of the different kinds of niche journalism in the editorial market. Editorial companies are facing a significant sales drop in the traditional paper-based markets. As newspaper and magazine circulation continues to decline, an interesting debate is being held on which strategies should be adopted to respond to the loss of readers. Publishing companies are adopting new means to increase customer affinity by offering free online content to print subscribers and other rewards similar to those made by the credit card and airline industries. Such programmes merge print with online world. Online behavioural targeting has emerged as new mantra. Traditional publishing companies are investing in electronic publishing whose contribution to revenues has been increasing. Acquisition of electronic publishing entities by traditional publishing companies corroborates the accent of electronic publishing in recent times. Also, entering in the e-tourism business is an opportunity for editorial companies to find new business models.

*Key players identification*: the second step is the identification of the main online editions of motor magazines. The study focused on the following languages: English (UK's market), French (France's market), Italian (Italy's market), and Spanish (Spain's market). Alexa.com has been used to select the 10 best ranked online editions of motor magazines for each of the four chosen languages. The inspector has interrogated the Alexa.com search engine, by selecting (a) country, (b) language, and (c) a set of 3 keywords concerning the semantic area of automotive.

*Indicators identification*: The third step of this methodology is the identification of indicators to describe in a quantitative manner content and functionalities of every website, and the definition of an analysis grid with these indicators. A group of websites has been chosen randomly among the sample (i.e. 30%, n= 12); each website has been analysed and content and functionalities have been annotated on cards. A card sorting activity helped to organize contents and functionalities and to merge similar ones. Card sorting "can provide insight into users' mental models, illuminating the way that they often tacitly group, sort and label tasks and content within their own heads" (Rosenfeld and Morville, 2002). The technique has proved very useful in helping to organize several pieces of information or concepts. It entails providing a group of users with a set of cards; written on each card there is a concept or piece of information from the information library that needs to be organized. Users then sort the cards with similar concepts into piles. The result suggests how users would organize a given set of concepts, which can be a valuable information when organizing a system or Web site (Faiks and Hyland, 2000). In this context a so called closed card-sort technique has been adopted: "users are presented with the cards to be sorted and the names of groups that the cards should be sorted into" (Tullis, 2007). In this case it implies that categories have been already identified, following a given narrative, and users have just assign each indicator to a category. The created grid presents 100 indicators, grouped into 5 main areas. The 5 areas describe a narrative path and represent the following steps: the indicators grouped into the "Information about the magazine" area (1) let understand how the magazine presents itself to the readers, as they ask "Who are the authors? Are they reliable?". The indicators grouped into the "Multimedia content" area (2) let us understand what kind of content the magazine presents to the readers, as they ask "What can I find here?". The indicators grouped into the "Web 2.0 features" area (3) offer a detailed view of what kind of functionalities readers can use in order to share and produce UGC (User Generated Content) using the web 2.0 tools, such as the social networks, as they ask "What can I do here?". The indicators grouped into the "Purchase process" area (4) let us understand what kind of business model has been adopted by the magazine. The indicators grouped into the "eTourism" area (5) let us know how the magazines deal with tourism issues, what kind of co-branding or co-marketing strategies are adopted, and what kind of functionalities readers can use in order to plan and even book a travel.

*Website analysis and Data Collection*: the inspector marks the presence or the absence of each indicator for each given web site (presence = 1, absence= 0). For example: 1 was assigned to indicator "Weather forecast" even when no weather info was actually on the website, because there was a link to the website of forecasting service. In the same way, when no shopping catalogue is on the website and there is a

link to a generic shopping catalogue (but not specific for travellers), 0 was assigned to indicator "Travel shopping catalogue". Please note that this is not a qualitative score: 1 means simply that the object represented by the indicator is on the website, but no evaluation of information quality is given, nor on the correct/smart positioning of the object in the navigation of the website. Table 1 shows an example for the Italian magazines data collection. For instance, "Quattroruote" presents 65% of all the indicators, while "Gente motori" only 21%.

| AREA | CATEGORY | INDICATORS | | Quattroruote | Due Ruote | Auto | Car | Al Volante | Panorama auto | Motociclismo (IT) | Autocar | Automobilismo | Auto Express | Classic & Sports Car | In Sella | Caravan & Camper | Gente Motori |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | 65 | 60 | 48 | 48 | 44 | 44 | 43 | 40 | 36 | 36 | 32 | 28 | 21 | 21 |
| INFO | REFERENCES | Who we are | 45 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| | | Where we are | 45 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| | | Link to the publisher website | 45 | 1 | 1 | 0 | 0 | 0 | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 0 | 0 |
| | REGISTRATION | Free reg. as a member / Log-in | 44 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 0 |
| | CONTACTS | E-mail/Phone/Fax the editorial staff | 51 | 1 | 1 | 1 | 1 | 1 | 0 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 0 |
| | | E-mail/Phone/Fax the customer service | 52 | 1 | 1 | 1 | 1 | 1 | 0 | 0 | 1 | 0 | 1 | 1 | 1 | 1 | 0 |
| | LEGAL ISSUES | Privacy policy | 46 | 0 | 1 | 1 | 1 | 1 | 1 | 0 | 1 | 0 | 1 | 1 | 1 | 1 | 1 |
| | | Terms of use | 47 | 0 | 1 | 1 | 1 | 1 | 1 | 0 | 1 | 0 | 0 | 1 | 1 | 1 | 1 |

**Table 1.** Example of score for category. Values 1 and 0 stand for presence or absence of an indicator.

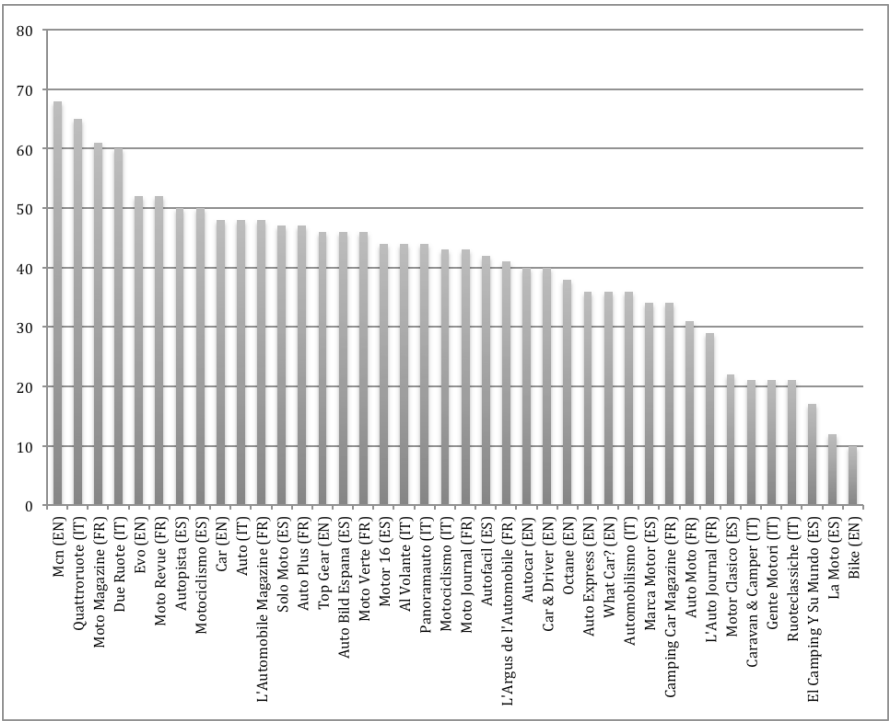
Table 1 also highlights the way the analysis grid has been created: indicators (3rd column) are grouped into categories (2nd one) and in areas (1st one); magazines are then listed and values have been assigned to each magazine.

## 4 Results

In the next paragraphs the results of the analysis are presented and discussed. Particularly, (i) the most complete websites, (ii) the most frequent design patterns, (iii) the business model of online motor magazines are described, and (iv) e-tourism and co-branding in the online motor magazines. Figure 2 shows the most complete online magazines analyzed, from the 1st to the 40th position.

### 4.1 The most complete websites

The highest presence of indicators was found in the magazine "MCN" (with the presence of 68 indicators) while the less complete magazine is "Bike" (with the presence of 10 indicators).




**Graph 1.** The most complete online magazines analyzed, from the 1st to the 40th.

The following table describes the tendencies within the four markets:

| Market | All markets | English | French | Italian | Spanish |
|---|---|---|---|---|---|
| Average | 40 | 40 | 43 | 40 | 36 |
| Max val. | 68 | 68 | 61 | 65 | 50 |
| Min val. | 10 | 10 | 29 | 21 | 12 |
| Mode | 43 | 40 | 44,5 | 43,5 | 43 |

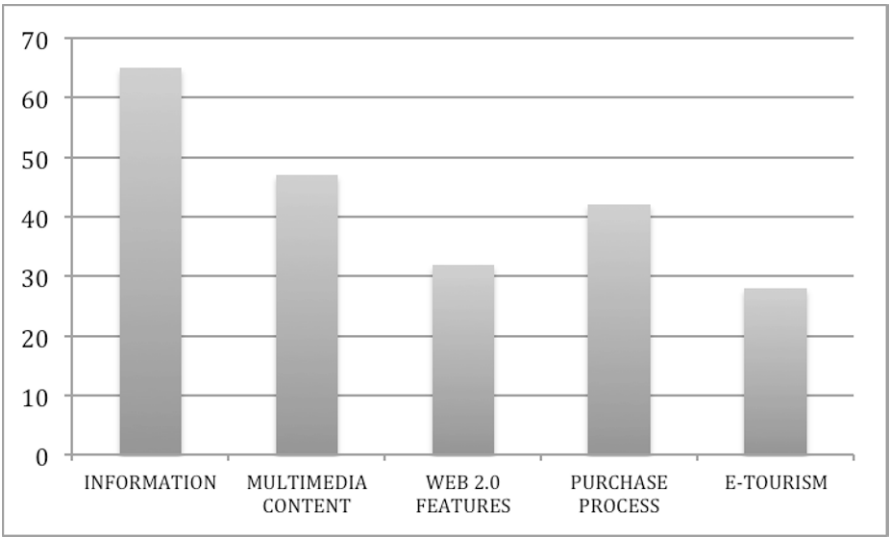
**Table 2.** Results for each language market.

Table 2 shows that, among the four different markets, the English and the Italian one seem to be the most active. English market has the magazine which hosts the highest number of indicators, while the Italian one has the highest mode. French and Spanish magazines are the ones less complete in terms of number of indicators. Analyzing the data, English online magazines, from the most to the less complete, 6 of them hold more than 40 indicators, 2 of them hold more than 50. Italian online magazines, from the most to the less complete: all of them hold more than 40 indicators; 3 of them hold

more than 50 ones. French online magazines, from the most to the less complete: 4 of them hold more than 40 indicators; only of them holds more than 50 ones. Spanish online magazines, from the most to the less complete: 5 of them hold more than 40 indicators; 2 of them holds 50 indicators.

### 4.2 The most frequent motor magazine web design patterns

Graph 2 shows the most frequent design patterns within the online motor magazines analyzed. Indicators have been grouped in order to understand the presence of each area. Indicators have been normalized and presented in percentage.



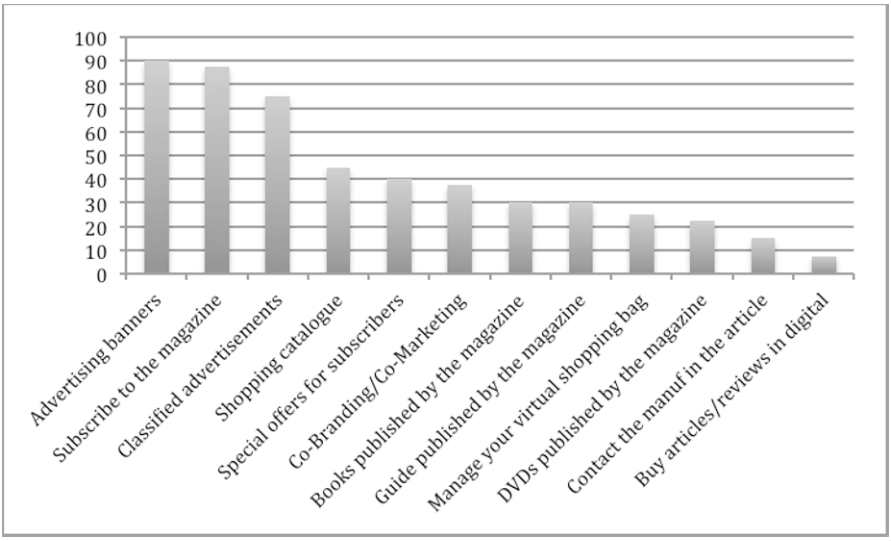

**Graph 2.** Percentage for areas.

The "Information" area has got the highest number of indicators, then the area which collects all the "Multimedia content" indicators, followed by "Purchase process" and "eTourism" sections. An interesting example of knowledge store is online motor magazine "Due ruote", which holds a specific "Tourism" section in the website, and lets the reader plan their own trip, offering also contextualized advertising banners. The "Tourism" section of that magazine also holds a forum where readers can publish/share diaries of their recent trips, discuss about destinations and tourist routes, and even share photos and videos. "Due ruote" tourism forum, which is integrated with the magazine's Facebook fan page, represent an interesting knowledge store. "Moto Revue", the most complete online motor magazine in the French market (with the presence of 52 indicators), holds an interesting "Multimédia" section, which includes a set of subsections, such as "Forums", "Blogs", "Photos", "Vidéos", "Newsletter", "Sondages", "Flux RSS". By providing a wide range of multimedia and sharing tools, editors can promote a collective production knowledge, and better understand their customers' preferences and needs. The English magazine "MCN – Motorcycle News" holds a specific "Forums" section in the website, with an interesting set of subsections, such as "Find members & topics", "Ask an expert",

"Rate my bike", "Photo & video gallery", and "My profile". In fact, readers can create and manage their own profile, publish and share tips and information, cooperate in building a living knowledge store and persistent community memory.

### 4.3 The business model of online motor magazines

The business model of the studied online motor magazines has been analysed using 12 indicators grouped into the "Purchase process" area. Graph 3 shows a detailed view of the business model.

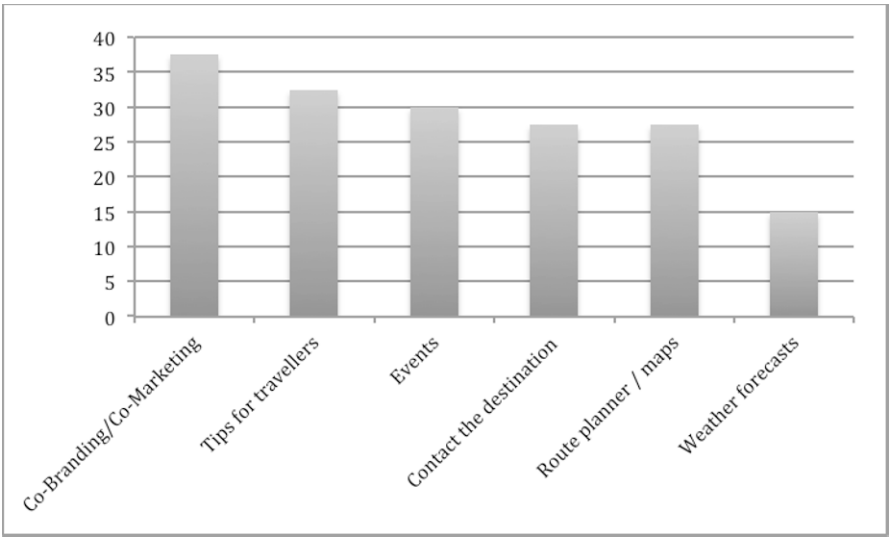



**Graph 3.** A detailed view of the purchase process in the 40 online motor magazines.

Graph 3 shows that "Advertising banners" (90%) and "Subscribe to the magazine" (88%) are the most present in the business model of the online magazines analysed. The 3 main indicators are present in at least 70% of the magazines. As "Co-branding and co-marketing" indicator is present in 38% of the cases, tourism issues gain relevance in the online motor magazines. The next paragraph focuses on how the hybridization between motoring and tourism issues in the studied magazines can bring new business models, and new opportunities both for eTourism and online journalism.

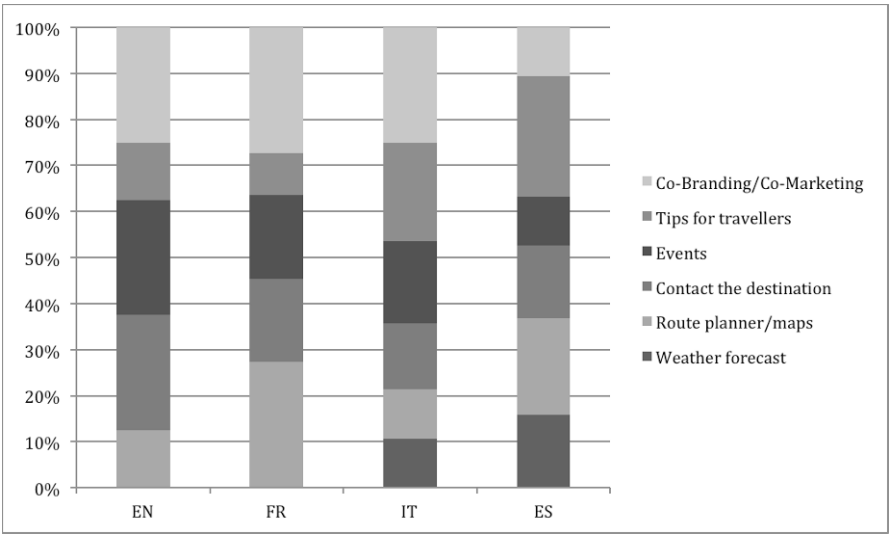
### 4.4 eTourism and co-branding in the online motor magazines

The hybridization between motoring and tourism issues in the studied magazines has been analysed using 6 indicators grouped into the "eTourism" area. Graph 4 shows a detailed view of it.




**Graph 4.** Values for indicators in the eTourism area.

Graph 4 shows that the "Co-branding/Co-marketing" indicator is most relevant in the business model of the online motor magazines analysed. Besides, "Tip for travellers" and "Events" indicators are present in at least 30% of the online magazine analysed. "Contact the destinations" and "Route planner/maps" are present in at least 25%. Among the 40 online magazine analysed in this study, one of the most interesting example of co-branding is the one involving "Quattroruote", the leading motor magazine in Italy, and "Meridiani", an important travel magazine. By accessing the online magazine "Quattroruote", readers can find trip ideas, plan a travel using a build in route planner integrated with Google Maps, and even buy a travel package, thanks to the finely contextualized advertising banners. Some online motor magazines offer to the readers an archive of articles covering a large range of topics and destinations and leave free to choose their preferred path, to compare possibilities and prices, to discover unexpected content and travel suggestions adopting sort of serendipitous approach (Spagnolo et al., 2010). The online motor magazine "Due ruote" holds a specific "Tourism" section in the website, and lets the reader plan their own trip, offering also contextualized advertising banners. A new business model is defined, as readers can directly plan a travel suggested by the motor magazine.




**Graph 5.** A detailed view of percentage for indicators in the eTourism area, comparing their presence among the language markets.

Graph 5 shows how relevant are the eTourism area indicators among the studied markets. Except for the Spanish one, "Co-branding/co-marketing" indicator represents more than 20% of all the eTourism area in each market. "Route planner/maps" indicator represents more than 20% in the French and the Spanish markets. "Contact the destination" represents more than 20% in the English one. "Tip for travellers" represents more than 20% in the Italian and the Spanish markets. The Italian magazine "Motociclismo" holds an interesting "Tourism" section, which includes a set of subsections, such as "Plan a travel in your country", "Plan a travel abroad", "Set your bike up for touring". "Motociclismo" adopts a business model based on contextualized advertising banners. The English magazine "Octane", which focuses on classic and performance cars, holds an interesting "Events" section, a sort of calendar showing scheduled car rallies and proposing travel destinations. "Octane" adopts a business model based both on contextualized advertising banners and a co-branding agreement with Travel Destinations Ltd, an online tour operator specialized in classic and performance car travel, which offers a full assistance in taking costumer's car abroad.

## 5 Conclusion

Since many online motor magazines deal with tourism destinations, new opportunities are emerging for them, in terms of co-branding, new business models, and new ways to listen to their readers and shape the offer. Co-branding looks promising both as a means of well-shaped online advertising and of a new business model to be adopted by online magazines. As pointed out in this research, online motor magazines can get better benefit if they publish articles sponsored both by motoring industry and tourism industry. For instance, "on the road" articles can deal with (a) a specific tourism

destination, (b) a drive from a city to another, or (c) promoting an initiative (i. e. an event, a contest, a special offer) sponsored both by a motor company and a tourism brand (i. e. a hotel chain). Most of the online motor magazines analysed adopt a business model based on contextualized advertising banners, while some others are trying to invent new ways to hybridize motoring and tourism issues, in order to build new business models. Online forums are an interesting example of collective production of knowledge (Lévy, 1999). Thanks to it, editors can listen to their readers, and have an actual dialogue with them. They can also shape the offer, according to the readers' preferences. By offering online forums, and a wide range of multimedia tools, editors can get benefit of the Internet as a means of collective production and sharing of knowledge, better understand their customers, extend their marketing reach into social channels, and understand how new devices and channels, such as social networks and the web, are changing the customer buying process and the ways editors can reach and communicate with existing and potential customers.

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# Same, Same but Different. How Pictures Influence Emotional Responses of Users with Different Web Search Behaviours

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## Abstract

Especially in the information-intensive tourism industry, searching for information is of major importance. In the context of online information search, a distinction between goal-directed and experiential searchers can be made. These two types of searchers have shown to differ in their perception of websites. As the notion "pictures are worth a thousand words" suggests, images are heavily used in advertising to convey information and trigger emotions. Besides the content of the picture, its low-level features have the power to shape the emotional quality. The purpose of this study is to link web search behaviour with emotional responses provoked by these stimulatory attributes. Following a between-subjects design, people were manipulated by randomly assigning them to one of the two search strategies. Results show that users with different web search strategies differ in their emotional responses initiated by pictures.

**Keywords:** Web search behaviour, picture, emotion

## 1 Introduction

Nowadays, the World Wide Web is accessible at any time and any place and we use it as a source of information day and night (Wang, Head, & Archer, 2002). Due to the intangible character of the tourism industry, the importance of the Internet is an undeniable fact (Buhalis & Law, 2008). It is used to gather information about the product in order to lower the risks involved and to reduce the opportunity costs to a minimum (Peterson & Merino, 2003). Not only customers but also suppliers use the Internet on a regular basis. Destination Management Organizations (DMOs), for instance, use it as an interactive way to develop, manage, and market their tourism products (Buhalis & Law, 2008). Moreover, suppliers benefit from cost advantages, an increase in revenues, a greater data base for marketing research purposes (Morrison, Taylor, Morrison, & Morrison, 1999), the ability to address different target markets (Buhalis & Law, 2008), and the ability to distribute their offerings globally (Buhalis, 1998).

Within the first few seconds, a user decides whether or not the information on the website is appropriate and useful (Kim & Fesenmaier, 2008). Therefore, attracting immediate attention through visual stimuli is of substantial importance. In tourism, pictures are often used to catch the tourists' interest through specific stimulatory attributes. A picture combines several of these so-called low-level features (LLFs)

L. Cantoni and Z. Xiang (eds.), *Information and Communication Technologies in Tourism 2013*, DOI: 10.1007/978-3-642-36309-2_32,

such as hue, brightness (luminance), and saturation (Thompson, Palacios, & Valera, 1992). Even though advertisers are aware of the several attributes of a picture, they normally choose their stimulatory material based on their gut feeling rather than on reasoned analyses (Labrecque & Milne, 2012).

From psychology it is known that pictures cause emotions. Above the content, LLFs (Schneider & Ring, 2010; Ring & Schneider, 2012; Valdez & Mehrabian, 1994; Ou, Luo, Woodcock, & Wright, 2004a; Ou, Luo, Woodcock, & Wright, 2004b), as well as personal characteristics of the observer (Ring & Schneider, 2012) have an effect on the perceived emotions. However, it is not clear how pictures influence consumer behaviour. Existing studies in marketing have already dealt with the effects of colours (e.g., Bellizzi & Hite, 1992; Gorn, Chattopadhyay, Sengupta, & Tripathi, 2004; Gorn, Chattopadhyay, Yi, & Dahl, 1997), but they typically investigate the effect of only one colour, at best a two-colour combination. This scarcity of research is surprising considering that pictures are heavily used in advertising. Recently, Labrecque and Milne (2012) have substantiated that colours have a strong influence on consumers' brand perceptions, familiarity and likeability, as well as on purchase intention. They explicitly highlight that it is not only the colour but also saturation and brightness (luminance) that matter when it comes to emotional judgements on brands. Therefore, marketers have to choose and use colours strategically.

Building on these findings showing the importance of several LLFs, we focus in this study on emotional responses to pictures as used on the Internet.

## 2 Literature review and development of hypotheses

### 2.1 Emotions and Russell's Circumplex Model of Affect

Emotions are defined as "mental states of readiness that arise from appraisals of events or one's own thoughts" (Bagozzi, Gopinath, & Nyer, 1999, p. 184). These appraisals and the resulting emotional responses may happen consciously or unconsciously (Bagozzi et al., 1999).

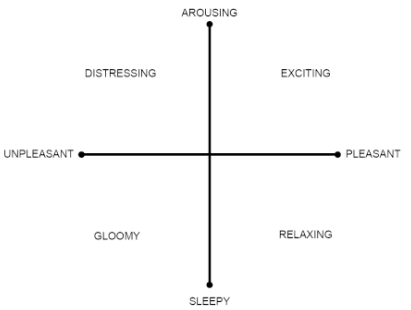


**Fig. 1.** Russell's Circumplex Model of Affect

One of the main difficulties researchers have to face, however, is the measurement of emotional responses to pictures. Russell's (1980) Circumplex Model of Affect is a

psychological method that allows measuring emotions on two bipolar dimensions, namely valence (anchored from pleasant to unpleasant) and arousal (anchored from arousing to sleepy). Different levels of valence and arousal result in eight emotional categories (Figure 1).

### 2.2 Web search behaviour

In spite of economic problems, e-commerce in tourism has experienced a substantial growth. As a result, the Internet is not only used as an information source but also for ordering services (Werthner & Ricci, 2004). Moreover, tourists state that, in comparison with traditional travel agencies, more information as well as more choices can be found online (Law, Leung, & Wong, 2004). Thus, the Internet is used as an important information source.

Initially, travellers, who are driven by the need to make a decision, search internally for information. If the internal sources, including prior knowledge and personal experiences, however, are insufficient in their decision-making process, it is highly likely that travellers tap external sources to collect further information (Gursoy & McCleary, 2004). The starting point for most tourists, who search for information online, is a web search query (e.g., using Google) (Fesenmaier, Xiang, Pan, & Law, 2011). Hence, travellers' web search behaviour and their strategies are of particular interest for web designers, online travel agencies, and tourist information websites.

In general, web search behaviour can be classified as goal-directed or experiential search behaviour. The first one refers to a task-specific and direct search pattern that is based on a particular situation, while in the latter, users increase their information and knowledge base for future use without searching for anything specific (Hoffman & Novak, 1996). Previous research has shown that these two different types of searchers differ in their perception of websites. The goal-directed searchers' website satisfaction depends on the perceived usefulness. Conversely, this is of little importance for experiential searchers. Their main drivers for satisfaction are the fun and entertaining parts of websites (Dickinger & Stangl, 2012).

As pictures do not represent concrete information but rather hedonic elements of a website, we presume that pictures are more important for the ones seeking for entertainment and fun, hence the experiential searchers. Consequently, we expect that

*H1: Pictures are more important for experiential searchers than for goal-oriented searchers.*

Additionally, as Dickinger and Stangl (2012) show that emotional elements are more important for experiential than goal-oriented searchers, we argue that people following one or the other search strategy are likely to differ not only regarding how they search for information but also how they process the information. Consequently, we expect the following hypothesis:

*H2: Emotional responses triggered by visual stimuli vary for the different search scenarios.*

In addition, we propose two more exploratory hypotheses. As previous research has shown that emotions are influenced by personal characteristics (Ring & Schneider, 2012), we propose:

*H3: Perceived fit of pictures influences emotional response.*

*H4: Perceived importance of pictures influences emotional responses.*

H3 builds on the perceived fit of pictures. Respondents are directly asked how well the pictures fit to their search task. H4 focuses on the importance of pictures during the search task. Both variables are included as explanatory variables.

### 2.3 Pictures in advertising and marketing

Using pictures for advertising has a long history. According to Baker (1961), marketers have been using pictures to convey information about the product and the brand since the late 50ies. Due to the rapid development of the Internet in the 1990s, advertisers have also embraced this communication channel as an efficient and effective way to market their products (Breitenbach & Van Doren, 1998). The Internet's ability to provide an almost unlimited amount of information, including texts and pictures, is one reason for this phenomenon (Koernig, 2003). Especially in the service industry, pictures are often used to reduce the inherent risk associated with intangibility (Cutler & Javalgi, 1993). Within an online promotion context in hospitality and tourism, Han & Mills (2006) have argued that the use of pictures and colours is an important element of the website's aesthetics.

Emotions are known to be related to the four goals of media messages, namely attracting attention, being remembered, entertaining, and persuading (Bolls, Lang, & Potter, 2001; Ravaja, 2004). More specifically, several studies have revealed the relationship between emotional responses and pictorial stimuli. Previous research demonstrates improved memory performance for emotionally arousing materials (e.g., pictures) (Bradley, Greenwald, Petry, & Lang, 1992), the varying emotional response when advertisements contain both positive and negative images (Chowdhury, Olsen, & Pracejus, 2008), and a longer observation period of affectively loaded pictures (Bradley & Lang, 1999). Even though findings do not allow the generalization of how to elicit distinct emotions, research has shown that pictures are often used as means to transport and trigger emotions.

Moreover, many marketing studies have examined colours and their effects (Bellizzi & Hite, 1992; Gorn et al., 2004; Gorn et al., 1997; Labrecque & Milne, 2012). Yet, a colour is not only blue, red or green but rather consists of three components: hue, saturation, and lightness (Thompson et al., 1992). Those three colour elements are known as LLFs. When we talk, for instance, about blue, red or any other colour, hue is described through the wavelength of the colour. Saturation describes the intensity of the colour for the given wavelength. Additionally, the luminance is known as the lightness of a picture and ranges from black (low luminance) to white (high luminance).

Research has shown that warm colours, or colours with longer wavelengths (e.g., red, orange, and yellow), increase the level of arousal. By contrast, cool colours, or colours with shorter wavelengths (e.g., green, blue, and violet), are emotionally and

physically relaxing, calming, and pleasant (Bellizzi & Hite, 1992; Bellizzi, Crowley, & Hasty, 1983). Furthermore, research on hue, saturation, and luminance has shown that these LLFs influence emotional responses under certain circumstances (Ring & Schneider, 2012). In addition, it is empirically confirmed that ads with higher saturated colours and a higher level of luminance increase the likeability of the respective ad (Gorn et al., 1997). Consequently, we expect:

*H5: LLFs influence the emotional response on the dimensions of arousal and valence.*

# 3 Study design and method

## 3.1 Choice of pictures

For this study, 29 pictures were chosen from a tourist information website. Special care was taken to choose pictures that do not show iconic monuments, sites or symbols but represent a broad variety of contents presented on the website. These pictures are, therefore, a sample of pictures that a person could easily come across while searching for information regarding a future holiday.

## 3.2 Extracting and clustering the LLFs

In a further step, the LLFs of all pictures were extracted. The HSL colour space gives direct information about hue, saturation, and luminance and is therefore of particular interest for this study. ImageJ[1] was used to extract the relevant information. For the analyses, we condensed the saturation and luminance information to one value for each picture. To do so, we computed the median saturation (luminance) value. The higher this value, the more saturated (the brighter) the picture. The hue values are divided into six categories, namely red, yellow, green, cyan, blue, and magenta. For every picture, the frequency of pixels falling into the relevant categories is used for further analyses.

Based on these LLFs, pictures were clustered using the non-parametric neuronal network procedure TRN (Typology Representing Network). This method draws on Martinetz and Schulten's (1994) algorithm and has been shown to provide more stable and robust results than traditional k-means clustering methods (Ganglmair & Wooliscroft, 2000). To carry out the analyses, TRN32[2] (Mazanec, 1997) was used. The weighted Simple Structure Index (wSSI = 0.66) provided in TRN32 suggests a five-cluster solution. These clusters are used to examine the effect of LLFs on emotional responses (see section 4.2).

## 3.3 Data collection and sample description

An online survey was conducted from August 9 to 20, 2012 among German-speaking consumers. The survey was distributed via the mailing list of a European business school and shared on Facebook. We applied a between-subjects design by randomly assigning people to one of three search scenarios (Table 1). Scenarios were developed to prime respondents to apply a goal-directed or experiential search behaviour

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1 http://rsbweb.nih.gov/ij/

2 TRN32 by J. A. Mazanec © 1997 may be downloaded from http://raptor.mazanec.com:3000/down/trn32

(Dickinger & Stangl, 2012). Several scenarios were pretested and the two scenarios that discriminate best between goal-directed and experiential search were selected for the present study.

**Table 1.** Search scenarios

| | |
|---|---|
| Goal-directed scenario | *Culture scenario*.<br>Imagine your parents have announced to come visit you on the next weekend. They have been really into art and culture for decades and they asked you to plan the weekend especially according to their wishes. The weekend has definitely to include a museum visit and an opera concert. |
| Experiential scenario | *Romance scenario.*<br>Charging your batteries, relaxing and regenerating. This is what you have been dreaming of for some time. Your next short holiday starts in mid-September. You do not have a concrete idea of the holiday, but a romantic weekend with your partner has been in your mind for weeks. |
| Control group | *No specific scenario was used.* |

We used the modification checks as suggested by Dickinger & Stangl (2012). Therefore, respondents rated their search task on four bipolar adjective pairs (rational – intuitive, thought-out – emotional, goal-oriented – experiential, time-saving – extensive). The results are satisfactory. As expected, respondents, who were assigned to the romance scenario, show higher mean values (representing more experiential-oriented search behaviour) than respondents who were assigned to the culture scenario. These differences are significant for all but the rational-intuitive variable.

After reading the scenario, respondents had to assign the 29 pictures to one of the eight emotional categories of Russell's Circumplex Model of Affect (Figure 1). Additionally, the respondents were asked to state how well the pictures fit to their search task, and how important pictures are for them when searching for travel related information. Furthermore, a question was included asking whether people see themselves as more rational or emotional (self-concept). To avoid interference of the modifications, this question was asked before respondents were presented with the scenarios. Finally, demographics and two Ishihara plates to test for dyschromatopsia were included.

On the whole, 364 people completed the survey. 13 respondents had to be dropped due to not passing the Ishihara colour test. One respondent was excluded because of inappropriate answers, resulting in a final sample size of 350. 70.3% of the respondents were female and 29.7% male. On average, the sample was 25.9 years old (*SD* 7.08). In terms of education, respondents were highly educated, with 39.1% holding a university degree and 58.6% having completed secondary education. Furthermore, 66.6% of all respondents were students, followed by 28.8% of white-collar workers. 102 respondents belong to the goal-directed search scenario (female = 69.6%; male = 30.4%), 122 to the experiential search scenario (female = 70.5%; male = 29.5%), and 126 to the control scenario (female = 70.6%; male = 29.4%).

### 3.4 Data preparation and used methods

Data had to be transformed in several ways. First, the respondents' classification of each picture to one emotional category was recoded. Each emotional category is characterized by one value for valence and one for arousal (low, middle, and high; Figure 1). Recoding the data accordingly results in distinct values for valence and arousal, for every picture and every respondent. This data is used as a basis for all the following analyses. In a second step, data was rearranged so that each evaluation of a picture becomes one observation, i.e., one person contributes 29 observations to the total dataset. These results in 10,150 observations (350 respondents times 29 pictures). The rearranged dataset is used to model influences on arousal and valence in total, not for each picture in specific.

Several methods are applied. To carry out the modification checks and to test for basic differences between the different scenarios, Kruskal-Wallis tests are applied. To test for different responses to the pictures, Friedman's ANOVAs are applied. For analyses that model influences on valence and arousal, ordered logistic regressions are used. In these models, an ordinal response variable (valence or arousal) can be predicted by several continuous or categorical predictors. Ordinal logistic regressions are based on the proportional odds assumption, which assumes that there is a single coefficient for each predictor. This assumes that a change on the log odds scale of the dependent variable is the same for each change in the predictor variable from one level to the next level. We examine this assumption following the procedure outlined in UCLA (2012) which shows that it is met satisfactorily.

All analyses are carried out in the *R* system (version 2.12.0) for computational statistics (R Development Core Team, 2010). The package MASS is used (Venables & Ripley, 2002).

## 4 Findings

### 4.1 Goal-directed versus exploratory search behaviour

With regard to H1, a Kruskal-Wallis test shows that the importance of pictures for the information search varies between the different scenarios ($H = 28.89$, $df = 2$, $p < .001$). Precisely, the less detailed a search task is, the more important pictures are. Post-hoc tests come out significant for the control and the culture scenario, as well as for the culture and the romance scenario ($p < .05$). Furthermore, a Jonckheere's test ($J = 25374$, $p < .001$) reveals a significant trend in the data, with increasing importance of pictures from the most specific scenario (culture) to the least specified (control group). We can therefore confirm H1, stating that pictures are more important for people following an experiential search strategy (romance scenario) than for people following a goal-oriented search strategy (culture scenario).

To test for Hypotheses 2, 3 and 4, we estimate two separate ordered logistic regression models to explain the valence and arousal dimension, respectively. In line with previous research, we also include sex (Valdez & Mehrabian, 1994) and self-concept of being more rational or emotional (Ring & Schneider, 2012).

For both dimensions, we started with the full model including sex, importance of pictures, fit of pictures, self-concept, and scenario as predictors. The full model for the valence dimensions exhibits significant effects for importance of pictures and fit of pictures only. Consequently, we dropped the other, non-significant predictors one by one while comparing each resulting model with the more complex model by likelihood ratio tests. All tests are non-significant, meaning that the more parsimonious model does not fit considerably worse than the more complex one. The final model, which includes only importance of pictures and fit of pictures, is exhibited in Table 2. The likelihood ratio test comparing this model with the full model is also non-significant (LR statistic = 7.19, $df = 4$, $p = .13$).

The results show positive but small effects for fit of pictures and importance of pictures. For an increase of 1 in importance of pictures, the odds of being in the middle or high category of valence is 1.05 higher than of being in the lowest category. As fit of pictures is included in its original metric (considered as an interval scale), odds ratios refer to a change from the lowest quartile (which is 4) as compared to the highest quartile (which is 7). As a consequence, a rise in fit of pictures from the lowest to the highest quartile increases the odds of being in the middle or high category of valence (odds are 1.04 times higher than for being in the lowest category). Consequently, both fit of pictures and importance of pictures increase valence ratings of pictorial stimuli.

**Table 2.** Ordinal logistic regression for valence and arousal dimension

| | **Valence dimension** | | | | **Arousal dimension** | | | |
|---|---|---|---|---|---|---|---|---|
| | **Coefficient** | **Std. Error** | **Odds ratio** | **t-value** | **Coefficient** | **Std. Error** | **Odds ratio** | **t-value** |
| Sex: male | | | | n.s. | -.16 | .04 | .85 | -3.95*** |
| Scenario: romance | | | | n.s. | .04 | .05 | 1.04 | .92 (n.s.) |
| Scenario: control | | | | n.s. | -.15 | .05 | .86 | -3.39*** |
| Fit of pictures | 0.04 | 0.01 | 1.04 | 4.19*** | | | | n.s |
| Importance of pictures | 0.05 | 0.02 | 1.05 | 2.85** | | | | n.s |

*** $p < .001$, ** $p < .01$, * $p < .05$

The full model for the arousal dimension shows significant effects for sex and scenario. Again, we dropped the non-significant predictors one by one and verified by means of likelihood ratio tests that dropping these variables does not lead to a significant deterioration of the model. The likelihood ratio test for the final model compared to the full model is also non-significant (LR statistic = 3.92, $df = 3$, $p = .27$), supporting the parsimonious model as exhibited in Table 2.

For the arousal dimension, we find negative effects for male respondents. For them, the odds of being in the middle or highest arousal category are only .85 the odds of being in the lowest arousal category. Moreover, the different scenarios show an

influence. Whether the respondent is presented with the culture scenario (which is the reference category in this model) or the romance scenario, does not make any difference as exhibited in a non-significant coefficient for the romance scenario. However, the control scenario shows a significant, negative effect. For people in the control scenario, the odds of being in the middle or highest category of arousal are just .85 times the odds of being in the lowest arousal category. To put it simple, how you respond to pictures on the arousal dimension depends on whether you have any idea what to search for, or not. However, which search strategy you are pursuing (experiential or goal-directed) is not important. Consequently, we can confirm H3 and H4 but cannot present conclusive evidence that different search strategies lead to different emotional responses (H2). We will further discuss this issue with regard to LLFs.

### 4.2 Low-Level Features

To examine the influence of LLFs on emotional responses, the clusters as described in section 3.2 are used. The average profiles for the five prototypes are shown in Table 3. The H column refers to the dominant colour(s), while the S and L values correspond to the average values in the respective cluster. This table also exhibits how often respondents assigned the pictures of each cluster to the eight emotional categories. Hence, each cluster can be described with regard to the most frequently associated emotions. There are two small clusters (prototype 1 and 2), one big cluster (prototype 3), and two mid-sized clusters (prototype 4 and 5). A very high level of saturation characterizes the picture in prototype 2, whereas pictures in all the other prototypes are of low saturation and luminance. Prototype 3 is the only cluster where there is no clear dominant hue category, but rather two colours are occurring more frequently (red and yellow). Moreover, relaxing is the dominant emotion in three clusters (prototype 1, 2, and 3), prototype 4 represents pleasant (27%), and pictures in prototype 5 are exciting (33%) and arousing (30%). As saturation and luminance behave almost similarly in all prototypes, the emotional associations of the clusters can be explained by the wavelength (hue) of the pictures. Clusters that are dominated by longer wavelength colours (prototype 2, 3, and 4) are related to emotional reactions with a higher level of valence. However, the shorter wavelength colour blue (prototype 5) is associated with a higher level of arousal. Hence, the longer the wavelength of the colour, the more important the dimension of valence.

**Table 3.** LLFs, clusters, and frequencies of corresponding emotional associations (%)

| Prototype | Size | H | S | L | Distressing | Arousing | Exciting | Unpleasant | Pleasant | Gloomy | Sleepy | Relaxing |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 2 | Cyan | 15 | 32 | 1 | 23 | 19 | 1 | 13 | 3 | 2 | 38 |
| 2 | 1 | Yellow | 91 | 16 | 4 | 9 | 20 | 5 | 7 | 8 | 9 | 39 |
| 3 | 13 | Yellow, Red | 17 | 19 | 3 | 16 | 7 | 4 | 23 | 11 | 10 | 26 |
| 4 | 6 | Red | 21 | 20 | 4 | 10 | 17 | 8 | 27 | 11 | 5 | 18 |
| 5 | 7 | Blue | 24 | 35 | 8 | 30 | 33 | 4 | 8 | 5 | 3 | 9 |

To further explore whether the results change for valence and arousal across the search scenarios, Kruskal-Wallis tests are conducted. Valence values differ across the search scenarios for prototype 2 ($H = 10.38$, $df = 2$, $p < .01$). Examining the arousal dimension for the clusters show that prototype 3 ($H = 10.19$, $df = 2$, $p < .001$), prototype 4 ($H = 8.5$, $df = 2$, $p < .01$) and prototype 5 ($H = 7.0$, $df = 2$, $p < .03$) differ across search scenarios. These findings partially support our assumption that in different scenarios pictures trigger different emotional reactions.

## 5 Conclusions

The significant effect of sex on the arousal dimension and the non-significant effect of sex on the valence dimension are in line with previous research (Valdez & Mehrabian, 1994). Additionally, our findings show that, irrespective of the concrete manipulation used, people who are confronted with a more or less concrete search task, are more likely to respond higher on the arousal dimension. When people do not have anything specific in mind (as represented by the control scenario), however, pictorial stimuli are not likely to arouse them. Though we did not make explicit assumptions regarding the effect of the different scenarios, the results coincide with previous findings where the arousal dimension has been shown to be reluctant to stimuli influences. The scenarios represent an overall state the person is put into but is not something that is actively perceived by the person. The non-significant effects of the different scenarios on the valence dimensions show that the degree of goal-directedness in people's search approach does not make a difference on how they perceive pictures in general. For the arousal dimension, the non-significant effect of self-concept is contrary to our expectations. Further analyses will be needed to identify conditions when personal characteristics do play a role. Yet, coinciding with previous findings, the arousal dimension is reluctant to consciously perceived or judged cues. Neither the importance of pictures for search nor the perceived fit of pictures to the search task show an influence. However, these two variables influence the valence dimension. As the importance of pictures is something you are aware of, and the fit of pictures is something you judge on consciously, our findings suggests that the valence dimension is the dimension resulting from conscious judgements, whereas the arousal dimension is influenced by more hidden general factors that are not consciously perceived. Moreover, not all of the pictures' LLFs have the power to affect the emotional state of the respondents. Since saturation and luminance behave in similar patterns, hue is the only stimulatory attribute that explains the various emotional responses and associations. Our findings suggest that pictures that are dominated by colours with a shorter wavelength (blue) elicit higher level of arousal. This finding is in contrast with previous findings (see section 2.3). Yet, previous studies have examined these colours separately rather than as a part of pictures. Further research needs to explain this contradiction.

Due to sampling limitations, generalization is limited. First, the study was sent via the mailing list of a European business school to a German-speaking population only. Second, the major part of the respondents was students. Additionally, the relatively small sample size per scenario can be seen as another constraint of this research. Finally, we did not include interactions in our study. As the stimuli used (pictures) are a complex interplay of colour, saturation, brightness, and context, including

interactions is important. Additionally, distinct reactions to these LLFs may also differ regarding the scenarios used, as our findings at least slightly suggest. Furthermore, the personal characteristics add to the full complexity. A model incorporating all different direct and interaction effects is not easy to estimate. Consequently, further studies should look at each possible interaction step-by-step.

To conclude, pictures have shown to influence the emotional reactions of users with different web search behaviour to some extent. Consequently, colour properties of pictures for marketing purposes have to be chosen especially in order to support searchers in their information-retrieving process. Satisfied visitors of a website reuse the site and disseminate positive word of mouth. Hence, if a DMO pays attention not only to the content but also to the characteristics of the pictures used, a DMO can reach a broader audience and increase its revenues.

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## 7 Acknowledgements

The authors would like to thank the Austrian National Tourist Office *(Österreich Werbung)* for providing all pictorial stimuli used in this study.

# The Customers' Perspective on Presenting Visual Hotel Information Online

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## Abstract

The use of visual presentation formats (VPFs) on the web enables services to appear more tangible. However, it is not known how customers perceive the potential of different VPFs for the purpose of communicating certain items of visual hotel information. An explorative study, by means of a written survey of potential hotel customers, examined which information attributes best lend themselves to being visually communicated, and with which VPF. The results show that the information attributes most relevant to the customers are the setting of the hotel, bathroom fittings, type of bed and leisure and catering facilities. Most information should be displayed using static pictures or text. Only the room layout of hotel bedrooms and the overview of the hotel complex can be captured better by virtual tours. Videos, on the other hand, are not perceived superior to other VPFs at all.

**Keywords:** Hotel Business, Information Attributes, Presentation Formats, Visualization.

## 1 Introduction

Intangibility is an intrinsic feature of services (Bowen & Schneider, 1988; Shostack, 1977; Zeithaml, Parasuraman, & Berry, 1985). Many services, for example an overnight stay at a hotel, cannot be tested for quality prior to purchase because of their immaterial character, which means that they have a higher purchase risk compared to physical products (Koernig, 2003; Parasuraman, Zeithaml, & Berry, 1985). Although the direct experience of services is not feasible before purchase, information about different attributes of the service and the related experiences may be obtained in other ways, e.g. by means of visual information (Jiang & Benbasat, 2007; Li, Daugherty, & Biocca, 2001). Visually communicating aspects of a service may make it appear more tangible (Stafford, 1996). For example, it is easier to imagine what it will be like to stay in a hotel room after having seen its size and style represented visually on the web. In this way services can be experienced virtually even before purchase (Cho, Wang, & Fesenmaier, 2002). The information thus obtained ultimately reduces the purchase risk by a significant degree (Ha, 2005; Park, Lennon, & Stoel, 2005).

Information visualization on the web can be achieved by means of different visual presentation formats (VPFs), such as pictures, videos or three-dimensional formats (Cho, et al., 2002; Herstell, 2008). There has been a large amount of research that showed the superiority of visual information over plain text (e.g. Holbrook & Moore, 1981; Kim & Lennon, 2008; Stringam & Gerdes, 2010). Yet, not all information attributes can be equally well communicated by means of the different VPFs (Jiang & Benbasat, 2007; Park, Stoel, & Lennon, 2008; Suh & Lee, 2005). Services, such as the stay at a hotel, are made up of different service parts, like room facilities,

L. Cantoni and Z. Xiang (eds.), *Information and Communication Technologies in Tourism 2013*, DOI: 10.1007/978-3-642-36309-2_33,

entertainment facilities, cleanliness or meals (Callan & Bowman, 2000; Chang & Tarn, 2008). Therefore, it can be assumed that, owing to the specific characteristics of each piece of information, the different information attributes can be best communicated by different VPFs. However, there exists neither a study that identifies certain visual information attributes of a hotel service nor by means of which VPFs these information attributes can be transported best. Thus, the relevance of different visual information attributes for customers is likewise not known.

Furthermore, it is also uncertain how the VPFs potential for communicating information is perceived by customers. But to be able to use VPFs effectively, it is essential to know which presentation format customers consider to be reasonable and useful for the communication of certain items of information. Using the hotel business as an example, our study aims to investigate which information attributes hoteliers are able to visualize on their websites, which information attributes are most important for customers and which VPFs are best able to illustrate these information from the customer's perspective. This should firstly improve the understanding of the effective use of VPFs regarding certain items of information and, secondly, enable the derivation of recommended courses of action for practitioners in the hotel business.

Initially, information attributes of hotels that can be visually displayed are described. Then the methodology and results are explained. A survey of potential hotel guests is intended to show which VPFs should be used for communicating certain items of information. In the next part, the results of the explorative study are discussed and practical implications as well as limitations are explained. The last section contains the conclusions and proposals for future studies.

## 2 Information Visualization

### 2.1 Visualizable Information Attributes

Generally, information may be classified on the basis of the objects to which it relates (Gräfe, 2005). It is possible to differentiate between business, transaction and product information (Blattmann & Grüter, 2009). With reference to a hotel service, product information includes information about the core service and the supplementary services provided. Accordingly, it contains details such as the size of the rooms, information about the type of bed, prizes or the catering facilities (Callan & Bowman, 2000). Business information includes information about the provider, such as contact details or the company philosophy (Davidson, 2002). Transaction information, on the other hand, means information about the exchange of services (Gräfe, 2005). This includes details of payment options and information on data protection, or – in the case of a hotel – details of booking facilities and cancellation deadlines. Because business and transaction information attributes in the hotel business is not physically tangible they cannot be directly depicted. Such information typically requires text-based communication or illustration by means of figures. Therefore, theses information attributes are not included in Table 1, which lists only information attributes of a hotel service that may be presented on the web by means of VPFs. They were captured from the literature and supplemented by own defined attributes.

**Table 1.** Visual information attributes of a hotel

| Information Attribute | Description | Adapted from |
|---|---|---|
| Additional Infrastructure | Shoe-shine machines, washing machines, room service, car park, shuttle service etc. | Callan & Bowman (2000); Koernig (2003) |
| Bathroom Fittings | Bathroom fittings such as shower, bath, WC, whirlpool, etc. | own definition |
| Brightness | Incidence of natural light in the hotel room from outside | own definition |
| Catering Facilities | Restaurant, bar, café, kiosk, snack vending machines, etc. | Callan & Bowman (2000); Chang & Tarn (2008) |
| Furnishings in Room | Physical inventory of room to include items such as safe, desk, chairs, mirrors, etc. | Chang & Tarn (2008) |
| Leisure Facilities | Wellness, sport and cultural facilities offered by the hotel, such as swimming pool, tennis court, library, etc. | Callan & Bowman (2000); Chang & Tarn (2008); Musante, Bojanic, & Zhang (2008) |
| Lighting Facilities | Lamps, candlesticks, etc. | Callan & Bowman (2000); Chang & Tarn (2008) |
| Overview | Overview of the hotel complex | own definition |
| Room Layout | Arrangement of different parts of the room such as beds, kitchenette, bathroom, etc. | own definition |
| Room Size | Size of the hotel room | Callan & Bowman (2000) |
| Setting | Type of setting of the hotel (e.g. urban/rural location, in the mountains, by the sea) | Callan & Bowman (2000) |
| Style of Furnishings | Type, form, colour and condition of the furnishings in the room (e.g. modern, traditional, romantic, spartan) | Davidson (2002); Schoenheit (2004) |
| Style of Bathroom | Type, form, colour and condition of the bathroom (e.g. modern, traditional, romantic) | Davidson (2002); Schoenheit (2004) |
| Style of Hotel Building | Type, form, colour and condition of the facade, windows, entrances and roof of the hotel (e.g. modern, traditional, old-fashioned, contemporary, renovated) | Callan & Bowman (2000); Davidson (2002); Jeong & Choi (2004) |
| Style of Public Areas | Type, form, colour and condition of walls, ceilings and floors of the lobby, restaurants, swimming pool, etc. (e.g. modern, traditional, old-fashioned, contemporary) | Callan & Bowman (2000); Davidson (2002); Schoenheit (2004) |
| Style of Room | Type, form, colour and condition of walls, ceilings and floors in the room (e.g. modern, traditional, old, new) | Callan & Bowman (2000); Davidson (2002); Schoenheit (2004) |
| Technological Equipment | Technological equipment such as television, telephone, alarm clock, etc. | own definition |
| Temperature Control | Control of the room temperature by means of air-conditioning, ventilators, heating, etc. | own definition |
| Type of Bed | Type of bed (e.g. twin, double, single) | Koernig (2003); Min, Min, & Chung (2002) |
| View from Room | View of the outside from the hotel room, through a window or from a balcony | own definition |

Visual communication is only possible if extrinsic elements such as commodities, people, places or objects that are associated with a service are shown (Berry & Clark, 1986). However, there also exist differences in the potential for visual representation concerning different types of product information attributes. Ratchford, Talukdar, & Lee (2001) distinguish between three subtypes of product information: functional attributes, expressive attributes and price. Expressive attributes, that refer to subjective feelings (e.g. exciting holiday experiences), cannot directly and objectively be depicted. Price cannot be visualized by VPFs at all. Functional attributes in contrast pertain to physical aspects of the product and can be objectively conveyed by VPFs through physical representation.

Thus, Table 1 lists only information attributes of the type product information about the hotel service that are a direct or peripheral part of the service. It contains an overview of functional product attributes of a hotel service each referred to the objects belonging to the hotel or to the objects' styles. A visual depiction can incorporate several of these information attributes. All of these information attributes can be illustrated by means of various VPFs, so that they can be perceived as if the viewer were actually present at the location where the service is provided. The VPFs that can provide visual hotel information are described in the following section.

### 2.2 Visual Presentation Formats

Three VPFs that are commonly used in the hotel business are differentiated in this study: *static pictures*, *videos* and *virtual tours* (Jeong & Choi, 2004). The three VPFs presented each have different interaction facilities. The highest level of interactivity is provided by virtual tours followed by videos and static pictures (Hyun, Lee, & Hu, 2009; Steuer, 1992).

*Static pictures*, the simplest form of visual presentation, are pictures, which show snapshots of real situations (Hansen & Neumann, 2005). As well as being positioned at various places on the website, static pictures are also placed in collections of pictures known as galleries. A manually controlled sequence of individual and different static pictures is called a slide show. The only interaction facilities consist in the selection and enlargement of a static picture by clicking with the computer mouse.

*Videos* or films are defined as a series of consecutive, similar, static pictures, which create the illusion of a moving image (Müller, 2003). Automatic and interrelated, the static pictures in videos differ only very slightly from one another (Jiang & Benbasat, 2007). Of the VPFs discussed in this study, video is the only presentation format which can also address the auditory sensory channel (Hyun, et al., 2009).

In *virtual tours* static pictures are arranged and linked together into 360º-panoramas which give the viewer a feeling of being in a space (Brockhaus, 2006; Kwiatek, 2005). The viewer is able to manipulate the section displayed but is confined in the virtual space to an axis around which he himself moves (Jiang & Benbasat, 2005). The scope of manipulation ranges from panning horizontally or vertically, to zooming in on a section of the image. By linking different panoramas, the user is able to gain an impression of the arrangements of rooms or a landscape. The ability of the three VPFs to communicate information is considered in the next chapter.

# 3 Empirical Study

## 3.1 Methodology

A questionnaire was compiled for the written survey, and then reviewed and improved in a pretesting stage. The final survey was then conducted among university students and other university members. To ensure that all respondents understood the same thing by the different VPFs, a picture gallery, a video and a virtual tour were presented for a specific hotel. The participants were first shown the presentations of the VPFs on a computer. They were then requested to complete the questionnaire. This contained a table with the 20 information attributes of a hotel service as they are described in Table 1. The respondents had to provide three pieces of information for each information attribute. Firstly, they had to state whether the individual information attribute was "not important", "moderately important" or "very important" for their individual decision-making process. Secondly, they had to decide whether they preferred the information to be provided by means of VPFs or in text form. Thirdly, they were requested to state, for each information attribute, which VPF is best able to illustrate it, in their opinion. Alongside "static pictures", "video" and "virtual tour", the option "all the same" could also be selected. In addition to a question about experience with regard to searching for information about hotel services on the web, some socio-demographic data – such as the respondents' gender, education and age – was also collected at the end.

## 3.2 Sample

In total, 185 participants completed the survey. After eliminating those respondents who stated that they had never obtained information about a hotel on the web, the sample still included 177 utilizable questionnaires. The sample consisted of 56% female and 44% male respondents. Of these, 80% were students. 74% of the respondents were aged between 20 and 29, 12% were younger than 20 and 14% were 30 years old or more. All of the remaining participants search for hotel information on the web at least one time per year. A whole 52% of the respondents consult the web to find out about a hotel service at least 3 times per year. Further 39% investigate a hotel online 3-6 times per year and 13% more than 6 times. These data correspond with the travelling behaviour of Swiss people (Bundesamt für Statistik, 2011). Thus, a young and experienced group of online hotel websites users could be reached. Moreover, students are an important customer segment for the online hotel business since they are expected to be highly experienced in using the web and to have the potential to spend a large amount of their future earnings on holidays.

Oneway ANOVAs were performed with SPSS to determine whether within the sample were groups with differing characteristics that had different preferences in the way they liked hotel information to be presented. It turned out that women, as well as more experienced users, who search online for hotel information 3 times per year or more, find that a higher number of information attributes can be presented best in textual rather than visual format. The mean values concerning gender (male: 7.56, female: 8.47, $p<0.05$) and online hotel information search experience (under 3 times per year: 7.68, 3 times per year or more: 8.43, $p<0.1$) differ significantly. Other than that, no significant differences could be found.

### 3.3 Results

Using descriptive statistics, it was possible to carry out an explorative data analysis with the data collected (Bortz & Döring, 2002). In order to determine the relevance of the individual information attributes, the responses relating to their importance were coded as “not important” = 1, “moderately important” = 2 and “very important” = 3. Then the mean values for the information attributes were calculated on this basis. Figure 1 provides an overview showing the importance of the information attributes.

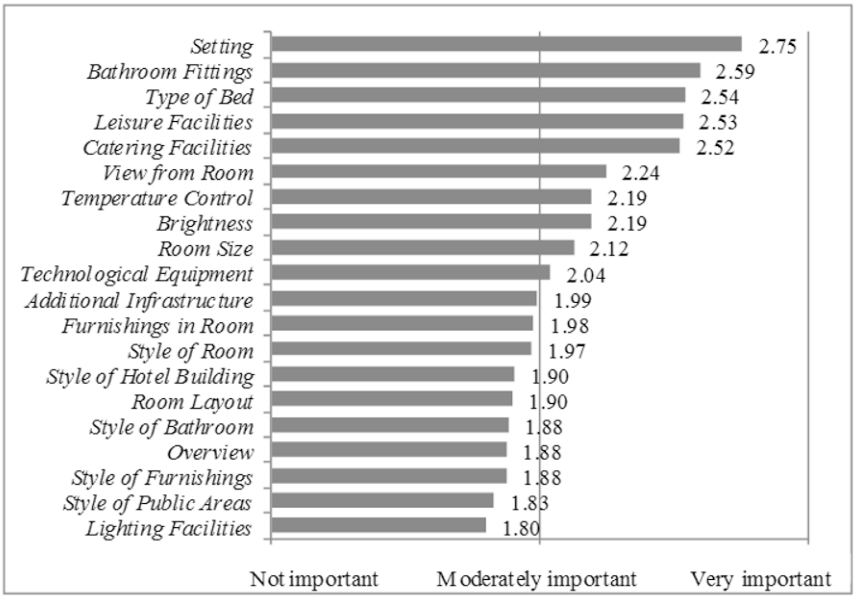


**Fig. 1.** Mean values for the importance of information attributes

With a mean value of 2.75, the setting of the hotel is the most important item of information for the respondents. Also very important was information on the bathroom fittings (2.59), the type of bed (2.54), the leisure facilities (2.53) and the catering facilities (2.52). Other relevant items of information scored a mean value of between 2 and 2.5. These include details of the view from the room (2.24), the room temperature control (2.19), the brightness (2.19), the room size (2.12) and the technological equipment (2.04). The remaining ten information attributes scored a mean value of less than 2. These items of information appear to be less important in relation to the others for the decision-making process. Especially the style of the hotel, its rooms and its equipment are considered less important to evaluate a hotel in comparison to the other information attributes. With 1.8, information about the lighting facilities had the lowest mean value. Concerning the reliability of the results, on average the information attributes have a standard deviation of 0.64.

In Table 2 the importance of the information attributes is indicated in the first column for a mean value over 2.5 by **=“very important” and for a mean value between 2

and 2.5 by *="important". All other information attributes with mean value under 2 are perceived by the participants as less important. Alongside the importance of the information attributes, the survey also recorded the preference of respondents for the individual items of information to be presented by means of text or VPFs. In the second column of Table 2 it is shown, which presentation formats are preferred for the individual items of information.

More than 90% of the respondents clearly preferred the textual presentation of information about the room temperature control, technological equipment and additional infrastructure. Likewise more than 90% of all respondents obtained information about the style of the room, the view and the furnishing style, preferring a visual presentation for these information attributes. With an agreement rate of over 80%, the respondents preferred six of the 20 information attributes to be presented as VPF and one as text. A further seven merely reflect a tendency towards one of the two presentation types (agreement rate of under 80%). Especially for the information attributes bathroom fittings, lighting facilities, room size and leisure facilities (agreement rate of under 60%) the respondents do not exhibit such a clear preference for presentation through either text or VPF as they do for the other information attributes.

**Table 2.** Information attributes according to presentation type

| Information Attribute | Preferred Presentation Type | Visual Presentation Formats | | | |
|---|---|---|---|---|---|
| | | *Static Pictures* | *Video* | *Virtual Tour* | *All the same* |
| Addition. Infrastructure | Text (92%) | *32.8%* | 9.0% | 10.2% | 48.0% |
| Bathroom Fittings** | Visual (56%) | 54.2% | 9.0% | *22.6%* | 14.1% |
| Brightness* | Visual (89%) | 40.7% | *22.6%* | 16.9% | 19.8% |
| Catering Facilities** | Text (81%) | 36.2% | 10.7% | 20.9% | *32.2%* |
| Furnishings in Room | Text (67%) | 41.8% | 6.2% | 21.5% | *30.5%* |
| Leisure Facilities** | Text (56%) | 41.2% | 18.6% | 19.2% | *20.9%* |
| Lighting Facilities | Visual (54%) | 46.9% | 6.2% | *23.7%* | 23.2% |
| Overview | Visual (84%) | *36.2%* | 18.1% | 37.9% | 7.9% |
| Room Layout | Visual (85%) | *29.4%* | 8.5% | 48.6% | 13.6% |
| Room Size* | Visual (54%) | 46.9% | 15.3% | *27.1%* | 10.7% |
| Setting** | Visual (73%) | 43.5% | *22.6%* | 20.3% | 13.6% |
| Style of Bathroom | Visual (84%) | 62.7% | 7.3% | 14.7% | *15.3%%* |
| Style of Furnishings | Visual (91%) | 55.9% | 10.7% | *17.5%* | 15.8% |
| Style of Hotel Building | Visual (89%) | 63.8% | 10.7% | 10.7% | *14.7%* |
| Style of Public Areas | Visual (90%) | 46.9% | 13.6% | *23.7%* | 15.8% |
| Style of Room | Visual (95%) | 62.1% | 9.6% | *19.8%* | 8.5% |
| Technolog. Equipment* | Text (92%) | *38.4%* | 4.5% | 16.4% | 40.7% |
| Temperature Control* | Text (93%) | *34.5%* | 4.0% | 16.4% | 45.2% |
| Type of Bed** | Text (65%) | 68.9% | 4.5% | 8.5% | *18.1%* |
| View from Room* | Visual (94%) | 55.4% | 13.0% | *22.0%* | 9.6% |

The main aim of the investigation was to find out which information attributes, in the opinion of customers, are best conveyed by static pictures, videos or virtual tours. Thus Table 2 also indicates how respondents rated the suitability of a specific VPF for each of the information attributes. The agreement percentages for each VPF were

assigned to each information attribute. The percentages that go with the VPFs that were rated most suitable are shaded in dark grey. The numbers of the VPFs that were second-best for presenting the corresponding information attribute are in italics and shaded in light grey.

Three-quarter of all information attributes can be presented most effectively with static pictures, in the opinion of those surveyed. As regards the information attributes of room temperature control, technological equipment and additional infrastructure, the respondents were indifferent between the three VPFs. According to the second column in Table 2 these information attributes are obviously preferred as text. But the respondents clearly consider static pictures to be superior to the other VPFs in transmitting the different information attributes, since static pictures always exhibit either the highest or second-highest agreement rate among the different VPFs.

Static pictures are followed by virtual tours that came second for seven information attributes and occupy the first place in two cases. Namely, the room layout and the overview of the hotel complex can be conveyed better by means of virtual tours. However, the participants regard static pictures as almost equally suitable for giving an overview of the hotel complex (difference of only 1.7 percentage points).

Videos, on the other hand, do not appear to be most suitable for any of the information attributes. They were most frequently mentioned for the brightness of the room and the hotel setting. Nevertheless, in both cases pictures were again believed to better convey these information attributes.

## 4 Discussion

As can be seen in Table 2, the respondents prefer text over VPF wherever the information can be conveyed through the listing of hard facts, like facility lists. VPFs, however, are considered more adequate for presenting information attributes that need to be circumscribed by adjectives and answer the question of how something is, like an object's style (soft facts), rather than what it is or what it includes (hard facts). VPFs facilitate evaluative judgments depending on aesthetics, taste or sensory experience because pictorial information can be processed simultaneously (Holbrook & Moore, 1981). Regarding this kind of information, especially information about styles seems to be less relevant for customers.

The room layout and the overview of the hotel complex, which are also considered by the survey participants as less relevant, can be conveyed best by means of virtual tours. The two information attributes both convey spatial aspects, which may be more difficult to present with individual pictures that show static views on a room or the hotel complex.

The information most important to the customers is hard facts about the core service. That is the hotel setting, followed by information on the bathroom fittings, the bed, leisure and catering facilities. Because they refer to listed facts which are received and handled sequentially the three latter ones are to be presented best by text (Paivio, 1971). The two most relevant hotel information attributes for customers can be provided best by means of static pictures as it is described above.

Concerning the different VPFs, pictures are effectively the basic building blocks for videos or virtual tours. As mentioned earlier the presentation or arrangement of the pictures varies depending on the VPF. In videos, a series of many, very slightly differing images are shown in extremely rapid succession, thus creating the impression of movement. In virtual tours, however, a series of pictures in a geometric composition are joined together into a panorama, creating the impression of a three-dimensional space. The individual information attributes are always to be found in pictures. A sufficiently large selection of pictures may therefore convey the same amount of information as a video or a virtual tour. Only the cognitive effort by the customer is greater, since he must recognize associated pictures and put them together in his head. However, this is not seen as a disadvantage by the respondents, which is why, for them, pictures are sufficient in most cases for conveying information.

A further reason for the great popularity of pictures in the search for information probably is that customers are more used to this format than to newer ones like videos or virtual tours. Moreover, pictures are also easier to use because of their limited interactivity (Hyun et al., 2009; Steuer, 1992). With a video, the visual content cannot be fully determined. It may be necessary to wind forward and backward until the required information is found. Likewise, in a virtual tour a customer first has to click through different panoramas until he finds the required information. A simple picture gallery, on the other hand, gives the customer an overview of the visual content and enables the required information to be selected quickly. The degree of control over the visual content is therefore greater with pictures than with videos or virtual tours.

### 4.1 Practical Implications

For practitioners in the hotel business the following implications can be drawn. Overall, the hotel website should provide information about the setting of the hotel, the bathroom fittings, the bed type, the leisure and the catering facilities. Furthermore, customers seem to prefer pictures over other VPFs when evaluating hotels. This may be due to the circumstance that pictures, especially if chosen well, show at a glance what the customer needs to know without having to actively search for it.

Text also plays an important role in communicating information about the hotel, especially where it is possible to explicitly list facts, such as for the technological equipment or the temperature control. Including text-based information on the website would especially suit women and more experienced users. A well-structured web page that shows the soft facts (e.g. styles and layouts) of the hotel by including static pictures and describes the hard facts (e.g. leisure or catering facilities) with the help of text is thus recommended. To add some fun and entertainment to the web page and enhance the user experience, virtual tours seem to be preferable over videos.

Virtual tours may especially become more relevant to the customers after having screened the most important information about the hotel and when they wish to get more in-depth information about what it will be like to stay at the hotel. In this case the room layout of hotel bedrooms and the overview of the hotel complex can be captured better by virtual tours than by other VPFs. Videos are not perceived superior to other VPFs at all. They could at best be used in addition to supplement pictures, in order to provide a better idea of the brightness of a room or the setting of the hotel.

### 4.2 Limitations

The findings illustrate to hoteliers which information is to be presented, and how, in order to obtain information benefits for customers. However, the list of visual hotel information attributes does not claim to be exhaustive. It is possible that further, physically representable information elements exist, which are not listed. For example a further breakdown of individual categories such as additional infrastructure or leisure facilities might lead to other information attributes. Furthermore, these attributes are oriented towards the hotel business. The information catalogue may be used as a guide, but – like the results of the study – it cannot be directly transferred to other industries. Owing to the heterogeneity of services as regards tangibility, it would be necessary for the information attributes to be significantly adapted to use for other sectors.

Moreover, this study focuses on static pictures, videos and virtual tours. However, there exist other presentation formats which cannot be clearly assigned to any of these categories. For example animated graphics, webcams or three-dimensional computer animations were not included in the study because they are rarely used on hotel websites (Wüthrich, Blattmann, Grüter, & Myrach, 2009). In addition to this limitation there may be diverse judgements on the quality of VPFs which were also not considered in the study. For example, a good video may outperform a mediocre picture or virtual tour.

Since the survey carried out an explorative study, certain subjectivity on the part of the respondents was consciously taken into account. In order to obtain objective data about the suitability of VPFs for presenting various information elements an experimental survey design would be more suitable. In future studies it will be important to overcome these limitations.

## 5 Conclusions and Future Research

This study investigates for the first time the customers' perspective on the suitability of different VPFs for the presentation of information on the web. It focuses on the hotel business as a service industry. In the study visual information attributes and their relevance to the customers were identified. As a main contribution, the results show for each functional product attribute by means of which VPF it should be provided on the web. It also improves the understanding of the effective use of VPFs on the basis of the customers' opinions on different computer interfaces regarding the information search process.

Whilst images and text were perceived as best means for communicating most information attributes, virtual tours seem to contain just a few and videos not any additional benefits with regard to how users believe information attributes can be communicated best. Wherever the information can be conveyed through the listing of facts (e.g. facilities) text is preferred over VPF. Especially static pictures are considered more adequate for presenting information attributes that need to be circumscribed by adjectives and answer questions of how something is rather than what it is or what it includes (e.g. object styles). Customers find virtual tours to be

best used for overviews of the room or the hotel. Hoteliers may use the findings as guidelines for designing visual information on their websites.

In future research the findings, which are based on exploratory research, have to be verified, e.g. by means of case studies or experiments. In order to obtain objective data about the suitability of VPFs for presenting various information elements, an experimental survey design should be conducted. Interviews with hotel customers could verify the presented items of hotel information and lead to a more detailed list of information attributes that can be visualized. For a further validation of the results in future studies the findings should also be adapted to other business sectors, technologies (e.g. mobile phones) and expanded by other VPFs.

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# Virtual Experience on Hotel Websites: A Web Analysis

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## Abstract

Visual presentation formats (VPFs) enable a hotel service offering to be experienced virtually on the web prior to purchase. This study addresses the potential benefit of VPFs for providers, taking the Swiss hotel business as an example. A web analysis examines for the first time the prevalence of individual VPFs in the Swiss online hotel market. While pictures appear on nearly every website, the use of videos and three-dimensional (3D) presentation formats is much less common. These two formats are found primarily on websites of higher-end hotel establishments. Based on the results, implications of VPFs for hoteliers are derived. It has been shown that websites in the Swiss online hotel market can be differentiated from the competition through the use of videos and 3D presentations, and this in turn could have a positive impact on brand awareness, image and confidence in the hotel on the part of the customer.

**Keywords:** Virtual Experience, Visual Presentation Formats, Swiss Hotel Business, Web Analysis.

## 1 Introduction

A representative and innovative website enables hotels to present themselves and the services they offer (Schegg, Steiner, Jufer, & Liebrich, 2005). A promising solution to allow customers to experience the hotel offering is the use of visual presentation formats (VPFs), including pictures, videos and three-dimensional (3D) formats (Cho, Wang, & Fesenmaier, 2002; Herstell, 2008). In the context of the impact of VPFs, the literature uses the term virtual experience (Jiang & Benbasat, 2005, 2007a; Li, Daugherty, & Biocca, 2001). Virtual experience is of particular relevance to hotel services. Like many other services, a hotel stay is an intangible and, as such, its quality features cannot all be examined prior to purchase; consequently, compared to physical products, it carries a higher purchasing risk (Koernig, 2003; Parasuraman, Zeithaml, & Berry, 1985). Services do, however, also possess distinctly tangible components, including for example, physical fixtures and fittings, work equipment and the appearance and impression of staff (Engelhardt, Kleinaltenkamp, & Reckenfelderbäumer, 1993; Parasuraman, et al., 1985). These can be used as reference points for judging the quality of the service (Müller, 2004; Parasuraman, Zeithaml, & Berry, 1988). Normally, the tangible components of a service cannot be experienced until during or after purchase; consequently they are classified as experience attributes (Nelson, 1970). Using VPFs, however, it is possible to experience some of those attributes (virtually) on the web prior to purchase (Wright & Lynch, 1995).

This raises the question of the extent to which hoteliers benefit from enabling customers to have a virtual experience of their service through the use of various VPFs. Indeed, evidence already exists of many positive effects of virtual experience (Chiou, Wan, & Lee, 2008; Daugherty, Li, & Biocca, 2008; Griffith & Chen, 2004;

L. Cantoni and Z. Xiang (eds.), *Information and Communication Technologies in Tourism 2013*, DOI: 10.1007/978-3-642-36309-2_34,

Park, Lennon, & Stoel, 2005; Park, Stoel, & Lennon, 2008). However, studies into this often focus on products and the mediation of information by 3D formats (Edwards & Gangadharbatla, 2001; Kim & Forsythe, 2008, 2009; Suh & Lee, 2005). Yet, pictures and videos are a particularly efficient means of delivering information about hotels, as the implementation of 3D formats can be significantly more costly and more complex compared with the other VPFs (Herstell, 2008; Wüthrich, Blattmann, Grüter, & Myrach, 2009).

In terms of the benefit they provide, the prevalence of individual VPFs is of key importance. The more a particular format is actually used, the less potential it offers for differentiation from the competition. The use of particular VPFs on hotel websites could offer hoteliers certain benefits, if use of these VPFs is not very widespread in a certain online hotel market. This is why, taking the Swiss hotel business as an example, a web analysis will be used to show which VPFs are found on hotel websites and how frequently, and what potential benefit can be achieved as a result. The differences between individual hotel categories will also be considered. Data on the prevalence of VPFs in the Swiss online hotel market has not been collected before. The aim, ultimately, is that the results of the study should lead to a better understanding of the potential benefit of VPFs for providers in the context of virtual experience.

The rest of the paper is organized as follows. A theoretical description of various VPFs in the context of virtual experience is followed by a presentation of the methodology and results of the web analysis. The web analysis is intended to identify the prevalence of VPFs in the Swiss online hotel market; the impact this has on certain benefit variables is then discussed and implications for practice are derived. After a discussion of limitations and implications for future research, the work concludes by summarizing the key findings of the study.

## 2 Theoretical Background

This section will explain the role of various VPFs in the creation of virtual experience as part of a hotel service offering. We will start by discussing virtual experience in the context of the hotel business. VPFs relevant for the study are then presented and their potential for generating virtual experience is demonstrated.

### 2.1 Virtual Experience in the Hotel Business

Virtual experience is when a product or a service can be experienced on the web by means of VPFs (Cho, et al., 2002; Griffith & Chen, 2004; Grüter & Myrach, 2012; Jiang & Benbasat, 2005). The experience involves interaction with 3D or two-dimensional (2D) presentation formats (Chiou, et al., 2008; Jiang & Benbasat, 2007a; Li, et al., 2001; Park, et al., 2008; Wan, Tsaur, Chiu, & Chiou, 2007). The methods of interaction include visual controls such as zoom and rotation as well as functional controls, for instance clicking on buttons with the mouse to produce a corresponding response by the VPF (Li, et al., 2001; Suh & Lee, 2005).

The suitability of products or services for information mediation by VPFs on the web depends critically on their sensory attributes (Suh & Lee, 2005). Virtual experience can be used to mediate visual, auditory or functional information (Li, Daugherty, &

Biocca, 2003). Olfactory or tactile information, by contrast, cannot be conveyed over the web (Keng & Lin, 2006). In the case of a hotel offering, while for example the comfort of a bed (tactile) can be assessed by 3D and realistic presentation formats, it is only by actually trying the bed that a definitive judgment can be made (Li, et al., 2003). Given that hotel guests themselves are part of a hotel's offering, many visual, auditory or functional attributes, as well as other attributes – the friendliness of hotel staff, for example – cannot be experienced or judged until the guest is actually staying in the hotel (Koernig, 2003; Stafford, 1996). On the other hand, tangible attributes such as the layout and furnishings of the hotel room, equipment at reception, the external appearance of personnel or a tangible output such as the taking of a souvenir photograph at dinner can be represented in advance (Engelhardt, et al., 1993; Parasuraman, et al., 1985). These visual attributes can be experienced through visual control, for example the ability to select and enlarge pictures, fast forward and rewind videos and zoom and rotate panoramas. In this way, VPFs can enable a hotel offering to be experienced on the web, prior to purchase (Jeong & Choi, 2004).

For a virtual experience of a hotel, the viewer is seated physically in front of the computer and feels transported into a virtual location by the VPF (Shih, 1998). This is explained by the construct of telepresence. Telepresence is the experience of presence in an environment by means of a communication medium (Steuer, 1992). The virtual environment is of special significance in terms of the hotel business. Simply portraying a product in an empty space (against a white background, for example) indicates a low level of telepresence. In the case of services such as the hotel industry where physical spaces constitute an important part of the offering (Koernig, 2003), telepresence is higher. VPFs enable hotel facilities to be assessed visually prior to purchase, by giving the viewers a sense of presence in the hotel (Jeong & Choi, 2004). In the hotel business, therefore, virtual experience is understood to mean experiencing a physical space by representing it using VPFs (Cho, et al., 2002). In this context, virtual experience and telepresence are almost synonymous (Grüter & Myrach, 2012). Which VPFs enable virtual experience will be discussed next.

### 2.2 Visual Presentation Formats

When considering VPFs, a distinction can be made between 2D and 3D formats. 2D formats consist essentially of individual pictures or photographs presented in one plane, defined by height and breadth. Static pictures and videos come into the category of 2D formats (Hansen & Neumann, 2005). Static pictures are placed in isolation on a web page or are integrated into a gallery or a slide show (Wüthrich, et al., 2009). With video, a sequence of images is played in a manner similar to an automatic slide show. Unlike the automatic slide show, however, with video the image sequence cadence is so high that the pictures are no longer perceived as individual images, instead they produce a flowing motion (Hansen & Neumann, 2005; Jiang & Benbasat, 2007a).

Compared to 2D formats, 3D formats have a depth dimension, in addition to breadth and height and this enables computer-generated geometric objects, such as cubes for example, to be created (Bauer, 1996; Chen, 1995). The implementation of pictures into these objects enables environments to be represented in three dimensions (Herstell, 2008). VPFs which are able to generate 3D environments based on the use

of geometric objects, are described collectively as 3D formats in this study. These include, for instance, virtual tours consisting of linked 360° panoramas where static pictures are arranged in a geometric space (Kwiatek, 2005). They also include virtual reconstructions, the only VPF to be based not on static pictures but on computer-generated graphics (Bauer, 1996).

The individual VPFs can each produce a different degree of telepresence. The higher the telepresence in a VPF, the more closely the virtual experience resembles the actual experience (Klein, 2003). Steuer (1992) and Hyun et al. (2009) attempted to determine theoretically the potential of VPFs to mediate telepresence. They classified VPFs according to the two variables, interactivity and vividness, which are also defined as determinants of telepresence (Coyle & Thorson, 2001; Khalifa & Shen, 2007). Steuer (1992) defines interactivity as the degree to which an individual can modify the form and content of a mediated environment in real time. Interaction may involve, for example, manipulating a virtual object or navigating through a virtual space (Herstell, 2008). Vividness is a technical aspect referring to the ability to transmit information over several parallel channels (Fiedler & Gallenkamp, 2008). It covers the number of channels of a medium which engage different senses simultaneously (for example, graphics, sound, speech, mimic or gesture), as well as the resolution or quality of the particular channel (Fiedler & Gallenkamp, 2008; Steuer, 1992).

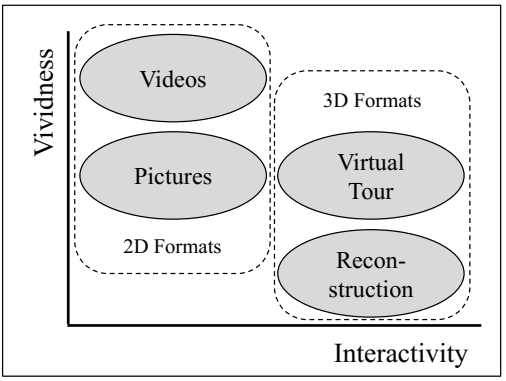


**Fig. 1.** Classification of VPFs according to telepresence

Figure 1 shows how the two studies classify the different VPFs based on their interactivity and vividness (Hyun, Lee, & Hu, 2009; Steuer, 1992). Assuming that the quality of the presentations is of the same standard in each case, videos by virtue of using the visual and auditory channel possess higher vividness than pictures or 3D formats which convey only visual information. Virtual reconstructions are not based on photorealistic underlying modules, consequently they are ranked lowest for vividness. In terms of interactivity, 3D formats are superior to videos and pictures. With static pictures, interaction is limited to selecting and enlarging individual pictures, while videos only have fast forward, rewind or pause options. In addition to actions such as rotate or zoom, 3D formats also support the integration of functional

responses of objects (Li, et al., 2001; Suh & Lee, 2005). Overall, pictures exhibit the lowest level of telepresence. Videos generate as high a level of telepresence on the basis of vividness, as virtual reconstructions can produce on the basis of interactivity. Due to their medium level of vividness and their high level of interactivity virtual tours have the highest level of telepresence. Accordingly, videos and 3D formats should be more significant for virtual experience than static pictures.

# 3 Web Analysis

The aim of the web analysis was three-fold. First, to investigate how prevalent the individual VPFs already are on Swiss hotel websites. Second, to identify any difference in prevalence between different hotel categories. Finally, based on the results, to draw conclusions on the prevalence and relevance of VPFs in the Swiss hotel business. In this section methodology and results are explained.

## 3.1 Methodology

The data collection grid used for the web analysis was a category system in which the instances of various criteria (categories) were recorded in coded form. The criteria consist of the presentation formats pictures, videos, 360° panoramas, virtual tours, virtual reconstructions plus the additional category, text. The instances were recorded in each case with the codes 1 for "present" and 0 for "not present". The presentation formats were only recorded, if they showed, or in the case of text, described, either the public areas (e.g. lobby, restaurant, swimming pool etc.) or the guest rooms of the hotel. Four coders analysed 1,462 hotel websites in the period from Oct. 16, 2009 to Dec. 10, 2009. The intercoder reliability calculated with Holsti's method constitutes a reliability coefficient of R=0.96. This means that the four coders recorded 96% of all instances identically (Mayring, 2008). The hotels analysed were 932 three-star, 442 four-star and 88 five-star hotels, registered with the Swiss hotel association hotelleriesuisse (www.hotelleriesuisse.ch [Oct. 8, 2008]). Originally the sample for the web analysis comprised 1,488 hotels. Not included in the sample are 26 hotels which did not have their own website or their website did not display. This meant that in 2009, 98.25% of the three- to five-star hotels registered with hotelleriesuisse had their own website. With reference to these hotel categories, a full survey was conducted (Früh, 2011). Lower-category hotels were not included as these presumably have only limited resources available to create their website and therefore rarely use different VPFs. The aim here was to obtain more meaningful information on the differences between the various VPFs.

## 3.2 Results

In the descriptive study design, the results were analysed using descriptive, univariate methods (Homburg & Krohmer, 2003). In most cases, these are relative frequency distributions of the type normally used to evaluate content analyses (Mayring, 2008). First, it was calculated how many different presentation formats Swiss hoteliers use on their websites to visualize public areas and guest rooms. As can be seen in Figure 2 the majority of hotels, 76.1%, use two different presentation formats for their website. Three presentation formats are found on 20% of all websites and 2.5% have as many as four different formats. A minority promote their offering with only one or indeed

none of the presentation formats in the study. The latter use no text, for example, instead they simply provide the hotel's contact details, sometimes accompanied by a picture. In these cases, the website serves as an online business card. Others may use words to describe what the hotel has to offer, but add no pictures which show the hotel facilities.

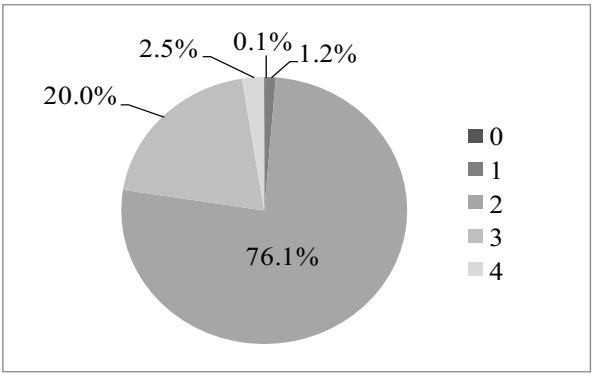


**Fig. 2.** Number of presentation formats used per hotel

At the time of the study, two hotels were using neither pictures nor a text-based description of the facilities. Furthermore, it turned out that the higher the hotel classification, the more different presentation formats are used on the websites. Correspondingly, the mean value of the amount of presentation formats within three-stars hotels (2.17) differs with $p<0.01$ significantly from the one of higher-end hotels. The mean values of the four- (2.31) and five-star hotels (2.56) are also different with a significance level of $p<0.1$.

In most cases, however, text and pictures are present on the websites. As the chart in Figure 3 shows, these two presentation formats are each found on 99% of all websites. By contrast, other VPFs are encountered much less frequently on hotel websites. At 13%, video is provided to approximately the same extent as 360° panoramas, for which the figure is 12%. Virtual tours are implemented on only 1% of all websites, while no example of a virtual reconstruction could be found.

Figure 4 shows the relative frequencies of VPFs in relation to websites in individual hotel categories. Given their low frequency of use, 360° panoramas and virtual tours have been combined into a single category, 3D formats. For the picture category, we can see that all four-star and five-star hotels provide pictures on their websites. Only 1% of the three-star hotels make no use of this VPF. These few hotels do not represent their facilities visually. At most, they are described using text. While, in absolute terms, videos and 3D formats are found most frequently on the websites of three-star, followed by four- and five-star hotels, the ranking is reversed when considering relative frequencies. While 9% of the websites of three-star hotels contain videos and 10% contain 3D formats, the corresponding figures for four-star hotels are 17% and 16%. Videos and 3D formats are found most frequently on the websites of five-star hotels, with 31% having videos and 25% 3D formats.

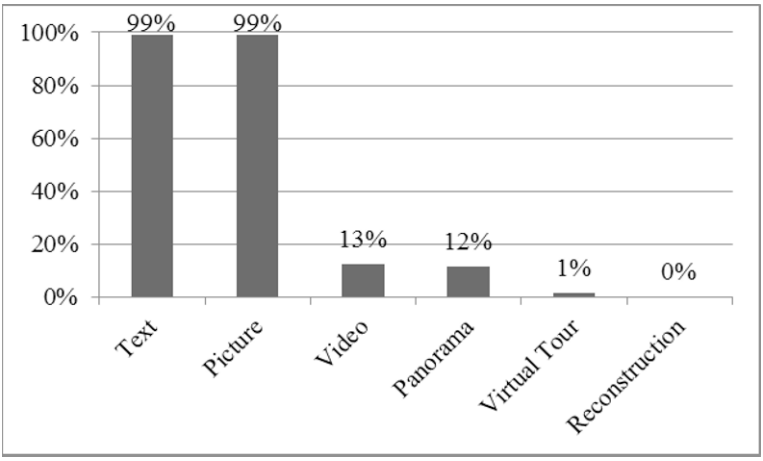


**Fig. 3.** Overview of the presentation formats used

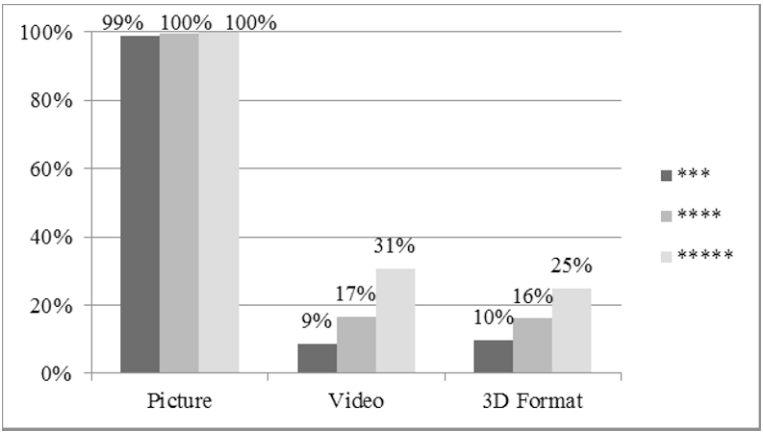


**Fig. 4.** VPFs used according to hotel category

The frequency distribution for videos and 3D formats suggests that the higher the star rating of the hotel, the more likely it is to have a video or 3D format on its website. As the dataset meets all the necessary requirements, cross tables with the corresponding chi-square values could be generated to check this assumption (Brosius, 2008). The chi-square values of both VPFs compared with their use in the three hotel categories show a significance level of $p<0.01$. The differences in the frequency distributions are thus significant. The assumption that higher-end hotels are more likely to provide videos or 3D formats on their websites is confirmed by these results.

# 4 Discussion

Based on the findings, in this section, implications for practice will be drawn. This is followed by a description of limitations which have to be considered in the present study. Finally, future research on VPFs regarding virtual experience is discussed.

## 4.1 Managerial Implications

Various studies have shown that benefit variables including attitude towards brand, shopping enjoyment and purchase intention can be achieved through pictures, videos and 3D presentation formats (Chiou, et al., 2008; Daugherty, et al., 2008; Jiang & Benbasat, 2007b). In some cases, videos are superior to pictures (Khalifa & Shen, 2007; Klein, 2003; Li, et al., 2003; Park, et al., 2005). 3D formats are, however, best at achieving the intended effects (Jiang & Benbasat, 2007b; Li, Daugherty, & Biocca, 2002; Suh & Lee, 2005). Videos and 3D formats are therefore preferable to pictures. The results of the web analysis provide another reason why videos and 3D formats should be used on hotel websites. Usually, no more than two different presentation formats are used to promote hotel facilities on hotel websites in Switzerland. These are primarily text and pictures, which are found on virtually all of these websites. Most Swiss hotels already enjoy the beneficial effects of pictures. By providing additional VPFs, hotels could make themselves stand out from the crowd. At present, videos and 3D formats such as 360° panoramas or virtual tours are the main candidates for delivering a better visual information offering as a means of differentiation from the competition. Virtual reconstructions, on the other hand, are not recommended. It is assumed that hoteliers would prefer to portray their facilities by means of real photographs rather than abstract virtual reconstructions as spaces depicted photorealistically are easier for the consumer to visualize.

Three benefit variables should be cited which are assumed to be positively influenced specifically by videos and 3D formats because their prevalence has so far been relatively low on Swiss hotel websites. These three benefit variables are brand awareness, image and confidence in the hotel. First, these two VPFs would extend the information offering beyond the standard presentation formats. The use of videos or 3D formats could reinforce the consumer's memory of the website and the hotel, as these VPFs do not appear on other hotel websites and for that reason make a particular impression. This, in turn, would have a positive impact on brand awareness. Second, by using newer VPFs such as videos and 3D formats, a hotel can project an innovative, modern image. Third, the use of additional VPFs would not only give consumers more information, they would also be able to decide for themselves how to access that information and this would increase confidence in the information provided. Not only would this enhance information transparency but the ability to choose how information is visualized also increases customer focus and this, in turn, could have a positive impact on image.

No differences were identified between the use of videos and 3D formats. However, videos and 3D formats incur significantly higher costs than text or pictures (Wüthrich, et al., 2009). This could explain why higher-end hotels are more likely to provide videos or 3D formats. Higher-category hotels tend to have more resources at their disposal than lower-category hotels and so are more able to afford to produce more costly VPFs such as a video or a virtual tour. Given the benefit outlined above, it

could however be worthwhile for lower-end hotels too to supplement their information offering with at least one other VPF in addition to text and pictures. At present, it is true to say that the lower the hotel category, the fewer VPFs are provided which means that the potential for differentiation in terms of brand awareness, image and confidence in the hotel is all the higher.

### 4.2 Limitations

The Swiss hotel business was used in this study as a case example. As a representative sample of all Swiss three-, four- and five-star hotels, the websites of those hotel establishments registered with hotelleriesuisse at the start of the study period were analysed. The results are therefore not informative for one- and two-star hotels but according to hotelleriesuisse these account for less than 20% of all hotel establishments in Switzerland (www.hotelleriesuisse.ch [Apr. 26, 2012]). Moreover, other presentation formats exist in addition to the VPFs proposed in this study. These are mostly hybrid formats comprising pictures, videos, panoramas or virtual tours. Examples include animated pictures, 360° video panoramas and interactive virtual tours which are enriched with videos and pictures. It would be desirable to include such VPFs in any future studies. Finally, with the web analysis method, non-verifiability is an issue as website content is constantly changing or disappearing (Welker et al., 2010). To overcome this problem as far as possible the study process was described precisely and narrow time windows for data collection were defined (Herbers & Friedemann, 2010). Archiving of the study units was not possible as these were dynamic web pages for the most part.

### 4.3 Future Research

Future studies should examine the proposed effects using quantitative empirical methods. Another question to be addressed is what advantages VPFs have for other service sectors in addition to the hotel sector considered here and whether the results of this study are transferable to those sectors. Adapting the results to another sector could provide additional validation for the results of this study. The disadvantages of VPFs should also be considered. These might include, for example, variables from a provider perspective such as implementation costs of VPFs or the interchangeability of visual content. From a consumer perspective, variables such as ease of use, usability and cognitive overload could play a role in this context and have a negative impact on the benefit for providers. Furthermore, future studies should also analyse more closely the content mediated by VPFs. The aim of a potential hotel guest looking at a VPF is to obtain information about the hotel offering that is as comprehensive as possible. Further studies could, for example, examine which VPFs are best able to mediate specific information attributes.

## 5 Conclusions

The present study discusses potential beneficial effects of virtual experience for providers based on different VPFs on Swiss hotel websites. By focusing on the hotel sector, the construct of virtual experience was considered in a service context, which has rarely been done before. The web analysis describes for the first time, the prevalence of different VPFs in the Swiss online hotel market. As well as the

frequency of VPFs on hotel websites, differences between hotel categories were also considered. The results of the web analysis show the benefit that could be achieved from the low prevalence of certain VPFs in the Swiss hotel market. The majority of hotels provide primarily text and pictures on their websites. While 3D formats are a key focus in the literature on virtual experience, they are not used all that often in practice. This suggests that their potential has not yet been recognized by Swiss hoteliers or that they are seen as having a downside too. Similarly, videos are not used that often on hotel websites. Videos and 3D presentation formats tend to be used by higher-end hotels. With reference to these two VPFs, the web analysis makes clear that there is potential for differentiation from other hotel websites. Specifically, these two VPFs can enhance brand awareness, image and confidence in a hotel.

The study fills part of a research gap on virtual experience by highlighting the benefit of VPFs for providers in a service context. Furthermore, practitioners from the hotel industry are shown potential for differentiating themselves from the competition using certain VPFs and thus enhancing certain benefit components. The ultimate aim is that the results of the studies will lead to a better understanding of VPFs in the context of virtual experience, so that these can be used effectively by providers, enabling the potential for benefits to be leveraged.

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# What Matters to The Industry? An Evaluation Framework for the Adoptability of Online Tourism Distribution Platforms

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## Abstract

Research identifying determinants of the adoption for Online Tourism Distribution Platforms by small operators is lacking. A number of solutions have been developed without addressing their needs. In an attempt to address this gap of research, this paper undertakes a series of interviews and focus groups of the European tourism industry. The findings provide the baseline for developing a framework to evaluate the *adoptability* of Online Tourism Distribution Platforms by SMEs. The framework is applied to evaluate a number of extant technological solutions. Theoretical, methodological and industry implications are outlined in the paper.

**Keywords:** B2B, B2C, Online Distribution, ICT Adoption, Standardisation.

## 1 Introduction

In the last five decades the distribution of the tourism industry has been transformed through the development of ICT. This transformation first started through the use of in-house computers in the 50s, it was then followed through the GDS developments in the 60s and 70s, which connected companies worldwide (Sheldon, 1997); and it evolved to the Internet and web service developments in the 90s and 2000s which enabled the direct interaction of consumers with the supply chain (Buhalis, 2003). With regards to the web services, a specific aspect which has been extensively researched and developed has been that one of B2B2C distribution. The literature outlines examples of solutions, which in the last 15 years have helped overcoming technical issues related to Online Distribution. This includes reference to DMSs (Rita, 2000); standardisation in tourism (Missikoff et al., 2003); and B2B2C applications (Liu, 2005). Nevertheless, statistics suggest that overall the adoption of B2B and B2C technology remains at surprisingly low levels. For example, only 67.9% of the Spanish hotels (Fundetec, 2009) and 74% of the Italian establishments (ISTAT, 2012) have online booking facilities. Although higher levels of adoption may be found in other European countries, these figures are even lower if we extend the search to the entire tourism industry. According to PhocusWright (2011) the European online travel market has a penetration of only 36%.

L. Cantoni and Z. Xiang (eds.), *Information and Communication Technologies in Tourism 2013*, DOI: 10.1007/978-3-642-36309-2_35,

The literature suggests some barriers of adoption of information technologies by SMEs and SMTEs (Small and Medium Tourism Enterprises). However, according to Reino et al. (2011) business characteristics may influence the adoption of systems differently. Limited work has focused on understanding the issues affecting B2B2C distribution among SMTEs. Additionally, the existing technological solutions show little consideration of the needs presented by SMTEs. This suggests a gap in research, which will be addressed through this paper. Based on the results from a series of interview and focus groups with European tourism operators, this paper develops and applies an evaluation framework for the *adoptability* of online distribution platforms. This is a framework to assess whether online distribution solutions fulfil the requirements of SMTEs for their adoption. Findings will be especially valuable for those involved in developing adoptable online distribution technology for the tourism industry. The research was generated through the EU-funded project TOURISMlink, financed through the DG Enterprise and Industry. The objective of the overall project is of facilitating and accelerating the digital connections between small local service providers in the broader tourism industry (hospitality, tourism, culture and leisure), and larger intermediaries (GDSs, OTAs and travel agencies), in order to increase their competitiveness.

## 2 Literature Review

Today the tools for exploring the available information in order to make a decision, as well as those enabling bookings, are mainly provided through the Internet (Poon, 1993; Buhalis, 2003). These play an important role in alleviating the historical and almost natural information asymmetry. Furthermore, they can give quite a large contribution to making destinations more attractive for the tourists (e.g. Pan and Fesenmaier, 2006). A quick confirmation comes, for example, from the World Economic Forum (WEF, 2011). As Fig. 1 shows, there is a clear positive and significant relationship between the overall tourism competitiveness index, and the quality of the ICT infrastructure (left) or the level of business usage of ICTs by tourism companies (right) in the countries examined.

The way in which the main tourism actors interact determining the structure of the tourism value chain has been also strongly influenced by the advent of Internet and e-commerce and is likely to be continuously reshaped further to the progress and innovation in Information and Communication Technologies. Recent studies on the behaviour of tourists while decide on a goal for their travels highlight that a destination is chosen as a whole, well before deciding which specific structure (hotel, attraction, etc.) to visit. Moreover, tourists seem to be more attracted by the richness and the variety of the offer rather than being driven only by economic considerations (price) and spend some time before deciding. In this time they make a number of comparisons on all the aspects they (individually) deem important. Decisions and changes can be very fast if tools are available to perform the choice and their final preference goes to destinations that are able to provide them with a full choice and personalization of all (or most) of the elements of their stay. Single operators, unless having high level of capacities and resources to deliver, can be less attractive and competitive than well organized groups.

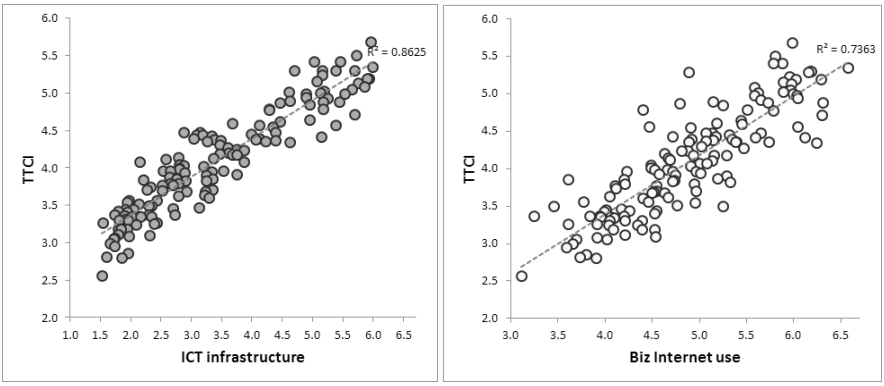


**Fig. 1.** Relationship between ICT infrastructure (left), level of business Internet usage (right) and the Tourism Competitiveness Index (TTCI). Source: WEF, 2011

ICTs have been crucial in bringing together the key players of the industry, namely the demand, consisting of very heterogeneous consumers; the supply, typically located in a particular tourist destination; and in between, intermediaries, which put together and sell the different tourism services to the customer. If the number of employees per enterprise is considered, the European tourism industry seems to be characterized by the high prevalence of SMEs. If the food and beverage sub-sectors are also considered, large enterprises (employing more than 250 persons) account for only 0.2% of the total number of active companies making the rest 99.8% belonging to the so-called SMTEs (micro, small and medium tourism enterprises: respectively 1-9 employees, 10-49 and 50-249). Even though with a very limited presence (especially in new member states), it should be acknowledged that large companies are responsible for 20% of the European tourist labour force and for 30% of the turnover yielded in the industry. This shows that overall the tourism industry is composed of very small operators, which entail their limited adoption of ICT.

### 2.1 Barriers and Drivers of ICT Adoption by SMTEs

Rogers (1969) is a key reference in research about adoption of innovations, which also includes the adoption of ICT. His work "The diffusion of innovations theory" refers to a collection of models, explaining the process by which innovation, including ICT, is embraced by users. According to his model, diffusion refers to the process by which an innovation is transferred through the communication channel to the members of a social system. The adoption of an innovation is initiated with the identification of a problem which is considered solvable through this adoption, and originated from a small number of centralized legitimising individuals and diffused to the other individuals of the system through the available communication channels. Therefore, four different elements determine the process: the characteristics of the innovation, the social system, the communication channels and the time factor.

In relation to the characteristics of the innovation, these include relative advantage, compatibility with potential user, its complexity, degree to which this can be experimented before its full adoption and visibility of its results. The social system

will influence the adoption in terms of whether this provides a framework for optional, collective or authority-based decisions to adopt innovations. The communication channels may favour or interfere in the diffusion of information from the small number of centralized legitimising individuals who initiate the adoption to the other individuals of the system. Finally, the time factor is defined by five different stages of adoption, the rate of adoption and the type of adopters.

The barriers and drivers of ICT adoption have been studied in many diverse sectors. Some of the studies here presented are tourism specific while others are not. Most of the research takes into consideration the work by Rogers (1969), and builds upon his framework or at least takes his views into careful consideration. Therefore, the work examining the barriers and drivers of adoption can be classified following Rogers' (1969) framework, i.e. (i) based upon the characteristics of the innovation, (ii) the social system in which the individual organisations operate, (iii) the communication channels through which the innovation is diffused and (iv) the time factor (this refers to the stages of adoption, the rate of adoption and the type of adopters).

(i) With regards to the characteristics of the innovation, Rehman et al. (2006), who applied the Theory of Reason Action (TORA) to study technology adoption among farmers. Their work identified drivers related to the perceived characteristics of the innovation, these are cost effectiveness and expectation of improved results. On the other hand, lacking any of these two factors would become important barriers to adoption. Also highlighting the influence of the characteristics of the innovation are the suggestions made by Boffa and Sucurro (2012). According to these authors, to be effective, ICT tools must be flexible, widely distributed and used in a coordinated way in order to avoid unwanted consequences such as those discussed by that state that "simple" travel portals and other possibilities offered online (e.g. specialized search engines or large OTAs favoured by fragmentation of offerings) greatly reduce the search costs incurred by the users, but that this big reduction in search costs and efforts may worsen seasonality factors and push customers towards "price only" considerations (Boffa and Sucurro, 2012). Furthermore, if the technology is easy to use its adoption is most likely to take place (Davis, 1989; Venkatesh et al, 2003; Wang and Qualls, 2007).

(ii) In terms of the influence of the social system in which the individual organisations operate, the pressure made by partners, costumers, the media, or competitors has been identified as a key driver of adoption among SMEs (Iacovau et al, 1995; Kirby and Turner, 1993; Julien and Raymond 1994; Poon and Swatman, 1996; Griffin, 2004). Furthermore, issues related to security concerns have also been highlighted as a potential barrier to adoption by SMTEs (Duffy, 2010).

(iii) The availability of the required technology, and the proximity to the channel of diffusion of the innovations have been regarded by Windrum and de Berranger (2002) as key drivers or barriers of adoption, which are related to the channels through which the innovation is diffused. These authors make special reference to the influence that the lack and cost of communication infrastructures, e.g.: broadband, both fixed and mobile, have on the adoption of the technology.

(iv) In relation to the time factor's barriers and drivers of adoption, these are mainly related to the type of adopters. Within this category, the work by McGregor (1996)

looks into the endogenous barriers of technology adoption among small and medium-sized enterprises. According to this author, small businesses tend to avoid ICT into their business if it is seen as complex to use. As suggested by Reynolds et al. (1994), Cragg and King (1993), Allison (1999), small businesses generally lack of training, and technical knowledge, and lack the ability to integrate technology into the business strategy (Griffin, 2004). Also related to the characteristics of adopters Duffy (2010) suggests that issues specifically related to SMTEs, such as for example seasonality, lack of ICT applications for micro and small tourism enterprises, as well as design, maintenance and integration of old/new systems can be an important barrier to adoption.

### 2.2 Previous B2B2C Solutions

Different approaches have been taken to facilitate a comprehensive distribution of tourism services online. These have been generated both through purpose-built applications, such as DMSs, B2B and B2C platforms, as well as through some initiatives for standardising already existing technologies. These technological initiatives take very different approaches to solve the intercommunication among organisations. Details of these initiatives are outlined in Table 1.

OTA and Caval Project´s approach is that one of generating a set of standards to be embraced by the industry. Hence, through their adoption, interoperability among all industry members will be enabled. However, the reality is that this option does not suit small operators, whose technical skills are limited. Furthermore, changing internal standards implies internal re-organisation that is not always feasible. Harmonise enables the interaction of the supply chain through mapping own data format into a set of pre-established standards. Thus, the organisations participating in this initiative may keep their in-house data format, but also interact automatically with other members. The positive aspects of this solution is that it enables organisations of any size to interact with other members, without the need to change their own systems, to acquire expensive technology (e.g. Switches such as Pegasus), or to pay expensive fees to large intermediaries. On the other hand, it also presents some limitations for the complexity of the essential task of mapping own data onto pre-established standards, which can be cumbersome for those operators lacking sufficient technical skills. Furthermore, the benefit of adopting this technology is only limited to the interaction with other members of the initiative. Thus, its success heavily relies on the development of an extended network of participants.

Rezgo, Venere, Visit Technology Group and Travel Open Apps take a very different approach to address the issue. The approach taken by these initiatives consists of the provision of digital platforms instead of tools for standardisation. Nevertheless, each of them presents their own singularities. REZGO, for example is exclusively focused on the provision of tours and activities, while Venere is only operating with the accommodation sector. Furthermore, Venere is mainly for B2C and REZGO for B2B, but none of them cover the entire supply chain (i.e. B2B2C).

**Table 1.** Main Technological Solutions for Online B2B2C Distribution

| Solutions | Protocols | Data formats | Resources considered |
|---|---|---|---|
| Harmonise | SOAP | RDFS/ XML | Accommodation, activities, food and drink. |
| Visit Technology Group | SOAP, REST | XML | Accommodation (cabins, apartments, hotels, camping, hostels etc.), activities, transport (flight, ferry, cruise, train, rental car, bus). |
| OTA (Open Travel Alliance) | SOAP | XML | Flights, cruises, packages, golf, hotels, ground transportation, insurance, railways, car rentals, tour activities… |
| Caval Project | REST | XML | Accommodation, transport, travel agencies, tour operators, activities. |
| Travel Open Apps | SOAP | XML | Accommodation, transport, travel agencies, tour operators, activities. |
| REZGO | REST | XML | Tours and activities. |
| Venere | SOAP | XML | Accommodation. |

However, both Visit Technology Group and Travel Open Apps provide a comprehensive tool to facilitate B2B2C distribution of key tourism providers. Both applications are currently available at regional level mainly (Visit Technology Group in Norway and Sweden; and Travel Open Apps in the Valencia region, Spain). A fundamental difference between these two is that Visit Technology Group takes a destination-focus approach, while Travel Open Apps adopts a broader approach which facilitates its geographical expansion.

## 3 Methods

The research adopted a two-stages approach. This was specifically developed to suit the aims of the project, focused on developing a framework for evaluating the *adoptability likelihood* of Online Tourism Distribution Platforms and Solutions.

In order to support the development of this evaluation framework, the identification of suitable criteria for analysis is required. Therefore, the first step of the methods consisted of a tourism industry survey, which provided an insight into the barriers and drivers of adoption of online distribution technology. A series of focus groups and interviews were undertaken. Direct and email semi-structured interviews were administered to almost 100 practitioners and managers from twelve European countries. A number of open questions were asked on the major problems faced in using ICTs, mainly for what concerns online B2B operations (for full details see TOURISMlink, 2012). The qualitative answers (comments, observations etc.) and the notes and reports taken during the focus groups meetings underwent narrative and content analysis (Mainil et al., 2010) in order to identify key concepts expressed by the interviewees; from these we derived the items described hereafter. It was also noticed that a "saturation" (i.e. the point at which no new information or themes are observed in the data) occurred at a very early stage in the analysis (Bowen, 2008). All

these considerations allow us to be quite confident in the validity of the outcomes of this investigation.

The second step consisted of the evaluation of major initiatives which have been developed to solve issues related to the online distribution of tourism products.

# 4 Results

## 4.1 Survey and Evaluation Criteria

The qualitative analysis of the results has confirmed the drivers and barriers to adoption suggested by previous studies on ICT adoption but it also highlighted additional ones. The drivers which aligned with the literature relates to the pressure made by partners, costumers, the media, or competitors (Thong and Yap, 1995; Iacovau et al, 1995; Kirby and Turner, 1993; Julien and Raymond 1994; Parker, 1997; Poon and Swatman, 1996; and Griffin, 2004); cost effectiveness and expectation of improved results (Rehman et al. (2006); the flexibility of ICT tools and their wide distributed and coordinated used (Boffa and Sucurro (2012);); easy to use (Davis, 1989; Venkatesh et al, 2003; Wang and Qualls, 2007). The additional drivers which were identified relate to:

- Technology specifically designed for SMTEs;
- With limited invasiveness in the procedures of suppliers;
- Including capabilities for using efficiently ICTs in B2B operations;
- Interoperable with large intermediaries and aggregators (e.g. GDSs and OTAs);
- Providing standardisation of data representation and communication protocols for interoperability with other companies.
- With seamless integration features for in-house systems;

With regards to the barriers, these also extended those suggested by the literature. Aligning with extant research mention was made to issues related to security concerns (Duffy, 2010); the availability and cost of the required technology, and the proximity of the organisation to the channel of diffusion (Windrum and de Berranger, 2002); lack of training, and technical knowledge (Cragg and King, 1993; Allison, 1999); lack the ability to integrate technology into the business strategy (Griffin, 2004); seasonality (Duffy, 2010); lack of ICT applications for micro and small tourism enterprises Duffy, 2010); design, maintenance and integration of old/new systems (Duffy, 2010). However, it also highlighted a number of barriers no previously mentioned by extant literature. These are:

- the scarcity of ICT applications specifically designed for mini and micro enterprises;
- the very limited capabilities available for using efficiently ICTs in B2B operations; and

- the difficulty in collaborating with other companies due to the number of different platforms used in the industry, especially when dealing with large aggregators (GDSs or large OTAs) and lack of standardization for data.

### 4.2 Evaluation of Extant B2B and B2C Online Distribution Solutions

This section undertakes an evaluation of the different solutions which were presented through section 2.2 of the literature review. This evaluation is based upon the criteria identified through the previous section (4.1), with regards to the characteristics of the system, the innovation and the channel of diffusion. The time factor features (lack of technical knowledge, lack of ability to integrate in business strategy and seasonality) will not be applied to this evaluation, because they affect equally to all the systems.

With regards to the characteristics of *the social system*, the external pressure the systems which account with the highest level of external pressure relate to Venere and OTA. The former´s pressure relates to the high penetration of the system in the market. Although it´s worth mentioning that this pressure is only taking place with regards to hotel bookings. The latter´s pressure relates to the expansion of OTA´s standards throughout the industry. However, it is also worth considering that the penetration of this latter does not imply a barrier of entry. Systems may adapt OTA standards. Also related to the characteristics of *the social system* is the level of distribution. OTA, Venere and REZGO count with distribution worldwide. However, both Venere and REZGO focus on a limited group of operators (Venere in Hotels and REZGO in Tours and activities.

The following evaluation is based upon the criteria related to the *characteristics of the innovation*:

- *cost effectiveness:* adopting a new set of standards such as OTA, Caval Project can be highly pricy. Furthermore, online intermediaries like Venere charge costly commissions. However, Harmonise, Visit Technology Group, Travel Open Apps and REZGO provide more affordable solutions;
- *flexibility:* both Harmonise, OTA and Caval Project rate low with regards to this characteristic. Their intrinsic nature (standardisation) makes them relatively inflexible. On the other hand, Visit Technology Group and Travel Open Apps offer high levels of flexibility with tools for B2B and B2C commerce and applications for both dynamic and static packaging;
- *coordinated use:* by their nature the use of these systems is highly coordinated, involving different tourism stakeholders (e.g. consumers and providers of different types, intermediaries, etc.);
- *SMEs specificity:* both REZGO and Travel Open Apps have been designed with the small operator in mind;
- *limited invasiveness in procedures with suppliers:* all.
- *efficiency in the use of ICTs for B2B operations:* REZGO, Visit Technology Group and Travel Open Apps include specific applications to facilitate B2B operations. Harmonise, OTA and Caval Project support B2B communications but they do not have specific applications to support these

procedures. Venere does not include them because it does not support B2B operations;

- *interoperability with large intermediaries and aggregators:* Venere does not count with this type of interoperability because it does not enable B2B operations. With regards to Harmonise, Caval Project and REZGO, their scope and coverage by main intermediaries and aggregators is limited. OTA, on the other hand accounts with high levels of adoptability by main aggregators and suppliers. Finally, both the Visit Technology Group and Travel Open Apps are interoperable with intermediaries and aggregators, both online travel agencies and GDSs. Additionally, Travel Open Apps is undertaking negotiations for interoperability with Expedia, Venere, HRS and Booking;
- *ease of use:* Visit Technology Group, Travel Open App, REZGO and Venere are easy to use. On the other hand, solutions for standardisation require technical knowledge;
- *seamless integration with in-house systems:* Harmonise, OTA and Caval project can be adopted for connectivity with the in-house system. Furthermore, Venere, Visit Technology Group and Travel Open Apps provide this type of connectivity with some PMS. On the other hand, this is not the case of REZGO, which does not provide connectivity to in-house systems;
- *security concerns:* none of them has been reported to present security issues.

With regards to the channel of diffusion, the following evaluation has been undertaken:

- *limited availability of required infrastructure:* this characteristic is applicable to those solutions which focus on standardisation (i.e. Harmonise, OTA and Caval Project). This is because they imply that in-house solutions have been placed;
- *high cost of required infrastructure:* in relation to the required infrastructure of the solutions which focus on standardisation, these will imply higher cost of required infrastructure.

This analysis is summarised in Table 2. It should be noted that barriers, which imply negative characteristics, have been re-worded into positive characteristics, to facilitate their integration in the evaluation framework. This applies to “limited availability of required infrastructure” and “high cost of required infrastructure”, which were re-named to “availability of required infrastructure” and “limited cost of required infrastructure” respectively. Based on this evaluation, Travel Open Apps is the application which most closely fulfils the criteria of adoptability by SMETs, whose unfulfilled conditions both relate to elements extrinsic to the innovation (i.e. external pressure and wide distribution). Travel Open Apps is closely followed by the Visit Technology Group. In addition to the two elements lacked by Travel Open Apps, this one has not been developed taking into consideration the requirements of SMEs.

**Table 2.** Evaluation Framework for Online B2B and B2C Solutions

| | | Harmonise | VTG | OTA | Caval Project | TOA | REZGO | Venere |
|---|---|---|---|---|---|---|---|---|
| System | External pressure | | | x | | | | x |
| | Wide distribution | | | x | | | x | x |
| Characteristics of the innovation | Cost effectiveness | x | x | | | x | x | |
| | Flexibility of ICT | | x | | | x | | |
| | Coordinated use | x | x | x | x | x | x | x |
| | Specifically designed for SMTEs | | | | | x | x | |
| | Limited invasiveness in procedures with suppliers | x | x | x | x | x | x | x |
| | Capabilities for using efficiently ICTs in B2B operations | | x | | | x | x | |
| | Interoperable with large intermediaries and aggregators | | x | x | | x | | |
| | Easy to use | | x | | | x | | x |
| | Seamless integration with in-house system | x | x | x | x | x | | x |
| | Security | x | x | x | x | x | x | x |
| Channel | Availability of required infrastructure | | x | | | x | x | x |
| | Limited cost of required infrastructure | | x | | | x | x | x |

## 5 Conclusions

This paper presents the results from a piece of research which set ups the baseline for the generation of an evaluation framework of online distribution solutions for the tourism industry. It does this on the basis of *adoptability* criteria, obtained through a survey of European tourism operators. The results have important implications for academia, managers of the industry, as well as those involved in the development of software for the tourism industry. With regards to the theoretical implications, these regard to the development of understanding regarding those issues affecting technology adoption by SMTEs. Although the findings partly aligned with the suggestion made by previous research, they also highlighted some specific issues which had not been mentioned before and which are equally relevant. These related to the scarcity of ICT applications specifically designed for mini and micro enterprises; the very limited capabilities available for using efficiently ICTs in B2B operations; and the difficulty in collaborating with other companies due to the number of different platforms used in the industry, especially when dealing with large aggregators (GDSs or large OTAs) and lack of standardization for data. Furthermore, it provides a method of evaluation for tourism online distribution solutions. In relation to the managerial implications, the evaluation method provides a framework for those

involved in making decisions about the adoption of online distribution solutions, both at the supplier and destination level. Existing solutions for tourism online distribution have been very proactive in overcoming technical issues (i.e. standardisation). However, their focus on the needs of the industry, and specifically on the requirements of SMEs have been largely neglected, which, due to the structure of the industry, are essential to their success.

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## 7 Acknowledgements

The authors wish to thank the members of the TOURISMlink consortium and the DG Enterprise and Industry - European Commission for supporting the project.

# A Tagging Recommender Service for Mobile Terminals

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## Abstract

This paper introduces moreTourism, a hybrid recommendation platform that provides information about tourist resources depending on the user profile, location, schedule and the amount of time for visiting interest points isolated or combined in a route. This platform is enriched with several services, such as: mashups, socialization, and adaptive interfaces in order to enrich the users experience when visiting touristic attractions. The system is able to find touristic resources taking into account users' likes, through the use of hybrid Content-based Filtering + Collaborative Filtering techniques combined with tagging and folksonomies. To our knowledge, this is the first recommendation service oriented to mobile terminals that use extensively the advantages of Web 2.0 for social collaborative tagging.

**Keywords:** Tourism, recommender systems, mobile services, tagging, folksonomies, social networks.

## 1 Introduction

In the last years we have seen how the mobile technology has evolved to provide powerful capabilities for computation and connectivity. For this reason, the time has come for new mobile services to help users to take decisions based on their location, timetable and mobility needs.

New mobile technologies and data networks (GPRS, UMTS and HSDPA, for example), allow providing services anytime and anywhere. This is especially important for tourism, since normally tourists do not know the places they are visiting, nor which restaurants, museums or shops are available or could be interesting for them. Besides, tourism is fundamental in the economy of a country, and it is important to facilitate quality tourism, avoiding the overload of non-profiled information. Moreover, the new mobile devices equipped with a GPS and broad band access are quickly becoming more and more common.

Among these opportunities for new mobile services, those based on transportation and tourism seem highly promising, as users desire, while travelling around, to obtain a

L. Cantoni and Z. Xiang (eds.), *Information and Communication Technologies in Tourism 2013*, DOI: 10.1007/978-3-642-36309-2_36,

high range of services, for instance: based on location, time, leisure activities, transport services, pub and restaurant recommendations, etc.

In the tourism scenario, travellers usually have a limited knowledge about the city or the environment to visit, and they search for tourist information in printed guides, tourism pages or by recommendations done by friends or family. But many touristic activities are done on the run taking into account the available time, the weather conditions, the place to visit, etc. Besides, tourist activities are very connected with personal preferences depending on the profile of each person.

The main aim of personal recommender systems is to provide suggestions about the access to resources or services in order to satisfy the users' preferences and their needs. Due to the rapid growing of users' needs in the tourism scenario and the deep penetration of mobile terminals, the proposal of new recommendation services based in temporal and spatial location has a special interest. Nowadays, Web 2.0 applications have become very popular as they support collaboration among users and the creation of shared contents. In particular, collaborative tagging applications allow users to describe the more relevant information to them (visited links, videos, etc.) by means of tags. This tagging is applied over the contents and over the users themselves, and as a result we obtain tag clouds to describe both contents and users. From these tag clouds, a structure relating the tags can be inferred: a folksonomy[1]. By comparing these tag clouds (with the aid of the folksonomy) it is possible to establish a very precise relation among users and contents, which allows to profile the services and to adapt the contents to the user's likes.

Directly related to the personalization topic, we can consider the adaptation of the contents to different users. This situation must be considered from two different perspectives: on the one hand, considering the mobile terminal the user has, and on the other hand, the user preferences and personal conditions, for instance, if the user has any type of handicap.

In this paper we present a proposal of a service oriented to mobility that provide touristic recommendations adapted to the profile of every user considering the user preferences (personalization) and the localization information enriched with the social characteristics provided by the Web 2.0, and in particular by means of social collaborative and content-based filtering.

The system considers models to describe touristic contents including text, images, audio, video, etc., and mashup services. We consider the profiling of the user interest and their relation with touristic resources by means of social collaborative tagging (tag clouds and folksonomies), and we also present procedures for measuring the similarity among the interests of the different users.

The rest of the paper is organized as follows: Section 2 describes the related systems and technologies. Section 3 offers an overview of the system. Section 4 addresses specifically the recommender system. Finally, the paper ends with a discussion and a conclusion, in sections 5 and 6 respectively.

[1] http://www.vanderwal.net/folksonomy.html

## 2 Systems and Related Technologies

In the last decade many systems have been developed to be used from mobile terminals in touristic activities. Most of them only consider the location of users and closer events. For instance, Guide ( Cheverst, Davies, Mitchell, & Friday, 2000), Crumpet (Schmidt-Belz, Laamanen, Poslad, & Zipf, 2003), DeepMap (Fink & Kobsa, 2002) and Tourist Guide (Simcock, Hillenbrand, & Thomas, 2003) provide facilities to suggest a touristic route in a city. Guide and Tourist Guide consider basically location information by means of a GPS antenna and do not provide personalization. Crumpet and DeepMap provide personalized services thanks to the users' profiles information, which they construct from the history of past interactions. But none of these systems consider the use of social information in a Web 2.0 style. The environment described in Voulodimos & Patrikakis (2008) uses personalized mashups for mobile services with location information, but it does not provide collaborative filtering neither. Finally, the environment described in Hinze & Junmanee (2006) uses recommendation techniques, but does not take advantage of the Web 2.0 possibilities for social recommendation. We can find more information about mobile recommender systems in Ricci (2011).

Next we provide an introduction to recommendation systems and we also introduce several technologies related with our project, moreTourism.

### 2.1 Recommendation Systems

Recommendation systems can be classified in three main areas:

- Content-based Filtering (CBF): This type of recommendation systems provides recommendations using the description of the resource and the user's interests (Pazzani & Billsus, 2007). They have a broad applicability and can be used for recommending web sites, news, restaurants, TV programs, etc. In this case, recommendations do not take care about the information provided by other users, and this is the reason why the description of the characteristics of every resource is very important to achieve precise recommendations.

- Collaborative Filtering (CF): These techniques usually consider the comparison of ratings from the users to the resources (i.e., movies or books) with similar users (concerning their preferences) in order to produce recommendations for resources that were not valuated previously. The user-based valuations or resource-based valuations are the two main alternatives in this approach. Recently, some hybrid approximations have been proposed, that usually are a combination of content recommendation and collaborative filtering (Adomavicius & Tuzhilin, 2005).

- Knowledge–based recommenders: These systems use knowledge about users and contents to generate a recommendation, reasoning about what contents meet the user's requirements (Burke, 2000). Within this class of recommenders we can find for example: (i) case-based reasoning (CBR) systems, where new problems are solved basing on previous cases (previously solved problems and their solutions) stored in a base of cases

(Aamodt & Plaza, 1994); (ii) constraint-based recommenders, where recommendation is viewed as a process of constraint satisfaction (some constraints come from users and other ones come from contents domain) (Felfernig & Burke, 2008); and (iii) critiquing, where the recommender system uses users' current preferences to recommend specific contents, and then obtains users' feedback in the form of critiques (Chen & Pu, 2007).

- Collaborative Tagging Recommendations: Collaborative tagging systems cannot be considered a class of recommendation systems by themself, as we can consider the three systems above. They rather constitute a hybrid between CF and CBF ones. This kind of systems allows users to describe contents by means of tags and share such descriptions. They generate two different types of structures: tag clouds and folksonomies. These structures can be used for content recommendation, and we can distinguish two different approaches: (i) systems that use tagging information to improve recommendation algorithms (Tso-Sutter, Balby Marinho, & Schmidt-Thieme, 2008), (Nakamoto, Nakajima, Miyazaki, & Uemura, 2007), where we can find the ones that consider the number of resources tagged and the numbers of tags used (Liang, Xu, Li, & Nayak, 2008), (Zanardi & Capra, 2008), (de Gemmis, Lops, Semeraro, & Basile, 2008); and (ii) works where only tagging information is used for recommendation (Niwa, Doi & Honiden, 2006), (Szomszor et al., 2007).

### 2.2 Mashups and Widgets for Mobile Terminals

The mashup concept refers to a very general concept in relation to an application that includes data and services in real time from an external source (3rd party) available in the Internet. The use of mashups on the Web has been very popular in the last years. Applications as Google Earth[1], Yahoo! Maps[2] or VirtualEarth[3] allow showing detailed information and routes in maps very easily. From a more general point of view, some other alternatives have been generated, as for example Yahoo Pipes[4], Dapper[5], and Google Gadgets[6], which after an adequate transformation to print the information in the displays of the mobile terminals, can be used from these ones. In fact, there are services that solve this transformation: PHONifier[7], Skweezer[8], or even the Google transcoder[9].

Widgets appeared as a way to provide applications for mobile terminals, with systems like Plusmo[10] or Widgetbox[11]. Concerning the development of widgets, it is important

[1] http://earth.google.com
[2] http://maps.yahoo.com
[3] http://www.viawindowslive.com/VirtualEarth.aspx
[4] http://pipes.yahoo.com/pipes
[5] http://www.dapper.net
[6] http://code.google.com/apis/gadgets/index.html
[7] http://mobiforge.com/directory/products/runtime-platforms/transcoders/phonifier
[8] http://company.skweezer.com
[9] http://www.google.com/mobile
[10] http://plusmo.com
[11] http://www.widgetbox.com

to remark the efforts done by the World Wide Web Consortium [1] (W3C) to standardize those resources, in order to simplify the management of the local resources and their configuration in the web sites.

### 2.3 Adaptive Users Interfaces

When considering topics like adaptation and accessibility in web contents, we must consider the recommendations provided by the W3C.

In order to adapt the contents for mobile terminals we also must have into account the design guides provided for the Mobile Web Initiative[2]. It is also relevant the Web Accessibility Initiative[3], for all the details directly related with users with reduced capabilities.

## 3 System Overview

In moreTourism (Fig. 1) is composed of two basic elements: a smartphone (the interface between the user and the system) and a server that offers several specialized functionalities.

The smartphone is the device that connects the user with the system, and thanks to it, the user will perform all the possible actions at any time and in an easy way (we take care about accessibility issues too).

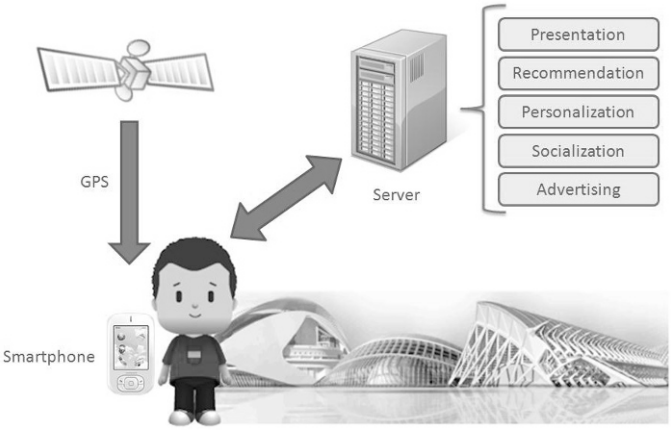


**Fig. 1.** moreTourism system model

The system provides different functionalities, being the main one the recommender (Sect. 4), but other several ones are included too. They are described next:

- Presentation of information through the use of mashups that integrate images, videos, geolocation, guiding services, access to urban networks, etc.

[1] http://www.w3c.org
[2] http://www.w3.org/Mobile
[3] http://www.w3.org/WAI

- Recommendation by means of hybrid techniques that combine collaborative filtering with content-based recommendation, and allowing the reasoning over folksonomies. These techniques are adapted to the needs of mobile services in the touristic scope.
- Personalization of tourism information adapted to the user's profile, and location in space and time.
- Socialization, allowing users to interact over popular social networks and create activity groups in particular locations to do social tourism.
- Advertising. The system considers several alternatives for the business model depending on the user profile.

moreTourism was considered from the beginning as a recommendation service for the tourist in the Galician Community in Spain. It is oriented to travelers, tourists or even local users considering the location in time and space of the local events (artistic, feasts, cultural, etc.). The system considers a multilingual approach to allow an easy interaction to local and foreign citizens.

moreTourism takes note of users' likes, and their present location to suggest activities either isolated or programmed in a sequence to be enjoyed by the users. For doing this, the system uses recommendation, tagging and social collaborative filtering, together with adaptive interfaces.

The system also considers the possibility to perform routes by foot or by car taking advantage of the guiding possibilities provided by web services as Google Maps in combination with mobile GPS antennas, which are included in many of commercial mobile phones. In this sense, and depending on the user timetable, the system provides touristic routes to visit interest points alone, or in a sequence; providing in this last case an estimation of the global time needed to do the whole route. This estimation considers the duration of the travelling time, and also the average time needed to visit the interest point (considering the inputs provided by similar users). Besides, the user can rate the route afterwards in order to help similar users in the future.

In this type of systems, the social component is very important, and we consider the possibility to create special ad-hoc interest groups to allow users to join and to organize visits and enjoy group offers, promotions or just the company of other tourists with similar interests.

An important element considered is the use of mashups, to simplify the integration of contents from general social networks (Twitter, Facebook, etc.), with video sites (Youtube), photo sites (Flickr, Picasa) or services like Google Earth, including the possibility to locate in time and space the resources shared in the network.

We also consider the use of advertisements as the main part of the business model, as it usually happens in many successful Internet services. This element has a special importance for the companies and organizations linked to the project, and from the first time, we have considered their proposals for the development of a future

commercial services that will consider the typical access possibilities for eventual users, free registered users or registered users that pay for the service received.

## 4 The recommender System

The recommender system is the main part of moreTourism. This is a hybrid proposal which combines collaborative filtering (CF) techniques with content-based filtering (CBF). Taking profit of our experience in recommendation systems for TV programs, this system has been initially provided with traditional recommendation techniques, enhanced with a well-known matrix factorization technique for the implementation of the CF algorithm (Barragáns-Martínez, Pazos-Arias, Fernández-Vilas, García-Duque, & López-Nores, 2007).

In this version of the system, these techniques are improved by social recommendations, taking into account the tags provided by users. These tags are used to compose three different tag clouds, which are used to calculate the recommendations:

- The user tag cloud (Fig. 2) contains all the tags provided by the user weighted by the ratings he/she has provided, i.e., the higher the number of times the user has used a tag to describe an attraction and the higher the ratings he/she has given to that attraction, the higher the weight of the tag in the tag cloud.
- The attraction tag cloud (Fig. 2) contains all the tags users have provided to describe this attraction. The higher the number of users who have described this attraction with a particular tag, the higher the weight of this tag in the tag cloud.

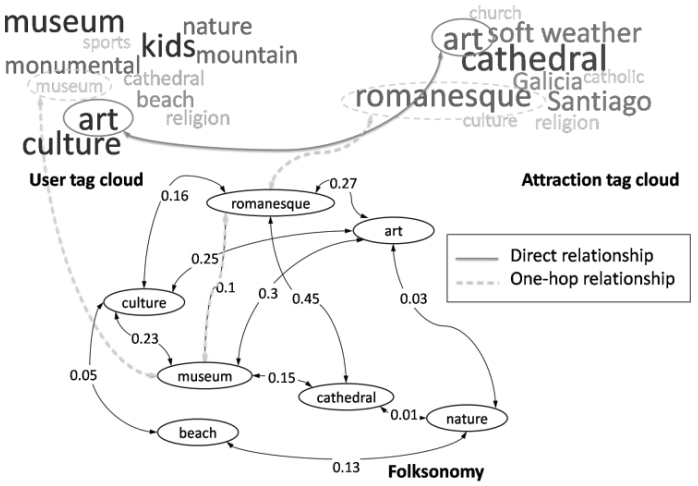


**Fig. 2.** Social content-based filtering

- The prototypical user tag cloud (Fig. 3) belongs to an attraction and it pictures the tag cloud that the perfect visitor of this attraction should have. This tag cloud is composed from the tag clouds of the users who have rated this attraction weighted by the given ratings.

Besides, a folksonomy (bottom of Fig. 2) is created as an undirected graph where nodes are the tags in the system and arcs represent the relationships between the tags they link (Michlmayr, Cayzer, & Shabajee, 2007). This relation (represented as $r_{ij}$ in successive equations) is increased every time two tags appear together in an attraction tag cloud. Hence, this structure reflects the relationships between the tags of the system.

The simplest way of recommending attractions to users is by directly comparing their tag clouds. This is the approach taken in the CBF techniques. In our case, to obtain the similarity between users' and attractions' tag clouds, we measure not only the number of coincident tags of both tag clouds (direct relationship, $R_0$ in (2)), but also the relationships between user's tags and attraction's tags (one-hop relationship, $R_1$ in (3)), as shown in Fig. 2. Hence, the relationship between the attraction $a$ and the user $u$ can be calculated as follows:

$$R(a,u) = \alpha\ R_0(a,u) + (1-\alpha)\ R_1(a,u) \tag{1}$$

$$R_0(a,u) = \sum_{\forall t \in |T_a \cap T_u|} (-1)^s \sqrt{|w(t,T_a)|\ |w(t,T_u)|} \tag{2}$$

$$R_1(a,u) = \sum_{\substack{\forall j / t_j \in T_a \\ \forall k / t_k \in T_u}} (-1)^s \sqrt{|w(t_j,T_a)|\ |w(t_k,T_u)|}\quad r_{jk} \tag{3}$$

Being:

$T_a$: The set of tags in the tag cloud of attraction $a$.
$T_u$: The set of tags in the tag cloud of user $u$.
$w(t, T)$: the weight of tag t in the tag cloud.
$\alpha$: The parameter used to indicate the importance of each type of relationship ($\alpha \in [0, 1]$).
$r_{jk}$: The relationship in the folksonomy between the tags $t_j$ and $t_k$.
$s$: This variable determines the sign of each summation term, whose value is 0 if both weights participating in the term are positive, and 1 in any other case.

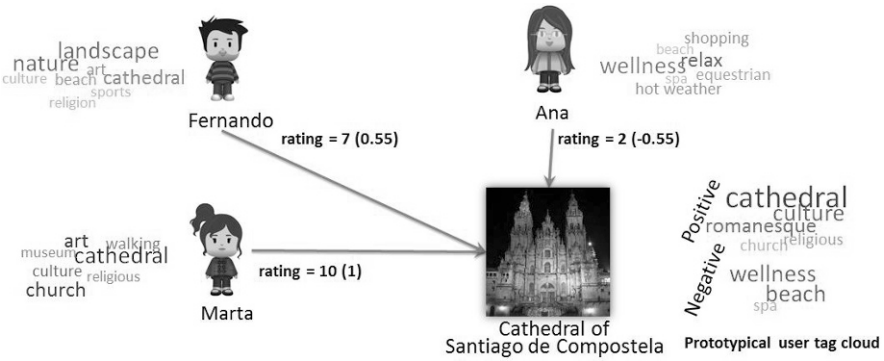


**Fig. 3.** Social collaborative filtering

The problem of CBF is that it selects attractions which are very similar to the ones the user has visited before. For this reason, these recommendations are improved with a Social Collaborative Filtering technique. This is made substituting the attraction's tag cloud in the equations of the previous section by the prototypical user tag cloud. This cloud describes the user for whom the attraction is appropriate, and is made from the tag clouds of the users who have visited the attraction and the ratings they have provided for it. As seen in Fig. 3, each user assigns a rating to the items he/she consumes. Hence, the users' tag clouds are weighted by their ratings to compose the prototypical user tag cloud.

Taking into account both approaches, the attractions that the system offers to the user are those who obtained the higher value of relationship in any of the techniques, giving priority to those which obtained higher results in both techniques.

In a system like moreTourism, which is aimed to assist the tourist, it is important to take into account the fact that tourism is usually a group activity. Hence, recommendations for groups are even more important than individual ones. For this to be possible, a new tag cloud can be created: the group tag cloud, which is created from the tag clouds of individual users (simply calculating the means of the weight of all the tags of the clouds). When calculating the relationships in the algorithms, the user tag cloud is substituted by the group tag cloud, obtaining recommendations for attractions that may suit the whole group.

However, the recommendation techniques presented suffer two main drawbacks which are typically encountered when dealing with CF systems where the users' ratings (in this system, not only their ratings but also their tags) are essential to make the system works. These problems are: (i) the *cold-start* problem (new users in the system which have not submitted any ratings); and (ii) the *first-rater* problem (new items cannot be recommended until some users have taken the time to evaluate them). To alleviate these problems, the recommendation system in moreTourism uses a hybrid approach for the description of the items, which combines the social tagging approach with taxonomies. In this manner, each attraction should be classified into a category of the taxonomy when entering the system. With the tag clouds of the attractions for each category, we can obtain a stereotype tag cloud for this category

(Fig. 4) using a similar approach to the one shown for prototypical user tag clouds. The objective of this stereotype is twofold: a tag cloud is assigned to a new attraction until this content is tagged by users (mitigating the *first-rater* problem), and it is also used to compose the initial user tag cloud (reducing the *cold-start* problem). In the latter, when joining the system, users are asked about their favorite attractions categories. Combining the stereotype tag clouds of these categories, we compose the provisional user tag cloud, which is used until the users have their own one.

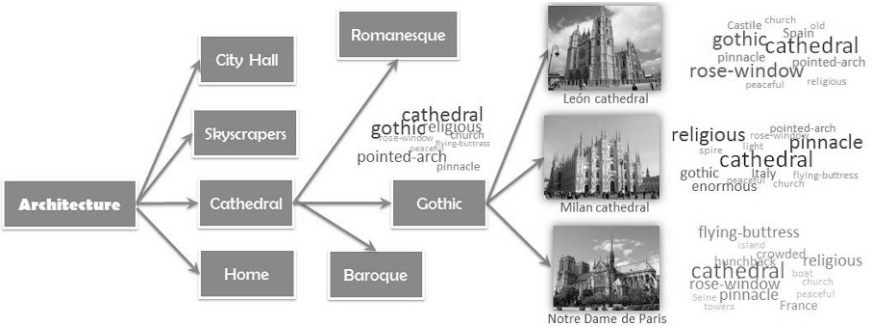


**Fig. 4.** Stereotype tag cloud

## 5 Conclusion

We have introduced moreTourism, a hybrid recommendation platform oriented to smartphones, and providing tourist information profiled for users with similar likes for providing a valuable touristic experience. The system also uses extensively mashups together with social networks to enhance the travelling experience and, at the same time, it includes requirements for security and privacy.

We have specifically addressed the recommender system, which is able to find attractions for the users, taking into account their likes, through the use of CBF + CF techniques combined with tagging and folksonomies.

At the present time, we have a functional prototype of the system, with a final version of the recommender and mashup systems. The future work includes introducing the advertising system, reputation techniques, and adaptability in the users' interface. These changes will be oriented to have a commercial version at the beginning of 2013.

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## 7 Acknowledgements

This work was partially supported by the Xunta de Galicia under INCITE Project Number 10 PXIB 322 039 PR and also by the program Formación de Profesorado Universitario (FPU). The authors want to thank Enrique Costa-Montenegro for fruitfully discussions in this and in similar projects. The authors also want to thank the members of the Transport Chapter in the Strategic Applications Agenda (SAA) at the European eMobility Platform for encouraging discussions on touristic topics.

# Ontology-based Identification of Music for Places

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## Abstract

Place is a notion closely linked with the wealth of human experience, and invested by values, attitudes, and cultural influences. In particular, many places are strongly linked to music, which contributes to shaping the perception and the meaning of a place. In this paper we propose a computational approach for identifying musicians and music suited for a place of interest (POI). We present a knowledge-based framework built upon the DBpedia ontology, and a graph-based algorithm that scores musicians with respect to their semantic relatedness to a POI and suggests the top scoring ones. We found that users appreciate and judge as valuable the musician suggestions generated by the proposed approach. Moreover, users perceived compositions of the suggested musicians as suited for the POIs.

**Keywords**: Meaning of a place, semantic networks, linked data, music information retrieval

## 1 Introduction

Place is a notion closely linked with the wealth of human experience, and invested by values, attitudes, and cultural influences. The humanistic school of geography, based on a perspective oriented towards understanding the dimensions of human experience within a physical environment, says that place is an "experienced space" (Tuan, 1977). From a philosophical perspective, Bachelard (1958) proposed a vision of space that takes into account the emotional dimension of one's experience of an environment. He claims that a specific space can trigger emotional responses according to the experiences that occurred within it, and memories associated with it. More recently, Augé (1995) suggested to stop considering the space as a mere shell, a container, or a location, and to start looking at it as a setting for action, experiences, and communication. Besides geography and philosophy, the analysis of destination image has become one of the most popular topics in the tourism literature (Pike, 2002).

Music is strictly connected to places: it is a cultural dimension, and human activity that contributes to give a meaning to a place. For instance, consider how important is music by Johann Strauss, or flamenco, for a place like Vienna or Seville respectively. There is no doubt that this music contributes to the image of these destinations, and we all deem this music as profoundly related to the places. But, finding musicians or music related to a given place is not a simple task; it requires knowledge of both

L. Cantoni and Z. Xiang (eds.), *Information and Communication Technologies in Tourism 2013*, DOI: 10.1007/978-3-642-36309-2_37,

domains, and it is clearly a difficult task to be solved automatically by an intelligent computer-based system (Gretzel, 2011).

Consider even a more specific place, a "place of interest" (POI), such as the State Opera of Vienna, Austria. It is one of the most famous opera houses dating back to the 19th century, and a prominent attraction for tourists visiting Vienna. A selection of well-fitting music for this place could consist of classical compositions by musicians who lived and worked in Vienna in that historical period. Another well suited selection could include operas by Austrian composers, which are frequently performed in this opera house, such as "Don Giovanni" by Wolfgang Amadeus Mozart. An even better match could be a composition by Arnold Schoenberg, who founded the so called Viennese School in that period, and revolutionized the classical music with the introduction of the atonal and dodecaphonic music. Such music selections, although rather straightforward to be done manually by a musicologist, can be a challenging task for a computer to perform. Performing this task automatically, for any given place of interest, requires a way to identify meaningful relations between POIs and music.

We note that finding music items that suit POIs can be exploited in a number of engaging information services. For instance, a mobile city guide providing an enhanced presentation of the place visited by a tourist, and playing music that is related to the place, i.e., music that is culturally or emotionally associated to the place (e.g. Mozart in Salzburg, or a Bach's fugue in a Gothic Cathedral). Other examples include a car entertainment and navigation system that adapts music to the place the car is passing by, or a tourism website where the information on travel destinations is enhanced through a matching music accompaniment. Such information services can be used both to enhance the user's travel experience, and to increase the sales of holiday destinations or music content.

The main challenge that one must face when addressing the above mentioned goal is related to the fact that POIs and musicians belong to two rather different domains, and there is no obvious way to match such heterogeneous items. But, with the advent of the Semantic Web, and specifically with its reference implementation in the Linked Data initiative (Bizer et al., 2009), new opportunities arise to face the above difficulties. In this paper we propose to exploit DBpedia (Auer et al., 2008) – the Linked Data version of Wikipedia – for building a framework in which focused semantic networks linking items belonging to some selected domains are automatically created. Over these networks we propose to use a graph-based spreading activation algorithm to rank and filter the items in the target domain (music) that are most related with certain given items in the source domain (POI).

We specifically address the following research questions. *RQ1:* how to automatically identify (using DBpedia) musicians semantically related to a given POI? *RQ2:* is the music of these musicians perceived by the users as well suited to the POI? By conducting user studies we found that users appreciate and judge as valuable the suggestions generated by the proposed approach. We also found that our approach is able to distinguish between relevant and non-relevant musicians, as those with a large or small number of semantic relations with the given POI. Moreover, users perceived compositions of the suggested musicians as suited for the POIs.

## 2 Related Work

Finding music that suits a POI can be viewed as a context-aware recommendation problem: the place being the context for consuming the recommendation (music) (Adomavicius et al., 2011). There have been several papers on context-aware music recommendation. Ankolekar and Sandholm (2011) presented a mobile audio application that plays audio content associated with a particular location with the goal of enhancing the sense of being in a place by creating its emotional atmosphere. Instead of establishing semantic relations between music and location, as we propose here, the presented approach relies on crowd-sourcing – users of the system are allowed to assign audio pieces (either music tracks or sound clips) to a specific location (represented by its geographical coordinates). Stupar and Michel (2011) described an approach to select music tracks for a given image. They rely on associations between the low-level music and image features mined from movies and their soundtracks.

Aiming to provide contextualized recommendations of music compositions when the user is visiting tourist attractions, Kaminskas and Ricci (2011) showed that emotional tags assigned to both types of items can be used to effectively select music content that fits a POI. From that result, and aiming to complement the tag-based recommendation model proposed there, the framework presented herein enables computing matching between places and musicians based on their semantic relatedness.

There have been some other attempts to establish semantic relations between items of different types. Loizou (2009) proposed to identify explicit semantic relations between items, and exploit such relations for cross-domain recommendations. Specifically, items were annotated and linked by concepts and properties extracted from Wikipedia. Then, with such relations, users and items were incorporated into a graph, upon which a probabilistic recommendation model was built. Passant (2010) developed dbrec – a system built upon DBpedia that computes semantic distances between concepts to recommend related music bands and solo artists.

As done by Loizou (2009), in this paper we exploit Wikipedia as a source of multi-domain information, but use Semantic Web technologies and Linked Data repositories to *automatically* build semantic networks interconnecting concepts from various domains – Architecture, Art, History, and Music. In previous work (Fernández-Tobías et al., 2011) we proposed a semantic-based framework that aims to extract and aggregate DBpedia concepts and relations between two different domains, but did not evaluate such approach. In this paper we extend that work by: a) developing a more efficient method to extract cross-domain information from DBpedia, b) finding richer semantic relations between Architecture and Music concepts, and c) conducting two user studies to evaluate the semantic relatedness between automatically matched POIs and musicians.

## 3 Knowledge-based Framework

Our recommendation framework is built upon an ontology-based knowledge representation model in the form of a graph/network of semantic entities (concepts) in

different domains, and interlinked by semantic relations (properties). The entities can be roughly categorized as classes and instances. Classes are types or categories of concepts, such as 'city', while instances are particular members of classes, such as 'Madrid.' Moreover, semantic relations can link classes (e.g. a city 'belongs to' a country), instances (e.g. Madrid 'is the capital of' Spain), or both types of entities (e.g. Madrid 'is' a city). Links can express hierarchical relationships, e.g. 'subclass of' and 'instance of', or have an arbitrary meaning.

Our goal is to automatically find paths in the above semantic graph between an instance in a source domain (a POI) to instances in a target domain (musicians), and to select (recommend) some of the reached target instances according to certain criteria.

Our approach consists of three main stages. In the first stage we restrict the subspace of DBpedia by identifying classes belonging to the two domains of interest, and the relations existing between instances of such classes. We then build a network consisting of a directed acyclic graph (DAG) whose nodes represent the identified classes, and edges represent the selected relations. In this graph there is a target node that does not have out edges, and corresponds to the class whose instances will be recommended. This stage is detailed in Section 3.1. In a second stage we instantiate the built framework into an instance network for a particular source instance (e.g. 'Vienna State Opera') whose related musicians are sought. In practice, we query DBpedia to obtain instances related to the source instance according to the classes and relations defined in the above-mentioned graph. The retrieved instances are then incorporated into the network, and are used to query DBpedia for additional related instances. This process is repeated iteratively until all the identifiable instances of the selected classes are reached. This stage is described in Section 3.2. Finally, in the third stage we assign weights to the nodes (instances) and edges of the instance network that was created, and perform a graph-based ranking algorithm over the network to identify (and recommend) the target instances with the highest score values. This stage is explained in Section 3.3.

### 3.1 Class Network

As we mentioned above, the output of the first stage consists of a DAG that describes how the classes in two domains of interest – source and target – are linked by means of semantic relations available in the used knowledge repositories (DBpedia). Nodes in this graph are associated to classes, and edges are associated to relations between classes and/or instances. Moreover, there is a target node without exiting edges that corresponds to the class of the instances to recommend. The selection of relevant classes and relations is guided by experts of the domains of interest and knowledge repositories. The source and target domains are respectively characterized by POIs and musicians, so 'POI' and 'Musician' classes represent the starting and ending nodes in the class network of our framework. Analysing DBpedia, we identify three potential types of semantic paths from POIs to musicians:

- *Location paths*. A particular POI may be linked to musicians who were born, lived, or died in the city of the POI. For instance, Arnold Schoenberg *was born in* Vienna, which is the city where Vienna State Opera *is located*.

- *Time paths*. A POI may be linked to musicians who were born, lived, or died in the same time period (e.g. year, decade, century) when the POI was built or opened. For instance, Gustav Mahler *was born in* 1869, the same decade when Vienna State Opera *was built*.
- *Category paths*. A POI may have Architecture categories (e.g. architectural styles and eras, building types) that are related to Music categories (e.g. music genres and eras, musician types), through relations with History and Art categories. In this way, musicians with matched Music categories could be linked to the input POI. For instance, Wolfgang Amadeus Mozart is a *classical music composer*, and classical compositions are played in *Opera houses*, which is the building type of the Vienna State Opera.

In total, the class network contains 14 classes (e.g., 'Architectural style', 'Years in architecture', 'Music genre', 'Musical era', etc.) and 11 different relations (e.g., 'Construction start date', 'Place of birth', etc.). Furthermore, in our framework we can assign relevance values for the considered semantic entities and relations, which may be used in the retrieval stage. These values may be assigned by the domain experts, or could come from the user's profile. For instance, a domain expert may assign higher relevance to the class 'City' than to the class 'Building type', since the former can be considered more informative to link a particular POI with related musicians. Similarly, specific concepts like 'Opera composers' and 'Classical music' may receive high relevance if the user has a clear preference for them, hence producing personalized associations. Moreover, we consider the case in which relations also receive relevance values, e.g. to measure the strength with which 'Art Deco' architectural style and 'Swing' music genre (both emerged in the 1930s) are related with respect to other more/less related categories. For simplicity, in the framework implementation described here we set the above relevance values to 1 and leave for future work the investigation of strategies to establish distinct relevance values.

### 3.2 Instance Networks

By exploring the structured data repository (i.e., DBpedia) through the classes and relations established in the class network (Section 3.1), we could build new networks, each one linking a particular instance in the source domain with related instances in the target domain. Fig. 1 shows part of a sub-network that links the POI 'Vienna State Opera' and the composer 'Gustav Mahler.' The full network of a POI is obtained by aggregating all the sub-networks linking the POI to semantically related musicians.

To test our approach, we have automatically extracted from DBPedia a dataset of 2860 POIs from 17 major city tourism destinations in Europe (Madrid, Berlin, Florence, Paris, etc.). On average, in this dataset, an instance network of a POI contains 684.5 musicians, i.e., this number of musicians can be retrieved per POI, by following the semantic paths established in section 3.1. We refer the reader to (Fernández-Tobías et al., 2011) for more details on the collected dataset.

An instance network has weights assigned to the relations between pairs of instances. These weights are computed from the relevance values of the relations linking the instance pairs and their classes. Specifically, a weight between two instances I, I' $\in I$ is given by a function w:$I \times I \rightarrow \mathrm{R}_{+}$ that depends on the relevance values of the

connections between the two instances, and between their classes $C_I$, $C_{I'} \in C$, that is, $w(I, I') = f(rel(I, I'), rel(C_I, C_{I'}))$, where $w(I, I')=0$ if there is no link from I to I'. We refer the reader to (Fernández-Tobías et al., 2011) for more details on the particular computation of the weights and relevance values.

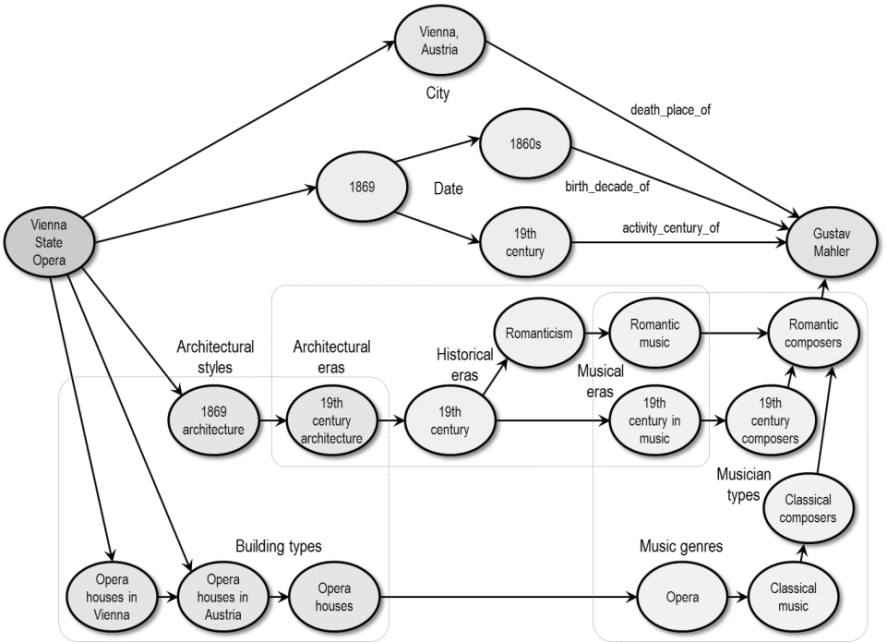


**Fig. 1.** Example of semantic sub-network linking the POI 'Vienna State Opera' with the composer 'Gustav Mahler'

### 3.3 Graph-based Ranking

In the final stage we run a graph-based ranking algorithm on the built instance networks. For each entity node in the network, the algorithm computes a relevance score to the source POI, by following a weight spreading strategy, and hence it provides a scoring of the target nodes (i.e., those belonging to the class 'Musician'). Then, the highest scored nodes are selected for recommendation. Thus, the score of an instance node *I* depends not only on the relevance values of the instance and its class, but also on the scores of instances that are connected to *I* along some paths in the semantic network.

Initially the score values of the instance nodes are set based on their relevance values, which, as explained in Section 3.1, may be related to domain characteristics and/or user preferences. Then, our spreading activation technique performs a single iteration for propagating instance scores in the instance network. The algorithm propagates the initial score of the source node through its weighted edges, updating the scores of its linked nodes. This is iteratively done for subsequent linked nodes until reaching the target nodes, whose scores cannot be further propagated because they do not have out

edges (Fig. 1). We refer the reader to (Kaminskas et al., 2012) for more details on the networks building process and ranking algorithm.

# 4 Experiments

We conducted two user studies aimed at evaluating how users perceive and judge musician-to-POI recommendations provided by our approach. Since the users cannot perform a large number of judgements during an evaluation session, we limited the evaluation dataset to 25 POIs (from the full set of 2860 POIs described in section 3.2). On average, these POIs had instance networks consisting of 708.2 nodes (with 668 nodes representing musicians). For each POI, we obtained the top 5 ranked musicians computed by three different methods: the spreading activation algorithm that we designed, and two additional baseline algorithms, HITS and PageRank (Manning, 2008). Additionally, 5 musicians were randomly selected from the whole set of musicians belonging to the POI's instance network, as an additional baseline method with which to compare our approach. We also downloaded a representative music composition for each musician. So in total, we had 4 competing methods to find a musician (and its music composition) matching any given POI.

The first experiment was designed to evaluate how the users judge the semantic relations between POIs and retrieved musicians, while the second experiment was performed to evaluate if the users deem compositions performed by the retrieved musicians as relevant for the POIs.

## 4.1 Knowledge-Based Relations between POIs and Musicians

The graphical interface for the first user study had to be carefully designed since assessing the quality of the relatedness (matching) of items from different domains is not easy. Hence, we designed a tailored interface (Fig. 2) that may require some considerable user effort, but let collect important and interesting information about the user-perceived quality of different musician matches for POIs.

During each evaluation session a user was presented with a sequence of 10 pairs of POIs and musicians, where the musicians were obtained using one of the four evaluated matching methods. The information describing each POI and musician pair was presented in a structured way, according to the representation in the graph model – location, date, and category relations were clearly separated. The user was asked to carefully check the presented information, and assess whether the musician was actually related to the POI, and if yes to specify which parts of the structured musician information were contributing, and in which degree, to the match (right part of the system's interface, in Fig. 2). We aimed to understand which types of semantic paths, linking POIs to musicians (i.e., either location, or date, or category paths) contribute more to the matches, and were better appreciated by the users.

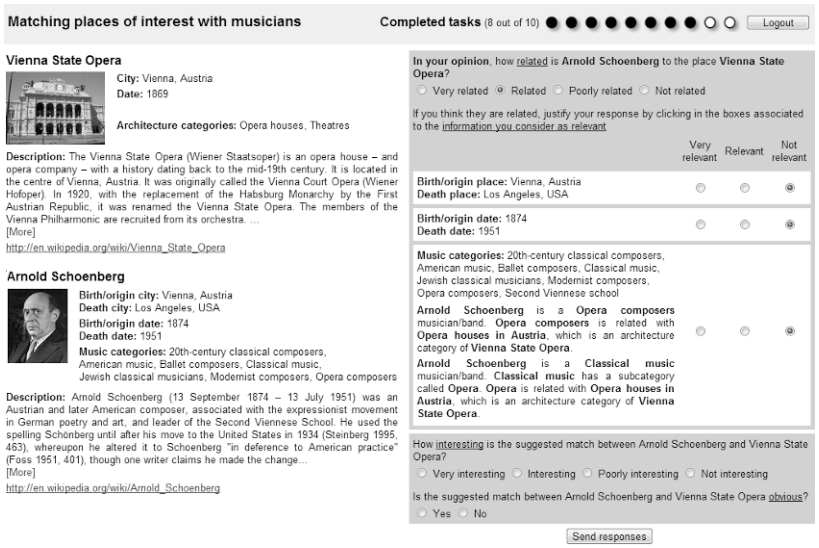


**Fig. 2.** Screenshot of the system used in assessing the knowledge-based relatedness of POIs and musicians

### 4.2 Matching Music to POIs Evaluation Study

For the second study we designed a simpler graphical interface (**Fig. 3**). During a single evaluation session a user was presented with a POI and a list of compositions of the musicians selected by each of the four evaluated methods. The order of the compositions was randomized, and the user was not aware of the algorithms that were used. The user was then asked to read the description of the POI, listen to the compositions, and select those that in her opinion well suited the POI.

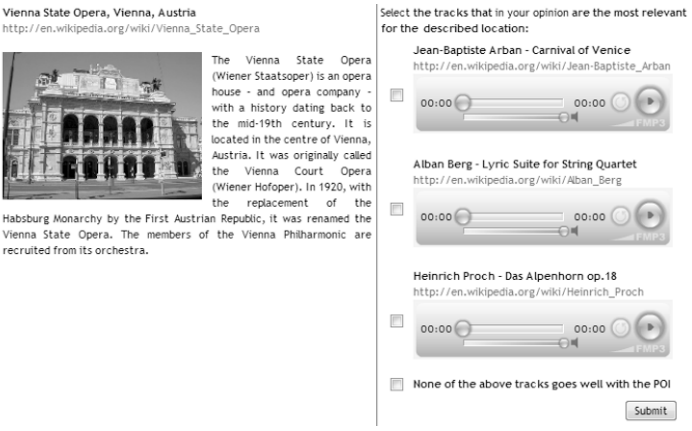


**Fig. 3.** Screenshot of the system used in the matching music to POIs evaluation study

Moreover, in this evaluation we asked the users to enter their music genre preferences prior to performing the evaluation. This was done to measure the influence of the users' music preferences on their decisions. The genre taxonomy was selected based on the musicians in our dataset, and included Classical, Pop, Medieval, Opera, Rock, Ambient, Folk, Hip Hop, Metal, and Electronic music genres.

# 5 Results

## 5.1 Relations between POIs and Musicians: Results

A total of 97 users participated in the study. They were PhD students and academic staff recruited via email, and covered an ample spectrum of ages and nationalities. They provided 1155 assessments for 356 distinct POI-musician pairs (note that a musician may match a POI for various scoring methods). Each of the 356 distinct pairs was assessed by at least 3 users. The Fleiss' Kappa correlation coefficient of the relatedness assessments per POI was 0.675, meaning a substantial agreement among users. Table 1 clearly shows that the proposed spreading activation method outperforms the baselines, in the precision@K metric.

**Table 1.** Average precision values obtained for the top 1 to 5 ranked musicians for each POI. The values marked with * have differences statistically significant (Wilcoxon signed-rank test, $p<0.05$) with Spreading algorithm's

| | P@1 | P@2 | P@3 | P@4 | P@5 |
|---|---|---|---|---|---|
| Random | 0.355* | 0.391* | 0.363* | 0.435* | 0.413* |
| HITS | 0.688 | 0.706 | 0.711* | 0.700* | 0.694 |
| PageRank | 0.753 | 0.728 | 0.707* | 0.660* | 0.646* |
| Spreading | 0.810 | 0.804 | 0.828 | 0.847 | 0.837 |

In order to understand which semantic information contributed, and in which degree, to the matches, Fig. 4 shows the average numbers of semantic paths in the instance network between the input POIs and the retrieved musicians. The higher these numbers, the more semantic relations between POIs and musicians were found, and thus the richer the semantic relation between the retrieved musician and the source POI is. Based on the obtained results, we can highlight two aspects of the proposed spreading algorithm. First, differently from the other two baseline algorithms, it differentiates relevant and non-relevant musicians by finding a larger number of paths, between a POI and a relevant musician, compared with a non relevant one. Second, it uses in a balanced way all the different types of the considered relations.

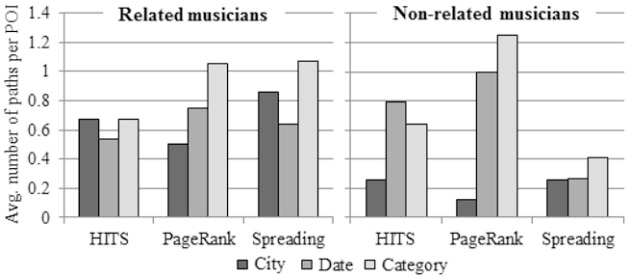


**Fig. 4.** Average number of semantic paths per POI

### 5.2 Matching Music to POIs Evaluation: Results

A total of 61 user participated in the second study. As in the first case, they were PhD students and academic staff recruited via email (some of them also participated in the previous study). 1125 evaluation sessions were performed (i.e., a POI shown to a user), and 1258 tracks were selected by the users as well-suited for a POI. Fig. 5 shows the performance of the matching methods, computed as the ratio of the number of times a track produced by each method was considered as well-suited over the total number of evaluation sessions (1125). All methods performed significantly better than the random track selection ($p<0.01$ in a two-proportion z-test). Moreover, again, our weight spreading activation method outperformed the others ($p<0.01$).

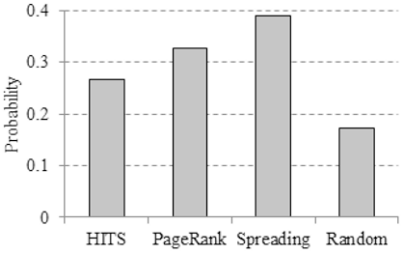


**Fig. 5.** Selection probability of the recommendation approaches

We also analysed the influence of the users' genre preferences on the music tracks that they selected as well-suited for the POIs. In the following, *TrkOK* represents the condition that a track was marked by a user as well-suited for a POI, $GTrk=g$ – the condition that the genre of a track is $g$, $g \in uPref$ – the condition that a user has included the genre $g$ in her genre preferences, and $g \notin uPref$ – the condition that a user has not included the genre in her preferences.

As a baseline for the analysis we have computed, for each genre, the probability that a music track is of genre $g$, given that it was marked as suited for a POI – $P(GTrk=g \mid TrkOK)$ – as the ratio of the number of tracks of genre $g$ selected as well-suited for the POIs over the total number of tracks selected as suited for POIs (1258). Then, to check the deviation from this baseline produced by the users' preferences, we measured $P(GTrk=g \mid TrkOK, g \in uPref)$ and $P(GTrk=g \mid TrkOK, g \notin uPref)$.

We have found that for the Classical, Medieval and Opera music genres the deviation from the baseline is significant ($p<0.01$ in a two-proportion z-test). For Classical music, the probability that a user who likes this genre will mark a classical track as well-suited for a POI is higher, and in the opposite case – lower. For other music genres the deviation from the baseline probabilities is not significant.

We also measured the conditional probability for a track to be selected as suited for a POI, given that its genre is $g$ – $P(TrkOK \mid GTrk=g)$ – as the ratio of the number of tracks of genre $g$ selected as suited over the total number of times a track of genre $g$ was displayed during the evaluation. The obtained results show that Medieval and Opera tracks are most often selected by the users (*0.49* probability), followed by Ambient (*0.36*) and Classical (*0.35*) music. Then, to check the deviation from this baseline produced by the users' preferences, we measured the probabilities $P(TrkOK \mid GTrk=g, g \in uPref)$ and $P(TrkOK \mid GTrk=g, g \notin uPref)$. From these probabilities the effect of user preferences is evident for Classical and Medieval music – the probability that a user will select a Classical/Medieval track as well suited for a POI is significantly ($p<0.05$) higher if the user likes these genres, compared to a user who does not.

We can thus confirm that for certain genres, in addition to the semantic matching between POIs and musician, there is a clear effect of user preferences on the decision for considering music to go well with a POI. Therefore, in the future we plan to take the users' music preferences into account when suggesting music suited for a POI.

## 6 Conclusions and Future Work

In this paper we have described an original approach for automatically identifying musicians semantically related to a given place of interest (*RQ1*). Two user studies showed that the musicians matched to a POI by the proposed approach are more likely to be considered as well suited to the POI by the user. Moreover, for the musicians that the users state as related to a POI, our approach can identify a high number of paths in the semantic network connecting them to the POI using all the proposed types of relations (i.e., city, date, and category). Conversely, these numbers are significantly lower for non-related musicians. This indicates that our approach, which is based on finding semantic paths between POIs and musicians, can be used effectively to define and evaluate the semantic relatedness between such instances. Finally, we have shown that users perceive music composed/performed by the recommended musicians as well-suited for the POIs (*RQ2*).

Future work will focus on identifying and exploiting other arbitrary semantic relations between POIs and musicians, e.g. direct relations such as 'Gustav Mahler *was the director of* Vienna State Opera', and complex non-directed relations such as 'Ana Belén (a famous Spanish singer) *composed a song* whose lyrics *are about* La Puerta de Alcalá (a well-known POI in Madrid, Spain).' We will search for these relations in different Linked Data repositories, and will use available tools such as RelFinder (Heim et al., 2009).

It is also important to better explore and evaluate strategies to initialize the importance weights of the relations and classes in the semantic network. In this context, we will explore other approaches to define and measure the semantic

relatedness between concepts (Ponzetto & Strube, 2007), and will adapt or extend them for cases in which the concepts belong to different domains. We will also explore more complex constrained spreading activation techniques (Crestani, 1997) to propagate the weights through the semantic networks, by taking into account factors such as path lengths, node in/out-degrees, and weight propagation thresholds. Finally, we will adapt the proposed framework to incorporate user preferences into the music recommendation process

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# Semantic Schedules for Dynamic Route Planning

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## Abstract

Tourism has always been an information intense industry. Especially information on how to reach the destination of choice and how to move around after arrival has been the focus of often tedious searches. When travelling within the country of residence or to a neighbouring country, the personal car seems to provide the most flexible choice as a means of transport for many tourists. Unfortunately, the rising amount of private transport by car has caused many problems. Certain initiatives to make the use of public transport more tempting for tourists have failed, partly due to complicated tariffs and schedules. In order to ease the creation of individualised travelling schedules using public transportation, the authors propose a combination of existing microformats which can be used to semantically enrich existing schedules. This enables the customer to create ad-hoc travel itineraries without the necessity of any formal cooperation between the involved transportation enterprises.

**Keywords:** public transport, schedule, semantic web, microformats

## 1 Introduction

The development of tourism is inextricably linked with technological improvements in the field of transportation (Schulz, 2009). Jet aircraft made far-off destinations more accessible for the mass market, while the wide dissemination of privately owned passenger cars revolutionised individual travel in the second half of the 20th century. Today, both air transport and passenger cars are the two most widely utilised modes of touristic transport within the European Union (Peeters, 2006). Especially for short-distance traffic within the country of residence or to neighbouring countries, the dominant means of transport is the car (Peeters, 2006). Unfortunately, passenger cars are major emitters of greenhouse gases and fine particulate matter especially impairing ecologically sensitive regions like the Alps. Several initiatives have succeeded in promoting the application of more environmentally friendly transportation devices like rail or buses. These initiatives were only local though (Thaler et al., 2006). Dubois (2006) defined a number of steps, which have to be taken by different stakeholders, to encourage the use of less polluting vehicles. One very central demand is the improvement of intermodal connections of public transport systems. This modal split indicates how different means of transport are combined to reach the destination (Groß, 2011). Crossing one or several national borders can easily result in switching carriers more than once. Coordinating the different ticketing systems and schedules is an arduous task but necessary to gain customers. In order to facilitate the combination of different timetables, the authors propose a combination of microformats to semantically enrich the itineraries of public transport carriers. The advantage for the customer lies in the ad-hoc creation of a personalised schedule. For

L. Cantoni and Z. Xiang (eds.), *Information and Communication Technologies in Tourism 2013*, DOI: 10.1007/978-3-642-36309-2_38,

transport companies the benefits are twofold. First, providing semantic markup may encourage third-party companies like search engine providers to include better transport searchability, and thus promoting these public transport systems. Second, the formats are combinations of existing microformats and therefore several software tools and orgware, like books and howtos, exist already. As a result, they keep implementation cost low.

### 1.1 Cooperation and Linked Transport Systems

The geographical and organisational fragmentation can be overcome by forming alliances and co-operations. Specifically in the air transport sector, the growth of technology has allowed the rise of alliances like Star Alliance or SkyTeam. National carriers can better coordinate their respective networks through code sharing. Low-cost carriers, which operate individual routes only, are often not involved in such a cooperation. One major benefit is the ability to provide improved connections to the customer by synchronising schedules (Page, 2009).

Another form of cooperation is Linked Transport Systems. A Linked Transport System is the formal cooperation of transportation companies in a certain region that provides a single tariff-system as well as a seamless integration of all transport schedules (Kapeller, 1994). The main advantage for the customers is that a single ticket is valid for all transportation businesses in the respective geographical area. For the participating businesses, on the other hand, all planning is coordinated without losing their independence (Kühschelm, 1996). Problems occur when a customer's route crosses two or more areas of operation of different systems. Often, these systems do not take commuting flows into account (Kühschelm, 1996). The issue of planning processes across a multitude of different businesses has led to the creation of information exchange standards like SIRI (Service Interface for Real Time Information CEN/TS 15531 2011 [August 27, 2012]) or the Integration Interface based on VDV-Recommendations 453 and 454 (Busch & Schröder, 2009).

The customer him/herself does not get into direct contact with these information exchange standards. Indirect contact, however, is established through the search interfaces provided by the transportation businesses. The way how people search for travel-related information, has changed though. Over the last few years, the number of customers using online information systems has risen dramatically (Roß, 2009). Today, tourists often use generic search engines like Google for their trip planning (Egger, Joss, & Schmeisser, 2009). These search engines still rely on matching the terms entered by a user as query against the (mostly weighted) terms of individual online documents (Berry & Browne, 1999). In order to improve the search results and gain the ability to answer more complex questions, Semantic Searches are needed (Maedche & Staab, 2002). That means that web pages are enriched by additional metadata characterising which content the respective web page offers (Davies, Studer & Warren., 2006). This metadata can be read and interpreted by machines and may then be used to answer more difficult queries. This is the basic idea behind the Semantic Web (Antoniou & van Harmelen, 2008).

The recent example of the openPlanB[1]-initiative in Germany revealed two major pitfalls. Probably the most critical issue is the ownership of data. As the Semantic Web is designed so third parties can combine data from different data sources to create new applications the legal conditions must be clearly defined. Licenses usually create legal clarification as to what may be done with the supplied data. In the special case of openPlanB, Deutsche Bahn claims that the data was taken from their CD-ROM illegally. Another problem is actuality of data. Transportation schedules normally change every year. If delays are incorporated into online schedules, it may be necessary to update the online platform every minute. A static information source like a CD-ROM does not match these criteria (Bohle, 2012 [October 29, 2012]). In order to circumvent these problems, the data provider can offer the data online, defining license terms and arrange for necessary updates.

In the remainder of section 1, the core concepts of the Semantic Web are described followed by a discussion of the research methodologies used (section 2), thereby laying the foundation for a thorough description of the resulting formats in section 3. The basic algorithm presented in section 4 helps to deepen the understanding of how the formats can be used in practice. The managerial implications given in section 5 indicate how transportation companies and customers may benefit from this technology, while section 6 points out what still has to be done in order to fully profit from these formats. Section 7 summarises the main points raised in this paper.

### 1.2 The Semantic Web

While the syntax is only grammatical rules, semantics describe the content of a document by linking metadata (i.e., data about data) to a document or inserting metadata directly into the document. Therefore, the Semantic Web comes in two flavours. On the one hand, there are full-fledged ontologies used to describe a domain of discourse in greater detail. In this regard, a domain is a collection of all entities belonging to a specific subject (Hjorland & Albrechtsen, 1995). Ontology languages, like RDF or OWL, are used to define relationships between important concepts (classes of objects). A finite list of the concepts and their relationships is called ontology (Antoniou & van Harmelen, 2008). On the other hand, embeddable semantics are inserted directly into the document. The two most important embeddable formats are microformats and RDFa. As the aim of this paper is the semantically enrichment of web pages for enhanced querying, the authors focused on these formats as a basis for this work.

#### *Microformats*

Microformats are primarily defined for consumption by human users. Machine readability and interpretability comes only second. This means that the HTML code is rendered as a normal web page by the browser. Semantic markup is added by inserting class-attributes with values specified in a profile (Lewis, 2010). Microformats can be used to describe explicit information and define the syntax as well as the vocabulary (Khare & Celik, 2006). Microformats have two main advantages. They are relatively easy to use and they reuse existing HTML tags.

[1] http://openplanb.tumblr.com/

***RDFa***

Contrary to microformats, RDFa provides a set of new attributes for adding metadata to a web page. As the name suggests, RDFa is interoperable with RDF. Only the syntax is defined. Vocabularies can be exchanged and new ones created using the RDF schema mechanism (Adida & Birbeck, 2008 [August 27, 2012]) making RDFa truly infinitely extensible and open-ended (Yu, 2011). Another advantage is that RDFa is a W3C standard. Despite these benefits, microformats are deployed in greater numbers (Lewis, 2010).

# 2 Research Methodology

Due to the two main goals, namely providing one or a combination of more than one semantic format to mark up transportation information on the web and showing how these formats can be employed, the methodology is twofold. The first part builds to a large extent on the methodology for engineering microformats introduced by Loibl and Tüz (2012). This methodology guides the user through the process-steps of problem definition, the discovery of existing solutions and finally the creation of a new format to solve the problem at hand. As the formalisation of the discovered data structures is one of the last steps, the same methodology can be used for defining RDFa vocabularies as well. The second part uses literature on shortest path algorithms to determine how the information is marked up on the web pages. This information may then be transformed into suitable data structures to be processed further.

## 2.1 Methodology for Microformats Engineering

The first step of the approach used in this paper involves defining the problems with current technology and the field of application. More and more customers use online information sources, especially search engines, for trip planning purposes (Xiang & Gretzel, 2010). The prospective traveller may find several online schedules and planning sites only to discover that not a single one covers all the areas he or she wants to tour around. Websites like anachb [1] try to combine information about different transportation companies but still rely on their partners to get the information from them (A. Prem, personal communication, June 21, 2012). Therefore, it would be worthwhile for all parties involved to have semantic markup directly on the web pages of transportation businesses. For search engines, the area of application would be the analysis of semantic information. This facilitates answering queries about transportation without having to cope with any limitations due to regional boundaries. The next step involves an analysis of existing schedules to define what information is needed to find appropriate public transport. For this purpose the authors used a sample of 15 Austrian transportation companies (rail and bus) and nine transport alliances to discover common pieces of information provided on all websites. All nine transport alliances offered their itineraries as downloads (as pdf-documents) as well as through a searchable online platform, five alliances offered mobile apps. The transportation companies provided downloadable schedules as well, but only six had a searchable online platform. Another two companies offered mobile applications. None of the companies or alliances investigated used any kind of

[1] http://www.anachb.at

semantic markup. The content, which is commonly found in transport itineraries, can be organised as follows:

- Information about means of transport:
- Type: bus, street car, train (ICE, etc.), underground, ...
- Line: line number
- Constraints or extras like smoking/non smoking, disability-friendly
- Geographical data:
- Place of departure and arrival: name or coordinates
- If no direct connection exists: changeover stops
- Information about time and disruptions:
- Time of arrival and departure, travel duration
- Disruptions like delays or cancellations

These pieces of information were then used to search for existing microformats or ontologies which could be used to solve the problems outlined above. The searches were conducted using literature relevant to the field of transportation and the Semantic Web, the microformats-website[1] and the semantic search engine Swoogle[2]. Consequently, a set of microformats for marking up information about events (like the arrival of a bus or the departure of a train) and geographical information (like the exact location and name of a train station) could be identified. Together with a real world example, section 3 provides a more thorough discussion on the combination of formats.

### 2.2 Methodology for Defining an Appropriate Data Structure

The main objective of this work is to provide a format for the semantic markup of transport itineraries enabling a machine to interpret the information. Interpretation in this context means that an application calculates the best (e.g., shortest, cheapest, etc.) route through the consolidated networks of individual transportation companies for a customer. Therefore, any machine using the proposed format has to perform two basic tasks. First, it has to form a single network out of the information provided by the individual websites. According to Zhan (1997), a network is a directed graph G = (N, A) with a set N of nodes and a set A of arcs connecting two nodes. Therefore, the main task is to translate certain semantically annotated information into nodes and arcs. The data structure used to store nodes and arcs is vital to the performance of any shortest path algorithm. Past research found the forward star data structure to be appropriate where data associated with arcs and data associated with nodes is stored in separate arrays (Zhan, 1997). In a second step, an application uses this data structure together with a suitable shortest path algorithm to compute the best path

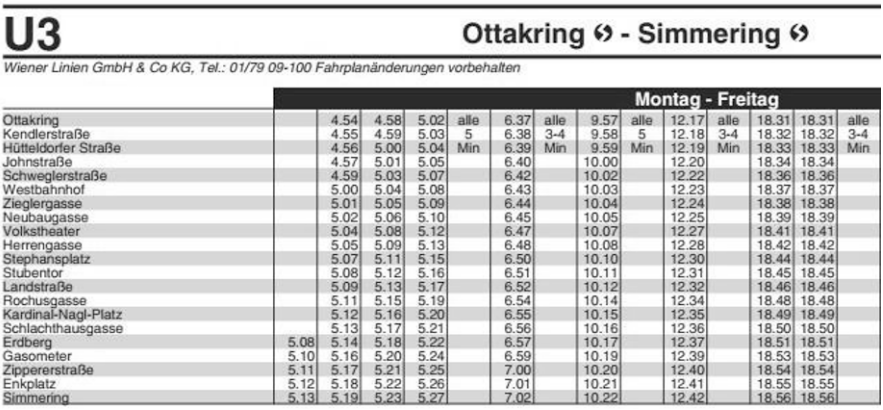
[1] http://www.microformats.org
[2] http://swoogle.umbc.edu/

between two nodes for a user. Defining an efficient algorithm for this task is beyond the scope of this work.

## 3 Semantic Markup of Transportation Schedules

The basic pieces of information to be covered by the format were discovered by an assessment of different websites (see section 2). This initial set was reduced due to the requirements of the data structure. Only the location of the stations and the time of departure and arrival are absolutely necessary to calculate the path through the network. Consequently, as little as such data has to be marked up constituting the core format. This approach is consistent with one of three design principles of microformats which requires the user to annotate only data necessary for solving the stated problem (Khare, 2006). The microformat used for location-data is an hCard (Celik & Suda, 2012b [August 27, 2012]) which gets embedded into instances of the hCalendar microformat (Celik & Suda, 2012a [August 28, 2012]). The basic idea behind this approach is that transportation from location A to location B can be seen as a series of events where each event is a single trip from one station to another station. So each event has a starting place with a start time and an end time at a different place. Such information is usually found online in the form of tables.

"`vcalendar`" acts as root-element and contains all the information about locations and times. A calendar, therefore, contains one or more event-objects with start and end-objects for defining the time of departure and the time of arrival. For each stop, the street address as well as coordinates are provided. The coordinates are necessary as they can be used to clearly distinct between two stops. Even if two stops have different street addresses, they may be so close together as to be seen as one stop. In addition, coordinates allow calculating the distance between two stations. Within the `vcalendar`-element one `vevent`-element for every trip between two stations is inserted. Each `vevent`-element in turn contains one `dtstart`-element for the departure time and a `dtend`-element for arrival time. Information about the exact location of a specific station is provided by a `location`-element which incorporates a `vcard`-element. Within the `vcard`-element geographical coordinates are provided through the `geo`-element which incorporates the `latitude`- and `longitude`-elements for the respective data. The street address is marked up using the `adr`-element. Recurring events (e.g., trains that run on weekdays from Monday to Friday) can be marked-up using the "`rrule`"-element. The following real-world example helps to clarify how it works.



**U3** Ottakring ↔ - Simmering ↔

*Wiener Linien GmbH & Co KG, Tel.: 01/79 09-100 Fahrplanänderungen vorbehalten*

| | Montag - Freitag | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Ottakring | | 4.54 | 4.58 | 5.02 | alle | 6.37 | alle | 9.57 | alle | 12.17 | alle | 18.31 | 18.31 | alle |
| Kendlerstraße | | 4.55 | 4.59 | 5.03 | 5 | 6.38 | 3-4 | 9.58 | 5 | 12.18 | 3-4 | 18.32 | 18.32 | 3-4 |
| Hütteldorfer Straße | | 4.56 | 5.00 | 5.04 | Min | 6.39 | Min | 9.59 | Min | 12.19 | Min | 18.33 | 18.33 | Min |
| Johnstraße | | 4.57 | 5.01 | 5.05 | | 6.40 | | 10.00 | | 12.20 | | 18.34 | 18.34 | |
| Schweglerstraße | | 4.59 | 5.03 | 5.07 | | 6.42 | | 10.02 | | 12.22 | | 18.36 | 18.36 | |
| Westbahnhof | | 5.00 | 5.04 | 5.08 | | 6.43 | | 10.03 | | 12.23 | | 18.37 | 18.37 | |
| Zieglergasse | | 5.01 | 5.05 | 5.09 | | 6.44 | | 10.04 | | 12.24 | | 18.38 | 18.38 | |
| Neubaugasse | | 5.02 | 5.06 | 5.10 | | 6.45 | | 10.05 | | 12.25 | | 18.39 | 18.39 | |
| Volkstheater | | 5.04 | 5.08 | 5.12 | | 6.47 | | 10.07 | | 12.27 | | 18.41 | 18.41 | |
| Herrengasse | | 5.05 | 5.09 | 5.13 | | 6.48 | | 10.08 | | 12.28 | | 18.42 | 18.42 | |
| Stephansplatz | | 5.07 | 5.11 | 5.15 | | 6.50 | | 10.10 | | 12.30 | | 18.44 | 18.44 | |
| Stubentor | | 5.08 | 5.12 | 5.16 | | 6.51 | | 10.11 | | 12.31 | | 18.45 | 18.45 | |
| Landstraße | | 5.09 | 5.13 | 5.17 | | 6.52 | | 10.12 | | 12.32 | | 18.46 | 18.46 | |
| Rochusgasse | | 5.11 | 5.15 | 5.19 | | 6.54 | | 10.14 | | 12.34 | | 18.48 | 18.48 | |
| Kardinal-Nagl-Platz | | 5.12 | 5.16 | 5.20 | | 6.55 | | 10.15 | | 12.35 | | 18.49 | 18.49 | |
| Schlachthausgasse | | 5.13 | 5.17 | 5.21 | | 6.56 | | 10.16 | | 12.36 | | 18.50 | 18.50 | |
| Erdberg | 5.08 | 5.14 | 5.18 | 5.22 | | 6.57 | | 10.17 | | 12.37 | | 18.51 | 18.51 | |
| Gasometer | 5.10 | 5.16 | 5.20 | 5.24 | | 6.59 | | 10.19 | | 12.39 | | 18.53 | 18.53 | |
| Zippererstraße | 5.11 | 5.17 | 5.21 | 5.25 | | 7.00 | | 10.20 | | 12.40 | | 18.54 | 18.54 | |
| Enkplatz | 5.12 | 5.18 | 5.22 | 5.26 | | 7.01 | | 10.21 | | 12.41 | | 18.55 | 18.55 | |
| Simmering | 5.13 | 5.19 | 5.23 | 5.27 | | 7.02 | | 10.22 | | 12.42 | | 18.56 | 18.56 | |

**Fig. 1.** Part of the itinerary of the Viennese metro line number 3 (Schedule Metro Line 3, 2012 [August 30, 2012])

Figure 1 shows a metro itinerary in a typical tabular form. Part of this schedule, namely the trip from station “Westbahnhof” to the stop “Zieglergasse” at 5:00 in the morning, was used in the example.

```
<html>
<table>
<div class="vcalendar">
<div class="vevent" id="hcalendar-Ubahn-Westbahnhof-Stephansplatz">
<a class="url" href="http://www.vor.at/">
<h1><div class="description">Vienna metro line U3</div></h1>
</a>
<span class="summary" style="display:none">metro line U3 from
*Westbahnhof* to *Zieglergasse*</span>
<tr><td>
<div class="location vcard">
<div class="fn"><a rel="tag" href="http://www.westbahnhof.w-s-o.net">
Westbahnhof</a></div>
<div class="geo">
<span class="latitude" style="display:none;">48.1966705</span>
<span class="longitude" style="display:none;">16.3372192</span>
</div>
<div class="adr">
<div class="street-adress" style="display:none;">Europaplatz 2</div>
<div class="postal-code" style="display:none;">1150</div>
<div class="locality" style="display:none;">Vienna</div>
<div class="country-name" style="display:none;">Austria</div>
</div>
</div>
</td>
<td>
<abbr class="dtstart" title="05:00:00">5:00</abbr> -
</td>
<tr><td>
```

```
<div class="location vcard">
<div class="fn"><a rel="tag" href="http://goo.gl/RU6Gp">
Zieglergasse</a></div>
<div class="geo">
<span class="latitude" style="display:none;">48.197055555556</span>
<span class="longitude" style="display:none;">16.345944444444</span>
</div>
<div class="adr">
<div class="street-adress" style="display:none;">Zieglergasse</div>
<div class="postal-code" style="display:none;">1060</div>
<div class="locality" style="display:none;">Vienna</div>
<div class="country-name" style="display:none;">Austria</div>
</div>
</div>
</td>
<td>
<abbr class="dtend" title="05:01:00">5:01</abbr>
</td>
</tr>
<div class="rrule" title="req=byday=MO,TU,WE,TH,FR">from Monday to
Friday</div>
</div>
</div>
</table>
</html>
```

**Listing 1.** Code sample of microformats used to markup transport information

Listing 1 shows the HTML code of the example. Marked in red are the attributes used to insert the microformats and the data. The corresponding values indicating the marked up information are labelled green whereas the information, which has to be extracted, is marked in blue colour. Figure 2 shows the rendered HTML code.


**Fig. 2.** Rendering of the HTML code given in Listing 1 (Browser Firefox)

Most of the additional information is not shown to the user. Instead, only the individual stations and the corresponding arrival and departure times are displayed in tabular form. Any machine can harvest the additional information provided within the code of the web page though. As can be seen by the coloured buttons located above,

the web page information about the contacts and tags can be exported using the operator plugin[1] for Firefox browsers.

## 4 Mapping Microformats into the Forward Star Data Structure

Before any piece of software can process the information hidden in annotated web pages, it has to find the individual data sources. This can either be done manually, e.g. by manually inserting the URLs of online itineraries into a database, or automatically. Automatic detection may involve a search engine which marks the page for later processing when it comes across an annotated page during crawling. When the pages are known, the machine can extract the nodes and arcs from the information content. Fortunately, the mapping between the data structure within the web pages and the data structure used for describing the network is rather straightforward. The information described within the "`vcard`"-element is the necessary data to denote a node. As the names of stations may be ambiguous, the coordinates within the "`geo`"-element are used to define a new node. When defining a new node, the machine has to take care that no double entries exist. This may happen when two stops of different transportation companies are in the immediate vicinity of each other and may in fact be seen as one stop. The data for the arcs is taken from the "`vevent`"-element. Both the time to travel and the distance can be computed from the "`dtstart`"- and "`dtend`"-elements, and the "`geo`"-element respectively. After the network has been defined, a shortest path algorithm may be used to answer user queries about transportation from one node to another. Equal queries, which are frequently asked, should be cached.

## 5 Managerial Implications

The format proposed in this work has implications for all three stakeholders in a search process for transportation. Transportation companies and alliances can use traditional search engines as additional distribution channels thereby promoting their products. Search engine providers may substantially increase their services portfolio simply by employing technology that they already use (Goel & Gupta, 2010). The users then utilize the search engines they are already familiar with to make more sophisticated queries. This enables users to better and more easily plan their travel using public transport. In turn, this may give these modes of transport a boost in the future. Consequently, such an increase in the passenger volume helps destinations to protect their ecological and ultimately economical environment.

## 6 Known Issues

The problems with this approach are twofold. The format itself currently covers only information which is absolutely necessary for building the network of nodes and arcs. Additional data, like accessibility for disabled people, were omitted although it may be crucial information for many customers. Another problem may be seen in the exclusion of any ticketing information. Instead, a link to the company website is provided where any purchases would have to be made. As the provision of a ticket

[1] https://addons.mozilla.org/de/firefox/addon/operator/

valid for all transport businesses seems unfeasible at the time of writing this paper, it has never been the aim of this format. Another problem poses the slow uptake of semantic technologies by the industry. This may be rooted in a lack of knowledge about certain Semantic Web technologies. Another reason may be the small supply of software and tools currently available (Haustein & Pleumann, 2002; McDowell et al., 2003). It is possible that companies see no reason in investing in technology and using semantic markup when no one is actively using the offered data and no advantage for the business is created. Search engines and other companies are loath to implement Semantic Web technologies because not enough marked-up data is available to make the effort worthwhile.

## 7 Conclusions and Further Research

In order to help solving the problems outlined above, any cost arising for a company should be kept as small as possible. To that end software tools must be created. Special attention has to be given to the ease of use of those tools resulting in a none to steep learning curve. These tools should be employed in a showcase in order to point out usage and potential gains of this technology. To that end potential cooperation partners who are willing to have their schedule data annotated must be identified. The components necessary for a real world implementation are the format itself, software tools for annotation, data extraction, building the network, and a query interface. As subsequent changes to software systems are always time consuming, the core format should be stable. Such a core format, which contains information about the transportation network only, is presented in this paper.

Additional markup for information, which is necessary for any decisions taken by customers, has to be defined in their own formats. Since these additions may depend on the type of conveyance, they are not integrated into the core format. Further research, therefore, has to focus on what extra information customers need in addition to reach a decision. In a next step, an appropriate format must be discovered or a new one engineered which can then be integrated into the existing one.

The current work is supposed to provide a semantic format which can be used to build a supra-regional public transport network. Such a network enables more complex queries about finding the optimal path. This goal was reached by combining two microformats which had the advantage of using only existing technology. Such an approach can help in keeping the implementation cost low. As with most software projects, this format is still in an early stage of development and will be subject to some additions as already outlined above. Nevertheless, the authors are convinced that it is a valuable addition to the Semantic Web.

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# Unplanned Behaviour of Exhibition Attendees and the Booth Recommender System: The Goal Framing Theory Perspective

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## Abstract

Our study of unplanned behaviour theory examines the effect of the booth recommender system (BRS) on the goals of exhibition attendees. Previous studies have overlooked the importance of the unplanned behavioural effectiveness of information technology (IT) devices for understanding motivation and delivering unexpected outcomes at exhibitions. In this paper, we distinguish several goal frames, including hedonic, gain, and normative goals, which contribute to the relationship between BRS use and unplanned boot visits. BRS use directly influences revisit intentions to an exhibition and contributes to unplanned booth visits. BRS use in an exhibition can contribute to attendees' impulsive behaviour and can induce them to return to an exhibition. The results and implications are discussed.

**Keywords:** Exhibition; Unplanned Behaviour; Booth Recommender System; Goal Framing

## 1 Introduction

The exhibition industry has grown rapidly in the last decade and has begun to use information technology (IT) devices to explain items to booth attendees. Exhibitions are market events at specific times that can draw various companies and consumers. Previous studies have not provided a theoretical foundation to identify the IT factors involved in attendees' behaviour at specific exhibitions. Recommender systems can provide more specific, detailed, and personalised service than at any other time in history through web-based and smart devices. Recommendation mechanisms are becoming increasingly critical in supporting customised and personalised service for consumers' and end users' decision-making processes by providing expertise to select appropriate and optimal options. Various types of recommender systems exist, such as book and music Recommendation from Amazon and customised products and services that result from analyses of customers' shopping behaviour.

Recommender mechanisms are designed to assist individuals in choosing between alternatives, but people may be inclined to avoid recommender systems in favour of freedom of choice. For example, Americans are less likely to trust automated systems (Huerta et al., 2012), or people may avoid salespersons who attempt to persuade them

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L. Cantoni and Z. Xiang (eds.), *Information and Communication Technologies in Tourism 2013*, DOI: 10.1007/978-3-642-36309-2_39,

to adopt certain items (Clee and Wicklund, 1980). The two contrasting points that we address in this paper can be explained by goal framing theory (Lindenberg and Steg, 2007), which explains the framing of attitudinal, personal, and contextual aspects of behaviour, and unplanned impulse behaviour (Park and Lennon, 2006; Pollay, 1968), which refers to the degree to which an individual is likely to make unintended, immediate, and unreflective purchases.

In the marketing literature, Pollay (1968) attempted to compare customers' planned and impulse purchases, which are influenced by circumstances at a specific moment. Pollay's (1968) study provided insight into the effects of consumers' unplanned impulse behaviour compared with well-planned behaviour. Our study examines how goal framing (hedonic, gain, and normative) affects booth recommender system (BRS) and generates unexpected outcomes, such as unplanned booth visits. Goal framing theory, as explained by Mandl et al. (2010), suggests that "the information which is framed is the goal of an action or behaviour" (p.16). A decision made by a goal frame is influenced by positive vs. negative information, which results in acceptance or rejection. Pollay stated that people's cognitive processes focus on the products and brands they plan to purchase. However, few studies have examined IT systems' usage for unplanned behaviour. Hostler et al. (2011) noted that very few studies have investigated how end users' impulses are influenced by the suggestions provided by recommender systems in the context of shopping behaviour. These authors examined the effect of online impulse purchase decisions facilitated by an online recommender agent. Our study investigates the complementary theories of goal framing and unplanned behaviour that are facilitated by the BRS at exhibitions. This study emphasises the role of BRS in the decision-making processes involved in goal framing and examines how BRS affects attendees' behaviour at an exhibition. We draw upon a study of unplanned attraction site visits by travellers based on impulsive decisions to select applications of unplanned behaviour theory (Hwang and Fesenmaier, 2011). This study reviews the 'unplanned decision theory' in diverse disciplines (Beatty and Ferrell, 1998), employs goal framing theory (Lindenberg and Steg, 2007), and measures the mediating effects of BRS for unplanned booth visits. The role of IT (i.e., BRS) in this paper involves the management of the relationship between goals and intention for unplanned booth visits to explain revisit intentions at exhibitions.

Building upon these theories, three research questions are addressed. First, how do perceived enjoyment (hedonic goal frame), perceived usefulness (gain goal), and threats to freedom of choice (normative goal) influence BRS use and unplanned booth visits? Second, is there a relationship between BRS use and unplanned booth visits that suggests intentions for unplanned booth visits? Third, how do BRS use and unplanned booth visits influence revisit intentions at exhibitions? The purpose of this study is to investigate the role of goal framing in BRS use and unplanned booth visits and its effect on revisit intentions at exhibitions.

# 2 Theoretical Background

## 2.1 Goal Framing Theory

Psychology and sociology suggest that all people have different ways of understanding any given context. The notion of goal orientation was introduced in the educational literature to explain individual differences in students' learning (Chen and Mathieu, 2008). Two goals have been articulated in the context of learning: learning versus performance. Individuals with learning goals and individuals with performance goals pursue these goals differently. A frame is "the way in which people process information and act on it" (Lindenberg, 2001, p.118). Therefore, when people change their goals, they behave differently in line with the new goals. A goal frame considers a specific goal in terms of how its framing effects (i.e., selective attention) are affected by cognitive processes. Therefore, the goal determines which frame people consider, which attitudes are most cognitively accessible, how people evaluate various aspects of the situation, and what alternatives are considered. Three types of goals have been identified in an environmental context: hedonic goals (i.e., to feel better immediately); gain goals (i.e., to guard and improve one's resources); and normative goals (i.e., to act appropriately) (Lindenberg and Steg, 2007). Thus, when these goals are activated, they influence people's attitudes, feelings, and actions. A hedonic goal frame activates one or more subgoals that involve the way a person feels in a particular situation (e.g., avoiding negative thoughts and events, seeking direct pleasure). People who have hedonic goals are generally sensitive to what increases or decreases their pleasure. A gain goal frame makes people very sensitive to changes in their personal resources. For example, if a particular spray that is environmentally harmful is cheaper than an environmentally sound spray, a person with a gain goal frame will choose the former because it is cheaper. A normative goal frame activates all subgoals related to appropriateness and makes people sensitive to what they think they should do.

## 2.2 Unplanned Behaviour Theory

Pollay (1968) stated that purchases that are not normally planned can be seen as unplanned impulse behaviours. The concept of 'unplanned' behaviour is another dimension of the relationship between intentions and actual behaviour that has been examined in marketing. Impulse buying tendencies are defined as "the degree to which an individual is likely to make unintended, immediate, and unreflective purchases" (Park and Lennon, 2006, p. 57). Consumer behaviour reacts to attempts to control that behaviour, and consumers enjoy freedom of choice under given circumstances (Clee and Wicklund, 1980).

Unplanned behaviour is a goal-interpreted rather than a goal-directed phenomenon that allows people to describe what they want to do rather than what they plan to do (March and Woodside, 2005). Exhibitions provide conditions that are more likely to increase unplanned behaviour via BRS, which helps attendees to browse freely, to unexpectedly find items, and to generate ideas from unexpected booth visits. The use of BRS may be positive when multiple items are available in a limited time.

Unplanned behaviour in the tourism industry is defined as travellers' willingness to choose secondary destinations, attractive sites, or restaurants using locally available

information (Hwang, 2011). Travellers who visit attractive destinations that were not previously planned are likely to unexpectedly find new information and to choose alternative options when they are disappointed by their expectations of their initial choices or when unexpected constraints occur (Hwang, 2011). Immediate and spontaneous behaviour is likely to occur in response to on-site stimuli.

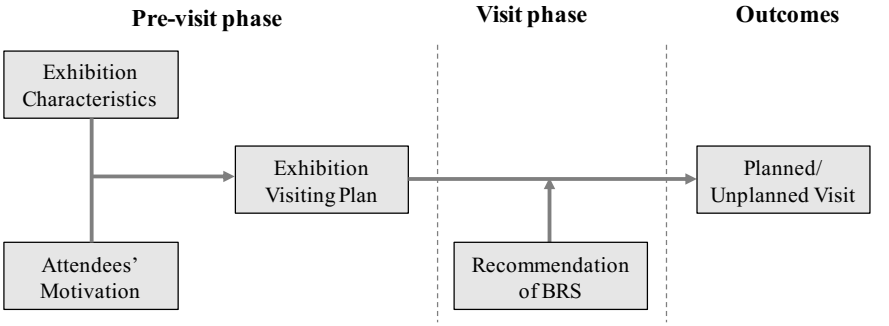


**Fig. 1.** Exhibition Attendees' Visiting Behaviour

Recommender services assist individuals in finding information on products or services. Unplanned behaviour theory can be applied to exhibition contexts in which BRS is used to manage the relationship between motivation and outcomes rather than intentions of planned behaviour, as shown in Figure 1.

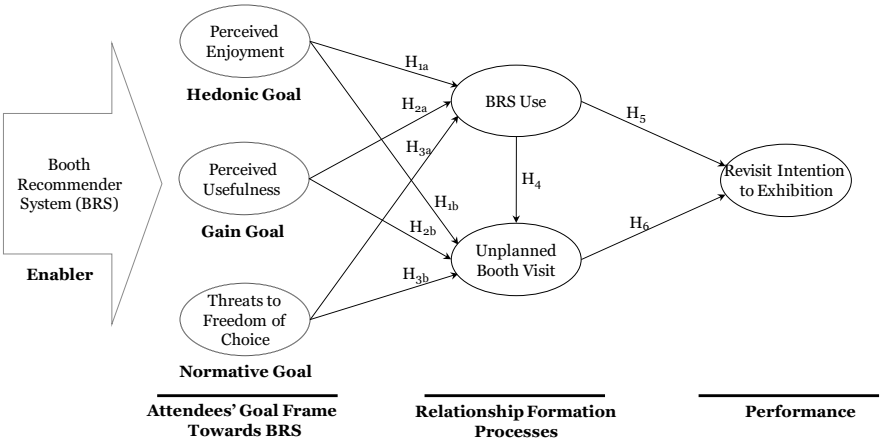


**Fig. 2.** Research Model

## 3 Research Model and Hypotheses

Based on the integrated theoretical background of unplanned behaviour and goal frame theory for recommender mechanisms, we applied BRS for personalisation

services to the context of booth exhibitions. The proposed research model is shown in Figure 2.

### 3.1 Perceived Enjoyment

Hedonic goals help people to experience positive or pleasurable thoughts and events in particular situations. People who have hedonic goals are generally sensitive to their level of pleasure. One goal frame is perceived enjoyment, such as the extent to which the activity of using a computer is perceived to be enjoyable (Davis et al., 1992, p.1113). Heijden (2004) found that the hedonic nature of an information system is an important boundary condition for the technology acceptance model (TAM). Many hedonic aspects of household technology are closely related to perceived enjoyment (Heijden, 2004). Recently, Sun and Zhang (2006) argued that intrinsic motivations, such as perceived enjoyment, can increase perceptions of behavioural intentions in utilitarian systems. Regarding the hedonic mood, Beatty and Ferrell (1998) found that shopping enjoyment influenced impulse buying. Thus, we propose that hedonic goals are positively involved in BRS use and unplanned booth visits in the context of exhibitions.

$H_{1a}$: Hedonic goal: perceived enjoyment has a positive impact on BRS use.

$H_{1b}$: Hedonic goal: perceived enjoyment has a positive impact on unplanned booth visits.

### 3.2 Perceived Usefulness

Gain goals make people sensitive to changes in their personal resources. TAM-based studies are related to the utilitarian use of work environments (i.e., goal-directed use) and the task-oriented perspective. Utilitarian value is related to the effectiveness and efficiency that result from the use of IT, or 'perceived usefulness' (Davis, 1989). Recent studies have shown that utilitarian value is positively related to adoption intentions (Kim and Han, 2011; Sun and Zhang, 2006). Utilitarian motivation is related to critical missions, rationality, effective decisions, and goal orientation. A goal-oriented consumer generates purchase intentions. In contrast, although a consumer may not purchase a particular item, he or she may obtain ideas and prices for potential purchases. Sometimes, utilitarian value may result in necessary unplanned behaviour. Therefore, consumers who emphasise utilitarian value may not only focus on relevant items to situationally explain efficiency but may be happy to browse in shopping places. Parboteeah et al. (2009) demonstrated that impulsive purchasing is related to product descriptions and navigation aids. Thus, we propose that perceived usefulness as a gain goal may be positively related to unplanned booth visits.

$H_{2a}$: Gain goal: perceived usefulness has a positive impact on BRS use.

$H_{2b}$: Gain goal: perceived usefulness has a positive impact on unplanned booth visits.

### 3.3 Threats to Freedom of Choice

Normative goals are related to concepts of rights, duties, and equality (Kolm, 1994). More generally, normative goals affect individual liberties, and one individual's action may severely affect another individual's possibilities. Paradoxically, normative

goals may enable individuals to move in the opposite direction from the influence by producing a negative effect, or a "boomerang effect" (Clee and Wicklund, 1980). If there are limited options, a person is not likely to choose one. Individuals may find recommenders restrictive or may feel pressured to accept them, and they may consider recommenders barriers to free choice or behaviour. In such cases, individuals react by negatively evaluating the recommender, refusing to accept it in an attempt to restore their freedom to choose, or even choosing the opposite of the recommender. Web users may perceive web recommenders as restricting their free will, even when the recommenders are relevant, accurate, and timely. When this occurs, consumers enter a motivational state in which they form negative attitudes towards the proposed recommenders. Therefore, we posit that perceptions of threats to freedom generated by normative goal recommenders are negatively related to intentions to use the recommender service (Lee and Lee, 2009). By contrast, if people are interested in the options but feel threatened by their choices, then they will tend to be more attractive or more sought before alternatives are eliminated (Clee and Wicklund, 1980). Thus, we hypothesise the following:

$H_{3a}$: Anti-normative goal: threats to freedom of choice have a negative impact on BRS use.

$H_{3b}$: Anti-normative goal: threats to freedom of choice have a positive impact on unplanned booth visits.

### 3.4 BRS Use, Unplanned Booth Visits, and Revisit Intentions at Exhibitions

TAM can apply to the Internet for either utilitarian or hedonic purposes. People surf the Internet for entertainment purposes and to seek information for work-related purposes (Heijden, 2004). Bressolles et al. (2007) found a strong relationship between website quality and unplanned purchases. Hostler et al. (2011) explored the use of recommender agents on online shopping behaviour and found that the use of a recommender agent significantly influences product search effectiveness, which leads to unplanned purchases. Many TAM studies have shown that IS continuance intentions are strongly related to satisfaction with prior use of IT. Satisfied consumers tend to return to the same store. However, impulse buying behaviour is voluntary, spontaneous, unanticipated and unplanned. Therefore, it is difficult to predict why consumers return to purchase new products (Harmancioglu et al., 2009). However, the use of BRS may directly influence unplanned booth visits and impulse purchasing behaviour. BRS can arouse hedonic desires and stimulate desires for fun and excitement related to unplanned booth visits. These desires may be increased and nurtured by unplanned experiences, which produce revisit intentions at exhibitions. We suggest that unplanned booth visits at exhibitions may generate fun and excitement, which can motivate individuals' revisit intentions at exhibitions. Thus, we suggest that BRS use influences unplanned booth visits and revisit intentions at exhibitions. In turn, unplanned booth visits facilitated by BRS are positively connected to revisit intentions at exhibitions.

$H_4$: BRS use has a positive impact on unplanned booth visits.

$H_5$: BRS use has a positive impact on revisit intentions at exhibitions.

$H_6$: Unplanned booth visits have a positive impact on revisit intentions at exhibitions.

# 4 Research Methodology

## 4.1 Instrument development

In this study, measurements were derived from previous literature pertaining to the six constructs of perceived enjoyment, perceived usefulness, threats to freedom of choice, intention to use BRS, unplanned booth visits, and revisit intentions at exhibitions (see Table 1). Four perceived enjoyment items were adopted from Hong and Tam (2006), three perceived usefulness items were adopted from Lee and Lee (2009), and three threats to freedom of choice items and intention to use BRS items were drawn from Lee and Lee (2009). Furthermore, four unplanned booth visit items were self-developed for the present study. Finally, four revisit intentions for exhibition items were adapted from Severt et al. (2007). All of these items were measured on a 7-point Likert scale ranging from strongly disagree (1) to strongly agree (7).

## 4.2 Data collection


**Fig. 3.** Snapshot of BRS Use

To this end, this study developed a system to test the BRS of the 2012 franchise exhibition and promoted this test with the event "Interesting Booth QR Click Event" (Figure 3). In this event, gifts were given to attendees who visited any of 300 booths, each of which had a specific QR (quick response) code. People who scanned the code with their smart phones were considered visitors. The purpose of this event was to identify the locations of attendees who scanned QR codes on a real-time basis and analyse their QR code information to understand the preference for booth recommender in real time. From 17 March to 19 March 2012, a large number of attendees participated in this exhibition. Of these attendees, 520 attendees utilised the BRS. As an incentive to complete tasks for the study, each participant who completed the survey was provided with a gift certificate worth $5. A total of 508 valid responses were collected from the survey and coded for analysis. The majority of the respondents in the present study were male (322, 63.4%). The largest proportion of respondents (261, 51.3%) was under the age of 30, followed by respondents aged 30 to 39 (122, 24.0%). Most respondents were students (197, 38.8%) and office workers (95, 18.7%). The average annual total income was less than 29 million won (286, 56.4%), followed by 30-39 million won (88, 17.3%).

# 5 Data Analysis and Results

This study employed a structural equation modelling (SEM) approach to test the hypotheses proposed in Figure 1.

## 5.1 Confirmatory Factor Analysis

We assessed the constructs for convergent validity and discriminant validity via confirmatory factor analysis (CFA) using AMOS 18. In CFA, the measurement model is revised by dropping items that share a high degree of residual variance with other items. The $\chi^2$ fit statistic was 303.763 with 174 degrees of freedom ($\chi^2$/d.f. = 1.746) ($p < 0.001$). The goodness-of-fit index (GFI) was 0.945, the adjusted goodness-of-fit index (AGFI) was 0.927, the normed fit index (NFI) was 0.966, the comparative fit index (CFI) was 0.985, and the root mean square error of approximation (RMSEA) was 0.038. All statistics supported the overall measurement quality given the number of indicators (Anderson and Gerbing, 1992). Average variance extracted (AVE) for each construct must exceed 0.5. As shown in Table 1, the standardised path loadings were all significant and greater than 0.7. Furthermore, the CR and the Cronbach's α exceeded 0.7 for all constructs. The AVE was greater than 0.5 for each construct. Therefore, convergent validity for the constructs was supported.

**Table 1.** Results of Convergent Validity Testing[a]

| Constructs and Variables | | Loadings | CR[b] | AVE[c] | α |
|---|---|---|---|---|---|
| Perceived Enjoyment | 1. I had fun using the booth Recommender service. | 0.894 | 0.927 | 0.761 | 0.926 |
| | 2. The booth Recommender service was entertaining for me. | 0.901 | | | |
| | 3. I enjoyed the booth Recommender service. | 0.888 | | | |
| | 4. The booth Recommender service was not boring. | 0.802 | | | |
| Perceived Usefulness | 1. Using the booth Recommender service enables me to find a desired booth more quickly. | 0.926 | 0.905 | 0.762 | 0.901 |
| | 2. Using the booth Recommender service enables me to find a desired booth more easily. | 0.898 | | | |
| | 3. Using the booth Recommender service is helpful for the show experience. | 0.788 | | | |
| Threats to Freedom of Choice | 1. The booth Recommender service limits me in finding an exhibition booth. | 0.780 | 0.903 | 0.758 | 0.901 |
| | 2. The booth Recommender service makes it inconvenient for me to find an exhibition booth. | 0.943 | | | |
| | 3. The booth Recommender service bothers me in finding the exhibition booth. | 0.881 | | | |
| BRS Use | 1. I actively used the booth Recommender service. | 0.872 | 0.911 | 0.773 | 0.909 |
| | 2. The booth Recommender service helped me to find booths easily. | 0.920 | | | |
| | 3. The booth Recommender service lived up to my expectations. | 0.844 | | | |

| Constructs and Variables | | Loadings | CR[b] | AVE[c] | α |
|---|---|---|---|---|---|
| Unplanned Booth Visits | 1. I visited an unplanned booth through the booth Recommender service. | 0.679 | 0.878 | 0.645 | 0.874 |
| | 2. I spontaneously visited a booth through the booth Recommender service. | 0.867 | | | |
| | 3. I visited a booth without thinking through the booth Recommender service. | 0.853 | | | |
| | 4. I visited a booth on the spur of the moment due to the booth Recommender service. | 0.799 | | | |
| Revisit Intention to Exhibition | 1. I will attend the franchise exhibition again. | 0.908 | 0.945 | 0.811 | 0.944 |
| | 2. I am planning to visit the franchise exhibition frequently in the future. | 0.922 | | | |
| | 3. I will continue to visit the franchise exhibition in the future. | 0.930 | | | |
| | 4. I would recommend the franchise exhibition to others. | 0.840 | | | |

[a] $\chi^2 = 303.736$, d.f. = 174 ($\chi^2$/d.f. =1.746), p = 0.000, GFI = 0.945, AGFI = 0.927, NFI=0.966, CFI=0.985, RMSEA = 0.038
[b] Composite Reliability
[c] Average Variance Extracted

### 5.2 Hypothesis Testing

Table 2 presents the maximum-likelihood estimates for the various overall fit parameters. The $\chi^2$ statistic fit was 321.213 with 177 degrees of freedom ($\chi^2$/d.f = 1.815) ($p < 0.000$). The GFI was 0.943, the AGFI was 0.925, the NFI was 0.964, the CFI was 0.983, and the RMSEA was 0.040. These multiple indicators suggest that the model has good fit, justifying further interpretation. Hypotheses $H_{1a}$, $H_{2a}$, and $H_{3a}$ : Perceived enjoyment has a positive effect on BRS use ($\gamma_{11} = 0.491$, t-value = 9.613, $p < 0.01$). $H_{2a}$ is supported by the significant positive impact of perceived usefulness on BRS use ($\gamma_{21} = 0.293$, t-value = 5.767, $p < 0.01$). $H_{3a}$ is supported by the significant negative impact of threats to freedom of choice on BRS use ($\gamma_{31} = -0.090$, t-value = -2.513, $p < 0.05$). Hypotheses $H_{1b}$, $H_{2b}$, and $H_{3b}$ address the structural relationships among perceived enjoyment, perceived usefulness, threats to freedom of choice, and unplanned booth visits. Perceived enjoyment has a positive effect on unplanned booth visit ($\gamma_{12} = 0.122$, t-value = 1.803, $p < 0.1$). $H_{2b}$ is supported by the significant positive impact of perceived usefulness on unplanned booth visits ($\gamma_{22} = 0.150$, t-value = 2.407, $p < 0.001$). $H_{3b}$ is supported by the significant impact of threats to freedom of choice on unplanned booth visits ($\gamma_{32} = 0.206$, t-value = 4.646, $p < 0.01$).

Finally, $H_4$-$H_5$ addresses the relationships among BRS use, unplanned booth visits, and revisit intention for an exhibition. BRS use has a positive effect on unplanned booth visits ($\beta_{21} = 0.333$, t-value = 4.890) and is statistically significant at the $p < 0.01$ level, supporting $H_4$. BRS use has a positive effect on revisit intention for an exhibition ($\beta_{31} = 0.435$, t-value = 8.443) and is statistically significant at the $p < 0.01$ level. $H_6$ is supported by the significant positive impact of unplanned booth visits on revisit intention for an exhibition ($\beta_{32} = 0.129$, t-value = 2.560, $p < 0.01$).

**Table 2.** Standardised Structural Estimates and Tests of the Main Hypotheses

| Hypothesis | Path | Estimates (t-value) | Results |
|---|---|---|---|
| $H_{1a}$ | Perceived enjoyment → BRS use | 0.491(9.613) | Supported |
| $H_{1b}$ | Perceived enjoyment → Unplanned booth visit | 0.122(1.803) | Supported |
| $H_{2a}$ | Perceived usefulness → BRS use | 0.293(5.767) | Supported |
| $H_{2b}$ | Perceived usefulness → Unplanned booth visit | 0.150(2.407) | Supported |
| $H_{3a}$ | Threats to freedom of choice → BRS use | -0.090(-2.513) | Supported |
| $H_{3b}$ | Threats to freedom of choice → Unplanned booth visit | 0.206(4.646) | Supported |
| $H_4$ | BRS use → Unplanned booth visit | 0.333(4.890) | Supported |
| $H_5$ | BRS use → Revisit intention for exhibition | 0.435(8.443) | Supported |
| $H_6$ | Unplanned booth visit → Revisit intention for exhibition | 0.129(2.560) | Supported |

## 6 Discussion and Conclusions

This study focused on whether exhibition attendees' adoption of the BRS leads to their revisit intention for exhibitions. In other words, this study attempted to identify whether the attitudes of exhibition attendees toward BRS influence their behaviours, such as exhibition visits. Exhibition attendees' motivations regarding BRS were segmented into three types based on goal framing theory: perceived enjoyment, perceived usefulness, and threats to freedom of choice (anti-normative), which represent the hedonic goal, the gain goal, and the normative goal, respectively. According to this study, these three goals were found to have a significant influence on both BRS use and unplanned booth visits. In addition, BRS use had a significant influence on unplanned booth visits and revisit intentions for exhibitions. The analysis indicated that exhibition attendees are fully aware of the various BRS functions. Moreover, as shown in hypothesis $H_{3a}$, the recommender function of the BRS was a negative influential factor because it discouraged autonomous booth selections by exhibition attendees. However, 'threats to booth choice' was a positive, not a negative, influential factor on unplanned booth visits. This outcome suggests that even though the BRS's recommender function negatively affected the exhibition attendees' freedom, the exhibition attendees made unplanned visits to booths for fun or excitement according to the BRS recommenders. In addition, among the antecedents for intention to revisit, the influence of the BRS obtained the highest level, at 0.435. These results indicate that the use of recommender systems at exhibitions is not confined to device-based options but has an extended influence on users' post-exhibition behaviours. The findings of this study are meaningful because they suggest that when people use intelligent devices at event venues or exhibitions, the influence of these devices do not remain at the level of present adoption but extend to future revisit intentions. When intelligent systems such as the BRS remain at the level of device-based onsite adoption, they have negligible meanings for exhibition hosts or marketers. Thus, the results of this study can be considered especially meaningful to BRS developers. Exhibition attendees were observed to visit

unplanned booths according to unplanned behaviours arising from the use of the BRS. In fact, such behaviours were revealed to be a positive influential factor on revisit intention, suggesting that positive influences can result not only from planned behaviours but also from unplanned behaviours. This study has both theoretical and practical implications. First, regarding the theoretical implications of this study, exhibition attendees' motivations for BRS use were explained based on the goal frame theory, and an explanation for exhibition visit behaviour was provided by combining the output with unplanned behaviour theory. Second, the concepts presented in this study explain not only online behaviours but also offline behaviours. As a result, these findings have implications for a combined model that explains both online and offline behaviour. As a practical implication of this study, the use of BRS at exhibitions is not only a means of arousing the interest of attendees; it also alters attendees' behaviours to encourage unplanned booth visits, thereby facilitating revisits to these exhibitions in the future. In this regard, this study suggests the need for an advanced BRS whose functions are customised according to user levels or types. A limitation of this study may be that the unplanned behaviours of exhibition attendees were identified by surveys. In the future, a more refined analysis will be necessary in which unplanned and planned behaviours are identified based on actual visit logs. In addition, further research should incorporate an analysis of how the identified behaviours are influenced by BRS and how they influence the behaviours regarding future exhibitions.

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## 8 Acknowledgements

This work was supported by the Knowledge service Ubiquitous Sensing Network (USN) Industrial Strategic technology development program, 10035426, Personalization marketer for an intelligent exhibit marketing funded by the Ministry of Knowledge Economy (MKE, Korea).

# Adopting Network Multimedia Systems in Interactive Digital Television: A Strategic Method towards Enhancing Tourism Relationship Marketing

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## Abstract

This paper investigates the convergence of network multimedia and interactive digital television systems and elaborates on a novel research approach that may be adopted in tourism relationship marketing, towards enabling for an efficient process of collecting and analyzing feedback data from tele-viewers. This process may be vital for optimum marketing purposes, targeting customers with a more efficient and effective way and enhancing the experience that they exploit with specific brands. Furthermore, the proposed technology convergence model enables for an efficient analysis of users' data, collected using the envisaged network systems, by exploiting data mining methods, such as predictive visual analytics. The analyzed data revealing customers' preferences is proposed to be optimally displayed to marketers, by utilizing cutting edge web technologies that provide an actual mean to automatically customize services for individual customers or market segments.

**Keywords:** Tourism Relationship Marketing, Customer Relationship Management, Interactive Digital Television.

## 1 Introduction

Travel and tourism has been for many years on the forefront of Information Communication Technologies (ICTs) sector due to its intangible, perishable, global nature and subsequent reliance upon the movement of information (Schweda & Varan, 2003). Both industries (i.e. ICTs and travel/tourism industries) are closely interrelated and intertwined, since ICTs are probably the strongest driving force for changes within the tourism sector (Werthner & Klein, 1999). Recent developments in Information Technology (IT) services and applications have a far reaching impact on the tourism industry in an increasing competitive environment. Each of the various sections of the travel industry (i.e. suppliers, tour operators and travel agencies, as well as travelers) is affected, as global distribution channels change, offering new chances to improve communication with business partners and consumers. The array of choices includes traditional computer reservation systems, Internet, telephone marketing, call centers, kiosk systems, teletext, interactive TV, as well as smartcards and ticketless travel. All provide new opportunities to drive down communication costs and to carry out direct marketing, not only for large companies, but also for small and medium-sized enterprises (Kuom & Oertel, 1999).

As one of the most progressive industries in IT adoption, travel and tourism sector provides an ideal context, towards investigating the influence of sophisticated technologies in marketing, especially regarding Customer Relationship Management (CRM) and niche marketing. These technologies provide new business opportunities

L. Cantoni and Z. Xiang (eds.), *Information and Communication Technologies in Tourism 2013*, DOI: 10.1007/978-3-642-36309-2_40,

in establishing, maintaining, enhancing and commercializing customer relationships through a better understanding of customer requirements and promise fulfillment. Tourism suppliers will then have in their disposal new tools and mechanisms for direct communication with consumers, with the interactivity empowered to unprecedented levels. This two-way interactive communication ensures that consumers and suppliers interact dynamically towards achieving their goals. Consumers need maximum satisfaction from the product and enterprises request to achieve their objectives and financial targets (Buhalis, 2003).

Furthermore, advances in interactive digital television systems, next generation network systems, such as IMS (i.e. IP Multimedia Subsystem), Internet based technologies and their convergence could contribute efficiently towards, optimizing the process of collecting and analyzing data that is vital in tourism relationship marketing. More specifically, interactive digital television elaborates on the study and realization of novel communication networks, able to provide multiple interactive multimedia and Internet based services, utilizing Digital Video Broadcasting (DVB) advances. On the other hand, IMS is a promising solution that may be adopted in next generation networks (e.g. mobile and digital television systems), providing advanced capabilities and added value data services. In this context, this paper elaborates on the exploitation of IMS in interactive digital television systems and proposes a novel research approach based on technology convergence, which could be adopted in tourism relationship marketing, enabling for a more efficient process of collecting and analyzing feedback data from users/viewers. As interactive relationship marketing relies upon customer information, this process may enable tourism enterprises and organisations to track customer preferences and subsequently provide them superior value via customized services. As a result, marketers will be able to base much more cost effective marketing decisions on a detailed knowledge of the behaviour and preferences of their existing or potential customers. Furthermore, towards enabling for an efficient analysis of users' data collected by exploiting the envisaged network architecture, data mining methods are proposed such as predictive visual analytics in order to optimally predict future purchasing patterns. The analyzed data revealing customers' preferences are proposed to be efficiently displayed to marketers by exploiting web technologies like HyperText Markup Language (HTML5), Cascading Style Sheets (CSS) and JavaScript (JS). Such web technologies will provide to them an actual mean to automatically customize services for individual customers or market segments. Finally, a plan for an actual implementation, testing and evaluation of the proposed solution is provided, concluding this paper.

## 2 Tourism Relationship Marketing

Relationship marketing (i.e. RM) is a marketing (communications) approach that is aimed at establishing long-term, trusting, profitable and mutual beneficial relationships with loyal valued customers (Kitchen & De Pelsmacker, 2004; Kim, Han & Lee, 2001). Cosic and Djuric (2010) suggest that RM represents a paradigm of changes which take place in marketing practice. Changes are mainly related to shift from the focus at transactions to the focus at relationships. Marketing is no longer simply about developing, selling and delivering products. It is progressively more concerned with the development and maintenance of mutually satisfying long-term

relationships with customers. This change is driven by several conditions: more intense, often global, competition; more fragmentation of markets; a generally high level of product quality which is forcing companies to seek competitive advantage in other ways; more demanding customers; and rapidly changing customer buying patterns. Enduring relationships with customers cannot be duplicated by competitors, and therefore provide for a unique and sustained competitive advantage (Buttle, 1996). Various other terms have been used either as substitutes for RM or to describe some close parallel – micro-marketing, loyalty marketing, one-to-one marketing, wraparound marketing, customer partnering, symbiotic marketing and interactive marketing (Buttle, 1996; Gilbert, Powell-Perry & Widijoso, 1999).

According to Buhalis (2003), CRM involves a two-way interactive and dynamic communication, which ensures that consumers and suppliers interact dynamically towards achieving their goals. With each successive interaction, the firm learns more and uses this information from customers to personalize further communications in ways that take into account the unique response and value proposition (Deighton, 1996). The relationship created by this strategy gets smarter with each interaction (Day & Montgomery, 1999). Ultimately consumers are involved in the product design process and assist the development of products suitable for themselves. Organisations should therefore encourage consumers to declare their interests and to interact with them in order to provide feedback and develop a relationship. Relationships should be based on adding value to the product on offer and on providing greater satisfaction for consumers (Buhalis, 2003, p. 169).

In the tourism industry, RM is directed to build brand loyalty. While in other economic sectors often there is no direct contact with consumers or very low level of those contacts, majority of activities in tourism assume direct contact with consumers (Cosic & Djuric, 2010). Buhalis (2003, p. 170) noted that traditionally few data kept by tourism organisations and were rarely used for interacting with consumers. Some hotels kept guest histories but they were rarely used proactively to make customers feel special. The growth of loyalty clubs has enabled more tourism organisations, airlines and hotel chains in particular to know more about the consumer patterns of their customers. The airline industry was the first to adopt relationship marketing plans that aimed to bond customers to brands through specific loyalty programs (Kim et al., 2001). From the other side, the hotel industry's relationship marketing strategies have focused on transactional tactics such as gifts for repeat guests and familiarization tours for meeting planners (Bowen & Shoemaker, 1998). Gilbert et al. (1999) pointed out the suitability of RM for the hotel industry which is based upon the characteristics of the hotel marketplace whereby there is weak brand loyalty and a high level of business travel bookings. As for travel intermediaries, Buhalis (2003) suggest that increasingly they are starting to offer RM and proactive functions based on consumer profiles. Although one-to-one marketing may be an expensive process, tourism products are ideal for customization. Not only are they bundles of individually produced products and services, but they are also consumed under unique-by-customer circumstances. There is a great volume of information available through each reservation and consumers are generally happy to provide more information about their preferences when they interact with members of the industry (Buhalis, 2003, p. 170). Technological developments have made the recording of

elements of individual taste easier and interactive broadcasting networks and IMS could be proved extremely helpful in this process.

## 3 Interactive Digital Television and Network Multimedia Systems

In the last decades, enterprises have realized the benefits of synergy among their communication efforts that led advertising agents to offer an integrated marketing communication (IMC) mix. An integrated marketing communication strategy has to employ more than one communication medium, considering the argument that one of the reasons that IMC was developed is the fragmentation of traditional mass media and the emergence of new media, which are more effective and efficient regarding the message distribution to the targeted group. Interactive media moves the viewer from a passive to an active participant, providing the viewer with more control over the information they see (to various extents) and in some cases the ability to purchase goods. For marketers, interactive media is argued to increase viewer involvement with the media and thus the content, and it allows information to be presented in more aesthetically pleasing and entertaining ways, as well as being easily updated (Schweda, 2005). Additionally, the sources that are delivering messages to customers are classified in three categories; the planned sources which are the traditional forms of communication like advertising, the unplanned sources which are more effective and are not intentionally developed by the company like chat rooms, blogs, comments and behaviour of employees/costumers and the often unconsidered sources like distribution channels, design or technical support services.

In this light, the technological achievements have changed already to some degree the most discussed and common in use mean of communication: advertising and its future role on television. Due to the acquaintance of mass audience with personal computers and its familiarity with the idea of interactivity, marketers have adapted this line of action and have realized its effectiveness. One such evolutionary development is the interactive digital television (IDTV), where tele-viewers are invited to move to a more interactive television world, to visit Web addresses or call a phone number. Despite the nature of required interaction by advertisers, either offline (not linear and deferred reaction to a received message even through a different medium), or online (which means that a message incites for a simultaneous correspondence from the viewer and simultaneous data exchange with the service provider), this interaction enables the messages from the enterprises to become more personalized to the finest level of one-to-one communication. Most features of the existing forms of mass media are not able to achieve this two way communication model. The new digital channels offer opportunities for tourism companies to reach niche markets by placing adverts in travel programmes or related subjects, such as history, the arts, food, music, wildlife and sport. Some companies, such as Thomas Cook, have their own digital television channels from which customers can watch films of destinations and then make their bookings via interactive connections (Middleton, Fyall, Morgan & Ranchhod, 2009).

Digital communication can be identified when a person has visited a page and this information can be used in order to find out what viewers are interested in. In general, interactive marketing systems were developed to such an extent, that allow large companies to achieve the best possible relationship with their customers, offering numerous choices to meet their needs (Chaffey & Smith, 2008). The extent to which a

company has adapted digital communication as a strategy varies, mainly due to their different orientation, mission, budget and the importance they attribute to the online and two-way communication platforms. However, one of the great advantages that this interaction offers is the development of either online or offline communities around the company's products. These communities offer important benefits such as better segmentation through the appropriate management of the input data created by the communities, the overall view of stakeholders, end users and media intermediates, low cost of immediate distribution and increased world of mouth. This open and free dialogue builds strong virtual brand communities, which enhance trust to the company, provide rich information regarding purchase process, depicts feelings and motivations which help the company to gain a better phycografical, behavioural and geodemografical segmentation of the market, improve the direct marketing efforts, expand its CRM and databases.

Moreover, interactive DVB systems could play a vital role, towards enabling end users to interact with service providers, by utilizing interactivity channels established between customers' premises and digital television systems. More specifically, interactive DVB-T (i.e. Digital Terrestrial Television) networking architectures (Xilouris, Gardikis, Pallis & Kourtis, 2002) have been realized based on a generic interactivity model, enabling for the provision of asymmetric data transfer among the service provider and the end users. In such cases, DVB-T channel provides forward data traffic, while reverse data traffic is transferred through several interaction channels (e.g. mobile, wireless or fixed networks) (Gardikis, Xilouris, Pallis & Kourtis, 2002; Gardikis, Kourtis & Constantinou, 2003). According to these configurations, the service provider's side may incorporate both interactive and one way digital television services. Interactive multimedia services include video and audio on demand and Internet facilities such as WWW access, e-mail services etc and one way digital television services include TV programmes that utilize digital transmission formats (i.e. MPEG-2). Both interactive and one way services are transmitted into one stream and distributed to the users via the digital television delivery media according to the DVB-T standard. Each user receives the provided services via a Set Top Unit (digital television decoder etc.), while user's requests for interactive services are forwarded by the Set Top Unit to an interactive interface module that may utilize wired or wireless access technology depending on the interaction media's specifications. This is essential to address the issue of measurement of the viewing behaviour of the audience.

While the first generation of Internet was mainly devoted to the transfer of data to non-real time services, sophisticated systems and new services now require interactivity and strict quality. Moreover, the requirements for the provision of multimedia services are expected to increase in coming years. The move towards a common Internet architecture for services and applications appears to be a strong trend. In this context, customers seem to wish access to personalized interactive multimedia services ubiquitously on any device. This trend introduces new requirements for a network infrastructure. Towards fulfilling this requirement, the IP Multimedia Subsystem (IMS) was originally defined by the 3GPP and 3GPP2 wireless operators working bodies. The main focus was to provide a new mobile network architecture that enables convergence of data, voice and technology in a

mobile network over a common Internet-based network infrastructure (Kinder, 2006). The IMS was designed to bridge the gap between existing traditional telecommunications technologies and Internet technology and support operators to offer new and innovative services that will attract new subscribers and maintain its existing base. IMS is a core network architecture that enables communication between servers and clients using open standards that support Internet-based network interfaces and fixed-mobile convergence. IMS consists of a layered and integrated architecture that manages the media as it moves through the network and provides the systems integration required to provide any multimedia services for and between any combination of wired and wireless end users. The core network contains reusable functions that manage media services in application servers. Application servers host the services and IMS defines monitoring services, routing, protocols, and the loading processes across the network. The development of the IMS framework defines how services connect and communicate with the underlying telecommunications network. IMS also defines how services are integrated with the provider of systems back-end (IP Unity, 2005).

IMS-enabled TV systems support combined services and interactivity by joining different communications paradigms into a complete multimedia user experience. IMS was designed to provide a personal communication infrastructure with group communication, thus transforming TV experience from a personal, private domain to a social interactive experience. In particular, presence and profile management will form the basis of new personalized TV experiences. Operators and their marketing departments can build the most accurate profile of their users - their habits and needs. Having a single, standardized database, which is based on the cellular world model with additions to meet DVB special needs, can be of great value to service providers.

## 4 Technology Convergence in Tourism Relationship Marketing

Interactive communication is vital in relationship marketing, enabling the real needs of customers/users to be successfully met. Traditionally, tourism enterprises try to maintain contact with customers/users via phone, emails and Internet based networks. Nowadays, sophisticated advances may be the mean, enabling for a vital interactive contact between the enterprise and its customers. In order for a more efficient cooperation and relationship to occur between these two parties, a first part of an IT strategy in an enterprise, is to integrate business systems using a common interface, so that customers can interact and report back directly their needs. The second component of this strategy is a database analysis. The results may define the basis for models aimed at understanding the real customers' needs. In this context, advances in interactive digital television systems (Crinon et al., 2006), IP Multimedia Subsystem (IMS) (Camarillo, Kauppinen, Kuparinen & Ivars, 2007), web technologies and their convergence could contribute efficiently towards optimizing the process of collecting and analyzing data, that is vital in tourism RM (Barwise & Farley, 2005).

Adopting the proposed approach, RM may enable customers' collaboration by utilizing digital media and allow a company to use direct response communication in order to build a relationship with them. In a general context, long-term communication strategies could be planned carefully, otherwise the client can develop a negative view of the company. For instance, if a company has come into contact

very often with the clients with no real purpose, the customers will likely ignore the notices in the future, when the company needs to communicate with them. In order to avoid this, potential customers are asked for feedback regularly. Despite the promotion of risks taken by tourism companies, they wish to have great opportunities to promote their products to individual customers. Some companies' websites utilize already «call back» images giving the opportunity for customers to contact them. Such information can be delivered directly to the company through fast and easy to complete research or through an independent third party. Therefore, the utilization of an interaction channel, according to the generic interactivity model (ETSI, 1997), is essential in order to transfer end user's requests to the service provider, enabling for the provision of real interactive services (Gardikis, 2004) through digital television systems.

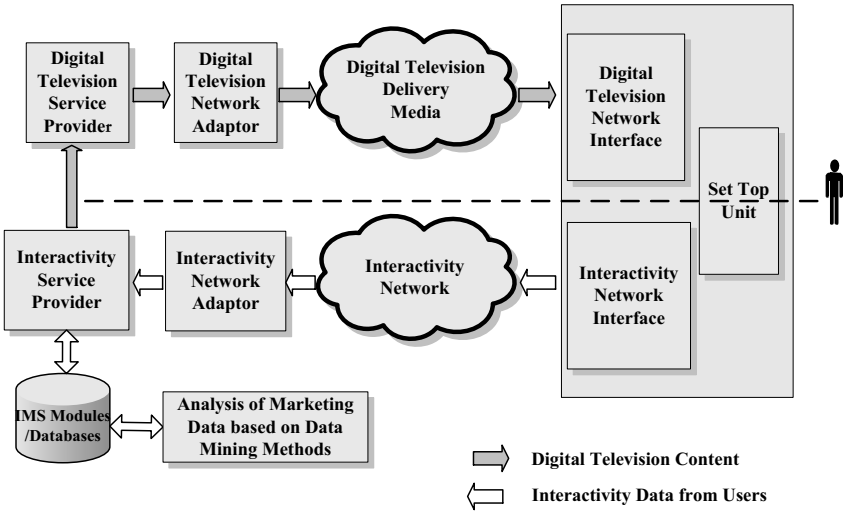


**Fig. 1.** Digital television interactivity model enhanced with IMS functionalities

More specifically, Figure 1 depicts the digital television interactivity model enhanced with IMS functionalities. The proposed convergence model enables for the real time collection of data stemming from customers' premises. This data is stored in the IMS Module/Database of Figure 1 and facilitate the marketing analysis phase towards establishing more targeted and efficient advertising strategies. Data analysis is performed by exploiting data mining methods such as predictive visual analytics. Predictive visual analytics is concerned with the prediction of future probabilities and trends based on observed events. It encompasses a multi-perspective approach that includes integrated reasoning, pattern recognition and predictive modeling associated with domain knowledge.

Analysing the collected data according to the proposed approach the attempt to better understand customers' behaviour and predict future purchasing patterns, will be enhanced. Among the most frequent applications in marketing are assessing lifetime customer value and future customer profitability, determining the optimum sales message to attract attention, stimulate interest and motivate purchase, and to identify cross-selling opportunities. The proposed data mining techniques are used to identify sales performance by geographical area, product type and buying characteristics, as well as channel strategies. Then demographics, lifestyle variables and purchasing behaviour are used to define for example what new products/services should be introduced into the tourism market. Finally, behavioural metrics developed using predictive analytics models can graphically reflect the selected sales information and create what-if scenarios to define and confirm the right combinations of new tourism product distribution. Therefore, the big driver in the growth of online advertising spending is the metrics – the ability to measure customers' response more precisely using the proposed predictive visual analytics. In a general context, the goal of predictive visual analytics research is to turn the information overload into an opportunity. Decision-makers should be enabled to examine massive, multi-dimensional, multi-source, time-varying information stream to make effective decisions in time-critical situations. For informed decisions, it is indispensable to include humans into the data analysis process to combine flexibility, creativity, and background knowledge with the enormous storage capacity and the computational power of today's computers. The specific advantage of visual analytics is that decision makers in the field of tourism sector, may focus their full cognitive and perceptual capabilities on the analytical process, while allowing them to apply advanced computational capabilities to augment the discovery process. In order to address all these issues, in our dynamic world, the center of research for cutting-edge technology and breakthrough has shifted from data warehousing and mining to predictive visual analytics.

## 5 Web Technologies Exploitation

There are many technologies on interactive TV systems for displaying information and allowing interactivity with the users. Many platforms, each one with a different development Application Programming Interface (API) can make it really hard for a widely compatible system to be produced. However, recently, there is a clear movement towards the adoption of the familiar standard web technologies of HTML, CSS and JavaScript for every Connected TV device either through their web browsers or even in their application development core. As W3C (2011) states: *There is a strong growth in the deployment of devices that integrate regular Web technologies such as HTML, CSS, and SVG, coupled with various device APIs.* The combination of the latest version of these technologies is often referred to as HTML5, a term strongly advertised by Steve Jobs, which is the latest HTML version but also includes the latest CSS version 3 and JavaScript.

There are two main demands for the display of information. The first one is associated with the presentation on the client-side (i.e. the interactive TV viewers) while the second one elaborates on the presentation of the gathered information to the marketers. For both cases Web Technologies (HTML5/CSS/JS) can be utilized for

optimum results. On the client side, the new capabilities of HTML5 can produce impressive, TV quality, graphics, effects, text and of course video (Daoust et al., 2011), that respond to the user commands using JavaScript. Information can be gathered in real-time using Ajax technology to send and receive data to/from the server database. On the marketers' side, HTML5 can be exploited to achieve real-time, easy-to-read visualization of the gathered data. One important advantage of real-time data visualization is that it is highly customizable and interactive, to allow the extraction of the most useful information. Also, since such web technologies are compatible with most devices, and are not based on a platform specific API, the analytics will easily be available on numerous devices, such as regular PCs, TVs and also tablets and mobile devices.

## 6 Conclusion

This paper investigates novel interactive broadcasting systems, able to provide multiple interactive multimedia and Internet based services utilizing Digital Video Broadcasting advances. It elaborates on the study of IMS, as a promising solution, that may be adopted in next generation networks and television systems, providing advanced capabilities and added value services. Taking into account the advances in both research fields, this paper proposes the convergence of IMS with interactive digital television systems, which may result to a novel research paradigm, able to be adopted in tourism RM. In an unstable and unpredictable environment of doing business at the tourist sector, characterized by strong competition and sophisticated demand, implementation of RM concept with focus at development of high quality relationships with consumers and stakeholders is becoming imperative of gaining a competitive advantage. Ensuring tourists' satisfaction is a sure way to make current customers loyal and attract potential ones. The overall target of RM is to enable marketers to track existing and potential customers' preferences and subsequently give them superior value via customized service. The proposed concept may enable for a more efficient process of collecting and analyzing feedback data from users/viewers, which is vital for optimum marketing purposes. It might be the answer to the one of the top priorities in the marketers' wishing list; to move forward to one-to-one marketing communication with the desired audience, gain their attention and interest, create their desire and end in the covetable impulse or well thought-out action of buying. Finally, data mining methods and web technologies are exploited in the proposed research approach, towards facilitating for an effective marketing data analysis and an efficient way to automatically customize services for individual customers or market segments, respectively.

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# Hybrid User Modelling Algorithms for Tourism Providers

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## Abstract

Currently, tourism providers build tourist models by collecting some specific pieces of information and then combining the knowledge they have about the groups to which current tourists belong. This paper presents the BaliaTour user modelling and Recommender System, which combines several techniques and methodologies in order to enhance the modelling process when scarce of data about an individual tourist is available. The core of the model is based on the predictions made over stereotypes as a initial characterization of the user profile. The modelling is further refined and enhanced by the combination of explicit preferences and ratings provided by the user. As a result, the proposed approach takes advantage of every information piece known about tourists in tourism ecosystems. The main advantage of BaliaTour is to minimize the main drawbacks of each of the existing user modelling techniques to obtain a user model.

**Keywords:** Hybrid user model; stereotypes; explicit preferences; tourism entity.

## 1 Introduction

Information and Communication Technologies (ICT) have enabled tourists to access and search reliable and accurate information as well as to make online bookings, plan trips and make other purchases themselves. However, the number of choices has increased so dramatically that tourists are overwhelmed with information and can not find what they are looking for. To cope with this problem, Travel Recommender Systems (TRS) personalize the interaction for each individual tourist, capturing or inferring the needs of that user. Such information is the basis of a user model, which can be defined as a description of a persona including the most representative characteristics about him or her.

To be successful, a user modelling system must provide techniques to process the recorded information and build a model for a particular user. This implies a well-structured arrangement of the user data and the inference processes. If a user model is very complex, the way of collecting the required information could be very cumbersome. Furthermore, it does not make sense to record information about a user which has no use, although nearly every piece of information helps to describe the model of the user.

This paper presents the BaliaTour user modelling and Recommender System, which combines several techniques and methodologies in order to enhance the user modelling process when only few data about an individual tourist is available. The core of the model is based on the predictions made over stereotypes as an initial characterization of the user profile. The modelling is further refined and enhanced by the combination of explicit preferences and ratings about tourism services and

L. Cantoni and Z. Xiang (eds.), *Information and Communication Technologies in Tourism 2013*, DOI: 10.1007/978-3-642-36309-2_41,

experiences provided by the user. As a result, the proposed approach combines every information piece known about tourists in tourism ecosystems.

This paper is organized as follows. First, Section 2 presents a brief state of the art where several definitions and classifications about user modelling techniques are described, including examples related to the tourism sector. Section 3 describes the BaliaTour user modelling and Recommender System, including a general overview of its architecture, the user modelling approach and a brief description of the Recommender System. The final Section presents some conclusions and future work.

## 2 State of the art

User modelling research has been fostered by the need of many software application areas to automatically adapt to their customers. Since tourism is closely connected to interests and preferences of the user, many of the technological applications developed in this field aim at providing personalized experiences. Personalization means that the system should know about each user on the basis of his/her interests, skills and previous experiences. Thus, applications should make assumptions about the user which may be relevant to personalize the behaviour of the system to the user.

Although the first traces related to user models research appeared in the late 70's, there is currently no standard definition for user models. Generally speaking, the term "user model" can be used to describe a wide variety of knowledge about people (Rich, 1983). A de facto definition made by Wahlster and Kobsa (1989) states that a user model is "a knowledge source in a natural-language dialog system which contains explicit assumptions on all aspects of user that may be relevant to the dialog behaviour of the system". Three important dimensions that characterize user models have been identified by Rich (1979):

- One model of a single, canonical user which is necessarily uncertain but can represent users who have not usually interacted with the system vs. a collection of models of individual users.
- Models specified explicitly vs. models inferred by the system on the basis of the behaviour of the user. For explicit models to be generated, users have to answer a large number of questions before they can interact with the system. Thus, implicit user modelling has been considered less intrusive than explicit one, although not so accurate.
- Long-term user models which represent demographics or general interests of the user vs. short-term user models that are suitable for a specific session or task.

First, the proposed BaliaTour user model combines a canonical user model based on stereotypes with models for individual users to refine tourism services and personalization of experiences. Secondly, BaliaTour includes explicit preferences defined by tourists to also improve the accuracy of the personalization. Finally, BaliaTour uses long-term user models which are enhanced by the interaction with the system.

User modelling aims at providing information about knowledge, goals or preferences of a user to application systems that try to adapt their behaviour to the individual characteristics of users (Pohl, 1996). Many research efforts have been put on the way information required for a specific model can be best collected or extracted from the user. A limiting factor towards the building of a complete user model is the large number of characteristics or properties of the model. Several techniques are available to acquire the specific information required.

One of the oldest and simplest approaches to user modelling is classifying users into stereotypes (Rich, 1979; Rich, 1989). A stereotype is a collection of frequently occurring characteristics of users. This technique is useful when there is no further information available about the user. New users are categorized and classified into a stereotype according to their initial user model characteristics. The small amount of initial information is used to infer a large number of default assumptions.

If a system should cope with stereotypes effectively, it needs two types of information. It must know about the stereotypes themselves- the collection of characteristics or facets. A user is characterized by a set of facets, each of them containing a value. Although they depend on the domain and purpose of the system, the age, sex or type of tourism could be some facets of a tourist stereotype. Furthermore, a system using stereotypes should also know about a set of triggers, or events which determine that a particular stereotype is appropriate for a user.

For instance, INTRIGUE (Ardissono *et al*, 2003) provides personalized recommendations of tourist attractions to heterogeneous groups. User profiles groups are defined on the basis of the stereotypical knowledge about the typical tourist classes. The generated stereotypes are mainly characterized by socio-demographic information and preferences over the features of the tourist attractions. Furthermore, TravelPlanner (Chin and Porage, 2001) combines stereotypes with a multi-criteria decision making theory to evaluate the available travelling opportunities and proposes the one that fits best the needs and preferences of the user. Finally, Yang and Marques (2005) proposed a framework called UMT for modelling user profiles based on user transactional data which has been applied to a hotel network. BaliaTour also uses stereotypes to initialize user models, mapping them to individual tourist models.

Another simple approach for user modelling is to explicitly ask users for information about their preferences using questionnaires and tests based on choice of answers, tick boxes or rating on scales. This method is very effective to get information, although the proper number of questions should be found to get the optimum amount of information from these questions without disturbing the user. Systems that only use this technique take the representations of the characteristics provided by the user as the corresponding elements in the user model. For example, Kramer, Modsching and ten Hagen (2006) have implemented an itinerary Recommender System that matches user preferences collected by the mobile device to extract interesting categories for users.

As the previous technique has several limitations (long forms, tell or write the truth, non-willingness to provide data), many modelling systems attempt to infer implicit knowledge about the users by observing their interactions with the system, recording them and discovering patterns from the collected data. In this case, the corresponding

elements in the user model are estimated by the system through machine learning techniques.

A wide variety of techniques coming from the areas of Machine Learning, Data Mining and Information Retrieval have been used for user modelling. Examples include Bayesian Networks, decision trees, association rules or Case-based Reasoning. As an example, Zheng *et al* (2011) have implemented a personalized friend and location recommender for geographical information systems (GIS) on the Web. The system uses real visits to a location as implicit ratings of that location.

Regarding explicit and implicit user modelling techniques in the tourism sector, Kabassi (2010) includes a detailed categorization of user modelling systems on the basis of the information acquisition method. For example, Entrée (Burke, 2000) explicitly asks users about their preferences to recommend restaurants. Other guides such as PTA (Coyle and Cunningham, 2003), GUIDE (Cheverst *et al*, 2000) or INTRIGUE (Ardissono *et al*, 2003) learn about preferences of a customer implicitly through different sources.

The more properties of a user that can be modelled, the better personalization can be achieved. However, overloading users with explicit modelling may make them impatient. On the other hand, if all information was modelled implicitly, users may not trust the system and feel that they cannot control the modelling processing.

The main advantage of BaliaTour is to minimize the main drawbacks of each of the existing user modelling techniques to obtain a user model. User profiles are only partially based on stereotypes, which avoids the bias of the tourism expert. At the same time, the limited need of explicit user preferences reduces the extra burden to tourists. Finally, as tourists can rate tourism services and experiences, the user model is enhanced with this overall knowledge.

## 3 BaliaTour user modelling and Recommender System

### 3.1 General architecture

The BaliaTour user modelling and Recommender System for tourism entities aims at recommending services and experiences in real-time that best fit the preferences of tourists, taking into account their demographics and preferences; the profiling information of the experiences defined by the providers; information about stereotypes; and the ratings of previously consumed experiences. Figure 1 shows some important aspects of the system, including the data gathering (D), the algorithms related to the user modelling (UM) and the Recommender System (R).

In order to standardize concepts, BaliaTour defines a tourism entity as the entity that provides tourism services and experiences. The entity can be composed of a single provider (a resort, a destination, a congress centre) or an ecosystem of providers (accommodation, transport and services).

### 3.2 User modelling

As stated by Pohl (1996), the main objectives of a user modelling system are the proper representation of the user model and the acquisition of assumptions about the

user. Regarding the former, the BaliaTour user model defines the user preferences and ratings about tourism services and experiences, as well as the similarity values of each tourist with the remaining ones.

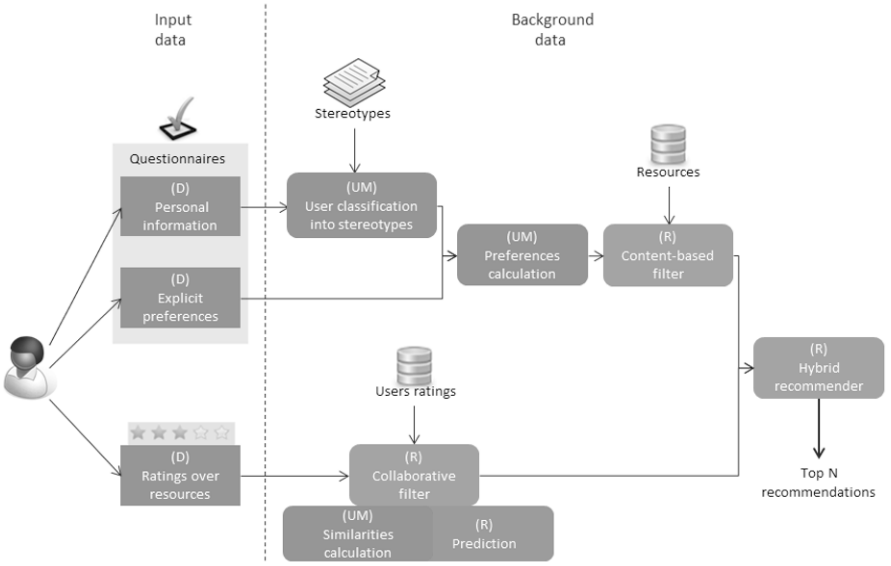


**Fig. 1.** Architecture of user modelling and Recommender System of BaliaTour.

Preferences are transformed into affinity with the metadata values of those services and experiences in a content-based process, while ratings and similarities are used in a collaborative process. The latter implies the collection of data to make assumptions about the user.

Input data to build the user model can be gradually gathered within the interaction between tourists and the tourism entity. The BaliaTour input data consists of three main sources (Figure 1):

- Personal information or user characteristics, which include demographic data (i.e. nationality, age, gender), transportation means or duration of the stay (number of nights). These data are useful to infer personal interests when comparing them to already defined stereotypes.
- Explicit preferences of tourists related to one or more types of tourism services and experiences. Each tourism entity defines the preferences that best correlate to each of the services and experiences offered. For example, in the case of a resort, “gastronomy”, “sport” or “shopping” could be some of such preferences. The preferences are represented on a discrete numerical scale which ranges from 0 to 100, with zero representing displeasure and 100 representing the best score.

- Ratings of the user about consumed services and experiences. They represent the starting point of the computation of similarities among users which are taken into account to recommend experiences to those users similar to the ones that liked those experiences in the past. Services and experiences are rated in a range between 1 and 5.

The first assumption of the BaliaTour system about the user states that if a tourist belongs to a category, then he/she may have similar characteristics and behaviours to other tourists in that category under a determined set of circumstances. Therefore, if a tourist is found to belong to a stereotype, it is possible to estimate his/her preferences.

Existing stereotype-based approaches in the literature are generally based on empirical observations (sales, analysis of user data, etc). Their main drawback is the work needed to build and fill appropriate stereotypes. Moreover, it is important to remark that the obtained conclusions could be uncertain. The BaliaTour platform enables each tourism entity to define its own stereotypes on the basis of their knowledge about previous tourists. In order to cluster tourists into stereotypes, the following steps have been taken in the platform.

An initial set of stereotypes was created for a tourism entity by exploiting existing information about tourist profiles and preferences from large query campaigns conducted by the Basque Government. These studies enabled specifying 47 stereotypes for the BaliaTour platform, such as Italian tourists, German tourists in the Basque Country, wellness tourism or urban tourism.

In parallel, the facets for each stereotype have been defined. These properties must be observable and measurable. It is compulsory to differentiate among the selected properties in order to ask tourists about them. The defined facets for BaliaTour are the age, sex and nationality of the tourist; the type of tourism (business, congress, general, …) and the way of travelling (alone, family, group).

The correct definition of the stereotypes took into account two main aspects. On the one hand, stereotypes should be consistent with the considered facets. For instance, the “German tourist” stereotype must have Germany as the input variable for the “Origin” facet. On the other hand, tourism entities are responsible for the appropriate weighting of each preference in the stereotype. For example, the assumption that people belonging to the “German tourist in the Basque Country” stereotype like going to restaurants is represented with a high weight of the “Gastronomy” value of that stereotype for that preference.

Once the stereotypes have been defined, questionnaires to classify tourists into stereotypes were designed. Questions are related to the list of defined BaliaTour facets, so that each tourist can be classified into one stereotype. In order to make it more efficient and attractive for tourists, questionnaires have a fixed number of questions with predefined answers just to be clicked.

Four questionnaires have been designed for the BaliaTour platform depending on the type of tourism (general tourism, business tourism, trade fairs or exhibitions) (Figure 2). In some application scenarios (for example, accommodation), there is no need to design questionnaires, as the required data can be easily obtained at the registration desk.

| | | | |
|---|---|---|---|
| **Objective of the trip** | Frequent business tourist | **Accommodation** | 5-star hotel |
| | Equipment purchase | | 4-star hotel |
| | Sales | | 3-star hotel |
| | Eventual work | | 2-star hotel |
| | Meeting at the main headquarters | | 1-star hotel |
| **Transport means** | Plane | | 2-star hostel |
| | Car | | Camping, rural house |
| | Public transport | **Activities** | Thematic routes |
| | Other (motorbike, on foot) | | Urban tourism |
| **Number of nights** | 1 night | | Knowing cities |
| | 2 nights | | Wandering in the street |
| | 3 nights | | Cultural tourism |
| | From 4 to 7 nights | | Night life |
| | From 8 to 15 nights | | Gastronomy |
| | 16 nights or more | | Shopping |

**Fig. 2.** Example of the questionnaire for "business tourism" stereotype.

Once this process is completed, BaliaTour is capable of classifying tourists into stereotypes. The platform compares the answers to questionnaires with the expected values of the facets for each stereotype on the basis of the k-Nearest Neighbour algorithm. This algorithm retrieves the k instances more similar to the data that has to be classified. The closest instance is the stereotype assigned to the tourist. A user associated with the stereotype inherits all stereotype preferences automatically. In such a way, the user model of the tourist is initialized with the values of the preferences associated to that stereotype. BaliaTour uses the implementation of the algorithm by the Weka library (http://www.cs.waikato.ac.nz/ml/weka [September 6,2012]), which includes a collection of automatic learning algorithms for Data Mining.

Secondly, the BaliaTour platform acquires the explicit user preferences related to the services and experiences available at the tourism entity. In this case, BaliaTour has selected the most representative preferences related to currently provided services and experiences in the Basque Country (gastronomy, culture, shopping or urban tourism).

The platform displays those preferences through an intuitive interface in order to be selected by tourists. The platform stores the user explicit preferences that have an important weight in order to generate recommendations. The information collection (both questionnaires for stereotypes and explicit preferences) has been unified into a single process when tourists register at the tourism entity.

After the explicit interaction with the tourist, the platform calculates the preferences of a tourist, weighting between the preferences assigned to his/her stereotype and those explicitly selected by the user. Such weighting solves several limitations. First, the output of the system can use one alternative (stereotype or explicit preferences) in cases where information is scarce. Secondly, when possible, the approach not only takes into account the explicit preferences, as they have been calculated on the subjective rating of only one user, but it is also based on the collective thinking represented by the stereotypes.

The algorithm tries to reduce the possible bias of the selection of several explicit preferences by odd users. Thus, a correction factor calculated from the typical deviation of the weights of the preferences has been applied. This means that if there are not important variations among explicit preferences, it can be concluded that the user has not properly determined the preferences. Thus, a larger weight is given to the stereotypes.

The proposed approach faces several cases, depending on whether the user has answered or not the questionnaire and the explicit preferences, as shown in Table 1. In each case, the most appropriate algorithm is selected. All algorithms are based on the same approach, giving more weight to the preferences directly selected by the user ($\alpha$ = 0.9) than the ones defined in the stereotype ($\beta$ = 0.1). Figure 3 displays the pseudo-code for the proposed algorithm.

**Table 1.** Defined cases for the proposed approach.

| | | Has the user answered the questionnaire about the preferences? | |
|---|---|---|---|
| | | NO | YES |
| Does the user have an assigned stereotype? | NO | Algorithm 1<br>No explicit preferences and no stereotype | Algorithm 2<br>Explicit preferences and no stereotype |
| | YES | Algorithm 3<br>No explicit preferences and stereotype | Algorithm 4<br>Explicit preferences and stereotype |

When there is no stereotype assigned to the user and the preferences have not been rated, algorithm number 1 calculates the value of each preference $w'_{u,p}$ as the weighted sum of the default value for all the explicit preferences $w^{o}_{p}$ and the assigned value of a preference due to all the stereotypes $\bar{w}_{p\_s}$.

$$w'_{up} = \alpha * w^{o}_{p} + \beta * \bar{w}_{p\_s} \quad (1)$$

Algorithm number 2 is applied when the user has no assigned stereotype and has rated at least one of the preferences. In this case, a correction factor $sep_u$ related to the explicit preferences of the user $u$ is applied, which takes into account the similarity among all his/her punctuations. If the similarity is high (small standard deviation), less importance is given to those punctuations and more importance is given to the collective value assigned to the preference related to the stereotypes.

$$w'_{up} = (\alpha - sep_u) * w_{up} + (\beta + sep_u) * \bar{w}_{p\_s} \quad (2)$$

Algorithm number 3 is used when the user has not rated any preferences but there is an associated stereotype. In this case, the default value of all the explicit preferences is used as the first term of the sum and the value $w_{sp}$ of the preference for the assigned stereotype for the second term.

$$w'_{up} = \alpha * w^{o}_{p} + \beta * w_{sp} \quad (3)$$

Finally, algorithm number 4 can be applied to every user that has a stereotype and has rated the corresponding preferences. In this case, the weight of the calculated preference is the weighted sum of the weights of the explicit user preference and that related to the assigned stereotype, applying the corrective factor related to the similarity of explicit preferences.

$$w'_{up} = (\alpha - sep_u) * w_{up} + (\beta + sep_u) * w_{sp} \quad (4)$$

It calculates the weight about the preferences defined by a tourist entity for a user $u$
**Data**: $u$: active user
**Result**: $W'_u$: set of computed weights of the user $u$ about all the preferences
$P$: set of all the preferences $p$ defined by the tourist entity
$hasEP_u$: 1 if the user $u$ has defined at least one explicit preference or 0, otherwise
$hasS_u$: 1 if the user $u$ has been classified into one stereotype or 0, otherwise
$w_{up}$: weight about the preference $p$ explicitly assigned by the user $u$
$w_{sp}$: weight about the preference $p$ assigned to the stereotype $s$ by the tourist entity
$w'_{up}$: computed weight about the preference $p$ assigned to the user $u$
$w^0_p$: default weight for the preference $p$ assigned by the tourist entity
$\overline{w}_{p\_s}$: default weight for each preference $p$ according to stereotypes
$sep_u$: similarity value over the explicit preferences of the user $u$
**begin**
  **for** $p \in P$ **do**
    **if** $hasS_u = 0$ **and** $hasEP_u = 0$ **then**
      $w'_{up} \longleftarrow applyAlgorithm1(w^0_p, \overline{w}_{p\_s})$
    **else if** $hasS_u = 0$ **and** $hasEP_u = 1$ **then**
      $w'_{up} \longleftarrow applyAlgorithm2(w_{up}, \overline{w}_{p\_s}, sep_u)$
    **else if** $hasS_u = 1$ **and** $hasEP_u = 0$ **then**
      $w'_{up} \longleftarrow applyAlgorithm3(w^0_p, w_{sp})$
    **else if** $hasS_u = 1$ **and** $hasEP_u = 1$ **then**
      $w'_{up} \longleftarrow applyAlgorithm4(w_{up}, w_{sp}, sep_u)$
    $W'_u \longleftarrow w'_{up}$

**Fig. 3.** Algorithm for calculating user preferences.

The final step of the BaliaTour user modelling system is related to the calculation of the similarities of the user with regard to other users on the basis of the ratings of tourism services and experiences. Tourists are able to rate all the services and experiences offered by the tourist entity after having experienced them, only selecting a number of "stars" between one and five. Although ratings are mainly included within the Travel Recommender Systems concept in the literature, the proposed BaliaTour model includes the ratings to enhance the user model.

The BaliaTour methodology follows a memory-based approach with off-line processing for a more efficient similarity calculation. Thus, the neighbourhood and the prediction generation are separated. The objective is to pre-compute the all-to-all user similarities so that the recommendation engine can retrieve the required similarity values more quickly.

For each particular user (or active user), similarity with the rest of the users is computed using Pearson's correlation which corresponds to the cosine of users' deviation from the mean rating. Pearson correlation ranges from 1.0 for users with perfect agreement to -1.0 for perfect disagreement users.

### 3.3 BaliaTour Recommender System

Recommender systems have been classified into Content-based (CB) versus Collaborative Filtering systems (CF). The former estimates the relevance of an item based on the preferences of the user towards the metadata values of that item. Thus, objects are defined by their associated metadata values. CB filtering systems recommend items similar to those that the user liked (i.e. positively rated) in the past or others with features that best satisfy the user preferences stored in the user profile.

On the other hand, the latter generates recommendations based on the opinions (ratings) of other people. For each target user, these algorithms attempt to discover a neighbourhood of users with the strongest correlation on the basis of previous ratings. Scores for unseen items are then predicted in the basis of the ratings given to them within the neighbourhood. Thus, while the first approach focuses on the metadata of the items, the second one generates recommendations only on the rating basis.

Due to the strengths and limitations of both approaches, the BaliaTour platform has implemented a hybrid recommendation algorithm, where recommendations are based on a weighted average of separately computed recommendations with both techniques. Although the approach is not novel, in this case, the values calculated on the basis of both techniques should be consistent in the range to be integrated. In order to achieve this consistency, similarity values achieved from the CB technique in the range [0,1] are escalated into the [1,5] range.

Regarding the recommendation process, the CB system makes a prediction $p\_cb_{u,r}$ for an active user $u$ about a tourism experience $r$. Then, the corresponding prediction $p\_cf_{u,r}$ is obtained from the CF system. In the case of BaliaTour, both predictions are equally weighted ($\gamma=0.5$) when making a recommendation.

$$p_{u,r} = \gamma * p\_cb_{u,r} + (1 - \gamma) * p\_cf_{u,r} \quad (5)$$

## 4 Conclusions

User modelling is a clear consequence of the need for personalization. It aims at providing a user model about the knowledge, goals and preferences of a user to systems that try to adapt their behaviour to those preferences. There are several approaches to classify the properties of a user model. The more relevant characteristics describing the user that are included in the user model, the more accurate and useful is the personalization provided.

The BaliaTour algorithm combines several information sources about tourists in order to build a proper representation of their user model. All these information sources are known by tourists at a tourism entity who participate actively in answering questionnaires, defining their interests and rating services and experiences. Tourists can perform one, some or all of these actions in a progressive way. Once the user model has been generated, it can be applied to personalized applications, such as a Travel Recommender System to suggest personalize tourism services and experiences about a destination.

The main advantage of the proposed BaliaTour user model algorithm is the different nature and extent of the data used, adapting to several possible situations in a tourist scenario. First, the use of stereotypes is a partial solution in the initialization of the preferences of the user model, improving the cold start problem. As stereotypes include different facets (for example, origin, age or gender) defined by the tourism entity, tourists can be classified into one stereotype after answering a questionnaire. The main advantage of stereotypes is that they draw many assumptions about tourists based on very little input. Once a stereotype is activated, its associated preferences are transferred into the user model of the individual tourist.

If the user model were only based on these preferences from stereotypes, all tourists within the same stereotype would be represented by the same user model and thus, obtain the same recommendations. Therefore, explicit preferences of the users are also taken into account to refine personalization. In order to overcome discrepancies, preferences for each tourist are calculated as a weighting between the preferences assigned to his/her stereotype and those explicitly selected by the user.

Finally, users usually assign ratings to tourism services and experiences on the basis of a defined scale. This evaluation feedback represents a further source of information which helps building user models on the basis of similarities among tourists. Although these similarities represent valuable information for the recommendation process, they could be also valuable to enlarge and refine the user model. When data is scarce about the user, his/her user model could be inferred from the models of users with similar ratings.

Future work on the BaliaTour user modeling and Recommender System will include the extension of the user model in order to include implicit preferences, such as those inferred by the location or the context. For instance, the inclusion of location information from Bluetooth devices (bracelets, SmartPhones) carried by tourists at the tourism entity will be used to infer further preferences from the services and experiences consumed.

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## 6 Acknowledgement

Authors would like to thank the Regional Government of Gipuzkoa for the support of the ZER4YOU project and the SMEs VilauMedia, The Movie Virtual, Batura Mobile Solutinos and Araldi for their collaboration in the BaliaTour project.

# Identifying Tourist Dispersion in Austria by Digital Footprints

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## Abstract

Tourism data are important for destinations, especially for planning, forecasting tourism demand, marketing, measuring economic impacts and benchmarking. There are different ways to collect tourism data. Traditional methods include guest surveys and data from accommodation providers, which are time consuming and expensive. Today, everyone leaves digital footprints on the internet, which can be used as data. One such footprint is photos uploaded on photo sharing websites. The purpose of this study is to find out how representative Flickr data is in comparison to actual tourist numbers in Austria. Using Flickr API data were collected related to Austria. The tourists and residents were categorized based on their activity time span on Flickr. Polynomial regression was conducted to estimate actual tourist bednights based on Flickr tourist numbers. The results show that Flickr data can be used as an estimation of actual tourist numbers in Austria.

**Keywords:** social media, digital footprint, Flickr, tourism statistics, photography

## 1 Introduction

According to Gunn (2002), a tourism system has two sides: demand and supply. The key is to have enough supply in order to match the demand side. The link between demand and supply is especially important at the destination and site levels, which leads to efficient land use planning and controls (Gunn, 2002). Since tourism is a dynamic industry it is difficult to predict demand. One way of predicting tourism demand is forecasting, which can help on the supply side of tourism planning such as transportation, employment and service provided. In order to plan and forecast tourism demand, data regarding the number of tourists to the destination or the number of visitors at a site is needed.

Tourism statistics are important for destinations for various reasons, including planning, forecasting, marketing, measuring economic impacts and benchmarking. There are various ways to get tourism statistics such as data from accommodation providers and guest surveys (Law, 1993; Page, 1995). However, in majority of these surveys, daily visitors are not included (Cockerell, 1997) and thus the tourism demand is underestimated (Wöber, 1999). In addition, conducting surveys is expensive and time consuming. On the other hand, similar types of information can be collected from digital footprints left on travel-related websites. These can take the form of messages posted on forums, uploaded photos or links clicked on a website. Photo-sharing websites such as Flickr, Picassa and Panoramia are good examples of where individuals post their travel photos.

L. Cantoni and Z. Xiang (eds.), *Information and Communication Technologies in Tourism 2013*, DOI: 10.1007/978-3-642-36309-2_42,

Although Flickr data have been investigated for identifying user movements (Girardin et al., 2008), points of interests at a destination (Popescu, Grefenstette, & Moellic, 2009; Shyang-Woei, 2010), event-based user movements (Kisilevich, Krstajic, Keim, Andrienko, & Andrienko, 2010), for creating recommendation systems (Dickinger, Scharl, Hermann, Weichselbraun, & Wöber, 2008; Majida et al., 2012; Van Canneyt, Schockeart, Van Leare, & Dhoedt, 2011), and for exploring the names of geographical regions (Hollenstein & Purves, 2010), how well the data represents actual number of tourists has yet to be examined.

The purpose of this study is to show how digital footprints from Flickr can be used in tourism to identify the number of tourists at a destination. In order to achieve this goal, photographs uploaded on Flickr with tags related to Austria were collected and the number of unique users per day was identified. These numbers are compared with the actual bednights numbers at the destination, which were retrieved from TourMIS to see if Flickr data can be used as an indicator of the number of tourists at a destination.

The paper is structured as follows: in the second section, an overview of previous related work is provided, followed by the description of the data and websites used in the study, data collection and cleaning. In the next section, data analysis and results are provided. In the last section, the results of the study and implications for the tourism industry are discussed.

## 2 Literature review

With the introduction of digital cameras, it has become easy and inexpensive to take photographs. In addition, having cell phones with integrated cameras makes it easier to take photographs wherever an individual is. Travellers are posting their photos on social media sites more and more each day.

We are living in a digital age and each individual leaves his digital footprints on the Internet whenever he is online. These digital footprints come in various forms and are invaluable data for marketing as well as research. Digital footprints can be uploaded photographs, websites visited, and messages sent online. For instance, by storing the product links that an individual clicked on (a type of digital footprint), a website recommends related products which could be interesting for that individual. These digital footprints can be categorized into two types: active and passive (Girardin, Blat, Calabrese, Dal Fiore, & Ratti, 2008). Passive footprints are left as a result of interaction with a website (for instance, browsing through products on Amazon.com, which collects user data). Active ones are, for example, left by users when they post a photo online and indicate where the photo was taken (Girardin et al., 2008). In this study, active footprints that include photographs posted on Flickr with user defined geotags are used.

Photographs are evidence of travel, showing others where the tourist has been. It is even at a stage where people take photographs during their travels and instantly upload them on social media to show their friends where they are. According to Jafari (2000) the main reason for people taking photographs during their travels is that tourists want to record their trip and have a memento, which also proves that they

were at the destination or the site. The publicly available photographs uploaded on Flickr or other social media are invaluable data sources for researchers.

Social media is defined as "a group of Internet-based applications that builds on the ideological and technological foundations of Web 2.0, and that allows the creation and exchange of user-generated content" (Kaplan & Haenlain, 2010, p.61). It is considered to be one of the recent Internet trends that emphasizes online collaboration and sharing of information among users (O'Connor, 2008).

As a result of social media, individuals can share information, photographs and videos with others and can get feedback almost instantly. The combination of photographs, tourism and social media, as occurs on Flickr, helps potential tourists get an idea of different destinations and sights. Flickr data can be used to understand the new trends amongst tourists and to improve the densely tourist populated areas. It can also serve for benchmarking the destination with its competitors to see when tourists visit different parts of the destination, and to identify points of interest.

The use of photo-sharing websites such as Flickr is common among travellers. A recent study of Hong Kong residents' use of online photo sharing technologies indicated that 89% of pleasure travellers take photographs and 41% of those post them online (Lo, McKercher, Lo, Cheung, & Law, 2011). Among those who post their photos online, around 40% of them use online photo sharing sites such as Flickr and Picassa, and 76% of them use another type of photo-sharing website in combination with these (Lo et al., 2011).

There are studies that have used Flickr and related information for geo tagging and identifying user movements. Geotaggging is a process which "assigns geospatial context information, ranging from specific point locations to arbitrarily shaped regions" (Dickinger et al, 2008, pg.547). Thus they are important in order to build location based information services for tourism industry such as identifying close by restaurants at the destinations or places to visit. In addition data from Flickr is used to develop an intelligent system that can learn from past tourist behaviours and make recommendations on places and attractions to see for first time visitors to a destination (Mamei, Rosi, & Zambonelli, 2010). In another study by Shyang-Woei (2010), Flickr data was used to determine the locations of the photographs taken in Taiwan for evaluating recreational tourists' satisfaction. The results also indicate convenient transportation points as there are more photographs uploaded showing these areas. De Choudhury et al. (2010) examine creating automated travel itineraries by using data from Flickr that shows when the photograph was taken, geographical location and semantic tags associated with the photos. The authors extract photo streams for individual users which show where the user was, how long he stayed at each place, and the time it took to get from one place to the next photographed place. The automatically created travel itineraries were compared with professional popular bus tours by crowdsourcing and results show that Flickr data is useful for creating meaningful travel itineraries.

Girardin et. al. (2008) investigate photographs uploaded on the web about Rome and analyzed tourist movements and created a map of Rome that shows where tourists go and the density of tourists in these areas. The authors also used mobile phone information in addition to uploaded photos to identify where people are in the city.

Popescu, Grefenstette and Moellic (2009) identify the places people visit, the duration of their stay and panoramic spots of the destinations from photos uploaded on Flickr covering 183 cities from different parts of the world. The attractiveness of a place is determined by the number of photographs in that region and can be obtained from the photo data. In a study conducted using Flickr data, spatio-temporal analysis based on geogtagged images are analyzed to identify attractive places and points of interest (Kisilevich et al., 2010). The authors investigate behaviours of different user communities (Flickr, Panoramio, Trpadvisor) and their movements based on geotagged photos. Automatically generated tourist maps based on the data from Flickr can be created that especially shows the points of interest. A system was developed to create dynamic maps by clustering the photos on Flickr based on their locations and identifying the popular tags for those places (Chen, Battestini, Gelfand, & Setlur, 2009). The quality of the map depends on the data which includes the tags and geotags of the photos and the number of photos in the dataset to create the maps.

Web 2.0 includes various types of data, which can be extracted and used for research. For instance travel narratives published on the Web are used to extract geographic locations in a previous study. Abascal-Mena & López-Ornelas (2010) used XML to collect the data and create a map that shows the destinations visited according to the travel narratives.

Digital footprints can be used to identify the location of photos taken by different users. For instance, a prototype system was developed that uses metadata from photos by combining RDF description of photos, including location and compass heading information to identify photographs of the same destination by different users (Torniai, Battle, & Cayzer, 2007). As a result, a virtual representation of the city can be seen from different photos taken by different users.

Digital footprints, such as metadata taken from photographs posted on Flickr, can be used in various ways, as in the previously-mentioned research in this area. In this study, the data were used to identify how representative the Flickr data is compared to the actual number of tourists in different regions of Austria based on the geotags on Flickr.

## 3 Methodology

Digital footprints include detailed records of user interaction with others or websites. Although the data is publicly available on the Internet, it needs to be collected, organized and arranged for analysis. This is one of the biggest challenges for conducting research online.

### 3.1 The data and the Web sites used in the study

Flickr and TourMIS were the online platforms used to collect data for the study. Flickr is an online platform to share photographs (www.Flickr.com), where users can upload their photos and anyone who is on the website can see them. It has 51 million registered users, who upload approximately 4.5 million photographs per day (http://advertising.yahoo.com/article/flickr.html, [Aug. 24, 2012]). By placing the photographs on a map, the user can indicate the place where it has been taken. These photographs show an object or a destination, which is interesting from the user's

perspective. Thus the content of the photographs, as well as the geo location of the photographs can indicate numerous things for the tourism industry such as new and trending points of interest at a destination.

The second website that the data was collected from is TourMIS (www.tourmis.info). It is an online database that has tourism statistics at the national and municipal level. The data are entered into the system by tourism authorities such as National Tourist Offices (NTOs) or City Tourism Offices (CTOs). It has both monthly and annual data on bednights, arrivals and capacities of mostly European destinations. Since the data is maintained by the users, it is updated frequently and is one of the most up to date tourism databases that are available. There are other online databases where one can get tourism data such as EUROSTAT, the World Travel and Tourism Council and the World Tourism Organization. The before-mentioned organizations have annual reports regarding tourism statistics; however none of them have as recent data as TourMIS. In addition, the data regarding Austria on TourMIS comes directly from Statistics Austria, which collects tourism statistics regarding accommodation from private and commercial establishments including the country of origin of visitors on a monthly basis (http://www.statistik.at/web_en/statistics/tourism/accommodation/index.html, [Aug. 23, 2012]) .

Bednights statistics retrieved from TourMIS were used as an indicator of number of tourists. According to UNWTO a tourist is defined as a person "travelling to and staying in places outside their usual environment for not more than one consecutive year for leisure, business and other purposes" (*Collection of Tourism Expenditure Statistics*, 1995, p.10) and staying overnight at the destination (UNWTO) .

### 3.2 Data collection

To collect data from Flickr an application was developed by one of the authors. Using the public Flickr REST API (http://www.flickr.com/services/api/, [Aug. 24, 2012]), the application fetches a list of photos and the corresponding meta-data for a given place (i.e. a geographical region, e.g. a city or province) in a given timeframe. The meta-data includes, among others a) textual information supplied by the user such as title, description and tags of the image, b) geographical information such as longitude, latitude and a plain-text name of the location, e.g. 'Vienna/Vienna/Austria', c) date information such as the date when the photo was taken or uploaded. Additionally, information about the user is also retrieved, such as the name, the current location, current occupation.

As not all information that is visible on the Flickr website is also retrievable from the API, the tool supplements the data fetched from the public API with data crawled from the photo's/user's website. To better deal with larger datasets (e.g. several months) and avoid limitations of the Flickr API, the timeframe is split into chunks of 7 days before fetching the data from the Flickr API.

The data were collected between March and May 2012. The photo metadata included information about photographs that were uploaded on Flickr between 01.01.2010 and 31.12.2011. Since the content of the photographs was not a concern for this study, actual photographs were not downloaded but the links to the photographs including longitude, latitude, date the photograph was taken, user id, and photo id were. The

photos were tagged by users with Austria and all of its regions, including Vienna, Burgenland, Carinthia, Styria, Upper Austria, Lower Austria, Salzburg, Tirol and Vorarlberg.

The monthly bednights data were retrieved from TourMIS in July of 2012 regarding Austrian total bednights and foreign bednights at different Austrian regions and their capitals. In total data from 18 different destinations were retrieved as bednights in all forms of paid accommodations.

### 3.3 Data check and cleaning

If a user anchors the photo to a physical location, Flickr assigns longitude and latitude values automatically based on the zoom level of the map as an accuracy measure. This means the photos at street level have a higher accuracy estimate than the photos on map level. In addition, Flickr adds the metadata from the camera of the user as well (Pereira, Vaccari, Giardin, Chiu, & Ratti, 2011). However, during the data collection and cleaning process, the authors realized that some of the photos were anchored in the wrong places on the map, due to the user's geotag information from Flickr or their cameras. Thus, the data needed to be cleaned.

All photos, which were not taken within the years 2010 and 2011, were deleted. In addition, photos of which the coordinates were not located in Austria were removed. Since our aim was to determine the number of people in a certain place, multiple photos of the same user on the same locations were removed from the data set as well.

To make sure that all data related to Austria are included in the study sample for each region, temporal distribution of tourists based on the Flickr data was also checked. A calendar was created, which shows the number of tourists on each day of 2010 and 2011 (Figure 2). This calendar was created for each region of Austria and on the dates where there were no tourists found, Flickr was crawled again to check if there were any missing data.

As the retrieved data included photos from residents as well, in a following step it was necessary to filter out photos from tourists. Tourists were identified by looking at the photo upload time span. The date of the first photo uploaded and the last photo uploaded was considered as the time span and if the time span was less than 30 days a user is defined as a tourist, otherwise they are considered a resident (Girardin et al., 2008).

The total number of photos collected for the study is 531.307. After the data cleaning the study sample consists of 154.956 tourist photos from 14,632 individual users, of whom 10,941 are tourists. The median of time span between the date of photo taken and upload date on Flickr for tourists are 10 days and the interquartile range is 3 days.

## 4 Results

The clean data was projected on Austrian map that shows the density of the tourists according to regions. Figure 1 represents the aggregated tourist density for 2010 and 2011 in Austria based on Flickr data. The colour of the dots represents the number of tourists in that region. Light colours indicate a lower number of tourists and the darker colours indicate a higher number of tourists. It can be seen that tourists cluster around

the major cities like Vienna, Linz, or Graz in the eastern part of Austria and on the western part around the mountainous areas.

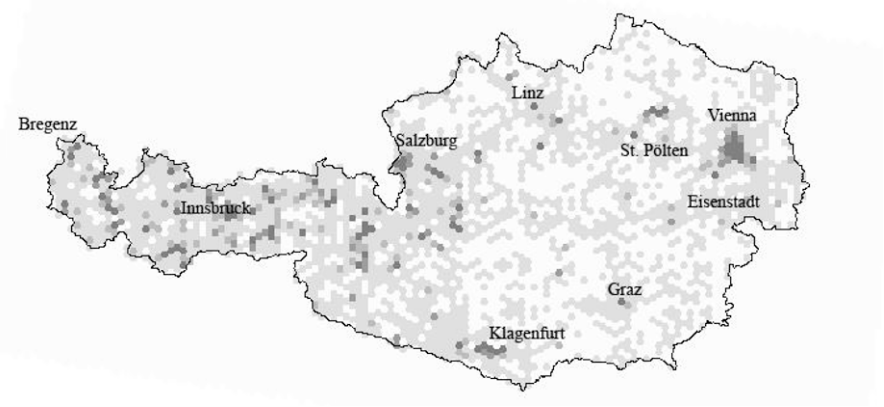


**Fig. 1.** Tourist density map of Austria

Figure 2 shows the temporal distribution of tourists in Austria according to Flickr data. The dark colours indicate a high number of tourists whereas light colours indicate the opposite. As a result, the tourists visit Austria throughout the year; however most of them visit in July and August as the number of Flickr tourists increase according to the results.

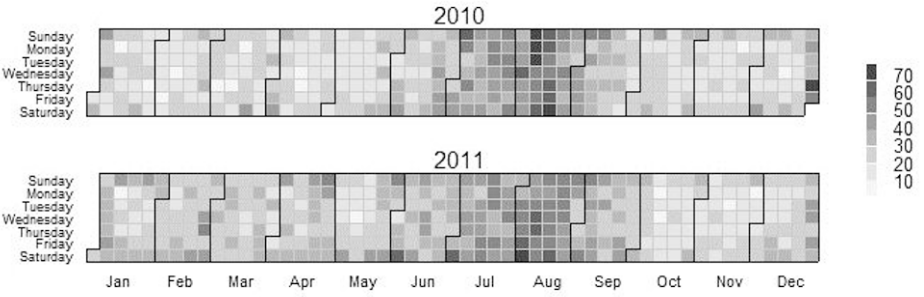


**Fig. 2.** Temporal distribution of tourists in Austria

In addition to the process of data checking, temporal data distribution information is also important for the tourism industry as seasonality is an issue for many destinations. Based on this data, different marketing campaigns can be conducted at different times of the year.

To assess the accuracy of estimating the number of tourists in a region in Austria, regression has been performed where the unique Flicker users per day per region/city

served as the independent variable and the bednights on TourMIS database as the dependent variable.

In order to understand whether the data representation is fitting for a more general level (regional) with a diverse background of tourist, or as well for a very specific area of destination (the city), it was analyzed at regional and city level. The results are reported accordingly in the next section.

### 4.1 Regional level results

In the regional level analysis Vienna was excluded from the sample since it is a city. The sample included Burgenland, Carinthia, Styria, Upper Austria, Lower Austria, Salzburg (region), Tirol and Vorarlberg.

To ensure normal distribution of the data, bednights as well as the Flickr data have been log transformed. As the scatterplot of bednights and Flickr users suggests a curvilinear relationship between these two variables instead of a linear relationship, a polynomial regression is carried out. The regression model is as follows:

$$\text{Bednights} = \text{Constant } (b_0) + \text{User/day } (b_1) + \text{User/day } (b_2)^2$$

The polynomial regression ($r^2$=0.72, $p < 0.01$) explains 72% of the variation in the data. The results indicate as the number of tourist photos in Flickr regarding Austrian regions increases, the number of bednights in those regions increases as well.

**Table 1.** Regional level regression results (tourists)

| | B | SE B | Beta | p-value |
|---|---|---|---|---|
| Constant $b_0$ | 9.43 | 0.39 | | <0.01 |
| Users/day $b_1$ | 0.63 | 0.23 | 0.48 | <0.01 |
| Users/day$^2$ $b_2$ | 0.07 | 0.03 | 0.05 | <0.01 |

$r^2$= 0.72; p <0.01

To evaluate the discrimination of tourists from residents, a second regression was conducted by using the whole data set, tourists as well as residents. The results show a substantial drop in the degree of explained variance ($r^2$=0.50) which indicates the separation of residents and tourists according to the time span is an effective method.

### 4.2 City level results

In the city level analysis, the cities that are included in the sample are Vienna, Innsbruck, Graz, Linz, Eisenstaedt, Klagenfurt, Salzburg (city), Bregenz, and St. Pölten.

To evaluate the Flickr data at the city level, similar to the regression at the regional level the variables have been log transformed, to assure normal distribution. As well, due to a rather curvilinear relationship a polynomial regression has been carried out.

**Table 2.** City level regression results (tourists)

| | B | SE B | Beta | p-value |
|---|---|---|---|---|
| Constant $b_0$ | 7.78 | 0.11 | | <0.01 |
| Users/day $b_1$ | 0.80 | 0.07 | 0.77 | <0.01 |
| Users/day² $b_2$ | 0.03 | 0.01 | 0.02 | <0.01 |

$r^2$=0.9185; p <0.01

Table 2 shows the results of the polynomial regression at the city level with $r^2$ of 0.92, which means that Flickr data can in fact be used as an estimation of tourists in Austrian cities. As the number of tourists identified based on Flickr data increases, the number of tourist bednights also increases.

The comparison of regional and city level regression results show that the model is a better predictor at the city level than the regional level. One reason for this result could be that there are more visitors to Austrian cities rather than the regions who upload photos on Flickr.

# 5 Conclusion

## 5.1 Discussion and limitations

The results of the polynomial regression analyses may seem tautological. However, the goal of this study is to show how representative the Flickr data is compared to actual tourist bednights in Austria. Thus, identification of tourists in the Flickr data based on time span applied in this study is a credible method.

The city level regression explains a higher percentage of variance (92%) in comparison to the regional level (72%). This may be due to the fact that city tourists are better represented in Flickr compared to regional tourists. One reason for this is there are more attractions and places to visit in a city, thus more opportunities to take photos than in regions. Moreover, the actual bednights data for the regions are higher in the winter season (85.155.935) compared to the summer season (75,487,167). This can also result in tourists taking fewer photographs in general in the winter season compared to the summer season in which they spend more time outside. Also, city tourists may be more heterogeneous than regional tourists. In different regions of the country, different types of activities can be done such as skiing, hiking, biking or spending time in a wellness hotel. This can influence the number of photos being taken. On the other hand, city tourists visit the points of interest that are well known and are eager to take photos (Jafari, 2000), and can be represented better in the overall Flickr data.

Overall, the results show that Flickr data can be used as an estimation of tourists in Austria. Until now, Flickr data have been used in research in different ways but not as an indicator of tourist numbers at a destination. The estimations could get better as more users upload more photos on Flickr as well. However, the results may not be representative for the whole world and could be true only for Austria. Thus, it would be best to replicate the study with a different sample of cities or countries.

Although the results of the study indicate that Flickr data can be a representation of tourists at a destination, not all tourists post their photos on Flickr. Thus, the Flickr data by itself cannot be used to identify the number of tourists or visitors at a certain place. This study is meant to show another way of retrieving visitor data to destinations or attractions. It is not a way to replace traditional ways of data collection such as surveys, but can complement the data. Destinations that have no way of collecting data, such as places like parks and attractions that do not have admissions tickets, may find this tool of particular use in tracking visitor numbers.

It needs to be acknowledged that the data from geo-referenced photos involve a degree of uncertainty. The date and time a picture has been taken is automatically saved as meta information with the photo. This time stamp corresponds with the time which is set in the camera but may refer to a different time zone where the tourist comes from, or the time on the camera may not have been set correctly. Additionally, the geo coordinates of the photos are subject to uncertainty. Modern cameras can save the geo references automatically as meta information with the pictures but in most cases the user has to mark the location of the picture on a map when he uploads the pictures to his account. The specified position can be inaccurate as the user might simply want to roughly mark the area where the photo has been taken. Moreover, the geo references may refer to the position of the photographer or may also refer to the position of the photographed object (Girardin et al., 2008).

Future research can focus on different cities and the comparison between cities. In addition, the data can be used to test how good it is for estimating micro level tourist numbers at attractions and points of interest such as museums where photos are often forbidden inside, or scenic view points where all tourists take photos.

### 5.2 Implications of the study

The results show that Flickr data can be an invaluable data source for tourism organizations and can be used as an indicator of number of visitors to a destination.

The findings can be used in various ways to assist city and national tourist organizations. One way would be to identify the preferred routes of tourists and thus adjust tourist maps accordingly.

The results of this study show the distribution of tourists and the crowded places can be identified on the map. Thus, the densely populated areas can be improved by implementing different types of marketing to move tourists to the lesser known areas at the destination or in the neighbouring areas. For instance, by placing bulletin board advertisements at the popular tourist destinations, tourists can learn about the lesser known places.

It is also important to understand the new trends amongst tourists for destinations. Trends over time for different touristic attractions can be seen, such as the time of the day tourists visit specific places or attractions. In addition, the information can be used for benchmarking the destination with its competitors to see when tourists visit different parts of the destination. Using Flickr data is a better way than using GPS tracking systems to find out where tourists go, and in addition what they find interesting at the destination, since tourists take photos of attractions and places they

find appealing. Thus, the data can be used to identify the most visited places at a destination where the number of people cannot be identified, such as parks.

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# Personal Data and User Modelling in Tourism

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## Abstract

According to recent studies and forecasts in the field of computer science, a significant portion of on-going research is related to the data that is generated and made available on the Web; this data is also known as 'big data' due to the volume of the storage space needed to retain it. This study aims to shed some light on the relation between the personal data that could be extracted from the Social Web and the various applications in the tourism domain that could profit from this personal data. The motivation is the design of an ecosystem that harnesses the power of shared personal data towards producing personalised services, offers and recommendations for users. One of the basic prerequisites, and the purpose of this investigation, is the creation of a user model specifically for the tourism sector, which aggregates the relevant tourism user properties.

**Keywords:** Personal Data; User Modelling; Semantic Web; Recommenders; Personalisation.

## 1 Introduction

The necessity of personalisation in the tourism domain is apparent when we consider the extraordinary number of offered services and products through the trip and travel life-cycle. In the pre-trip phase, travellers search for destinations, accommodation, etc. and during the trip they keep looking for points of interest (POI), restaurants and activities. Location based services (LBS) adopt personalisation techniques in order to support their users with targeted results and services aligned to their needs. Recommender systems (Resnick & Varian, 1997) realise the personalisation concept by matching individuals' interests and domain objects.

The objective of recommender systems in tourism is the creation of personalised and appealing offers for the potential customers of touristic products. Thus, three parties could be roughly distinguished within the recommenders' ecosystem, i.e. the interests and preferences of the traveller, the characteristics of the businesses, and finally, the approach that brings the traveller closer to the touristic products offered by the various destinations (e.g. recommendation algorithms). These perspectives have been formalised by the research community and are referred to as the *user model*, the *domain model* and the *adaptation mechanism*, respectively (De Bra, Houben, & Wu, 1999). The current paper aims to emphasize the strong borders that exist between the different recommender systems and the Social Web. The approach that is presented in the scope of the paper proposes to erase these borders by proposing a unified user model for tourism.

Right Time Experiences (RTEs) is a new term introduced by Lopez Research (Lopez, 2012) that holds the vision of delivering to an employee or customer the right information at the exact moment of need. The study presents the Foursquare platform to illustrate (with the new "Explorer" feature) the potential future look of customer

L. Cantoni and Z. Xiang (eds.), *Information and Communication Technologies in Tourism 2013*, DOI: 10.1007/978-3-642-36309-2_43,

engagement and recommendations. The "Explorer" functionality of Foursquare enables users to explore nearby POIs according to their previous preferences. Both the Foursquare initiative to move towards recommendations and RTEs' introduction in the market research, uphold the need of a personalisation layer and a unified user model that will reflect the preferences of the users among the social networks.

Due to the enablers of the technologies that have been incubated throughout the last few years in this field (e.g. ontologies, vocabularies), the user modelling in the context of the adaptive Web (Brusilovsky & Maybury, 2002) has also been considered from the Semantic Web viewpoint (Heckmann, Schwarzkopf, Mori, Dengler, & Kröner, 2007). Conceptualisation and sharing (Fensel, 2004) could be considered the main characteristics of ontologies that support the user modelling approaches. In contrast to other approaches in which the user model is in essence a document with key-pair values that describe place names, categories and tags (e.g. (Savage, Baranski, Elva Chavez, & Höllerer, 2012), the presented methodology relies on Semantic Web technologies for the design of the model. As emphasized in previous studies (Aroyo & Houben, 2010), the representation of user properties that shape the user model are neither standardised nor defined, or broadly accepted in the various domains. This is primarily due to the closeness of the systems in the recommendation field. Recommenders are storing the usage data and users' profiles in proprietary databases and are not willing to share the aggregated model. The presented approach aims to define an open user model for exploitation specifically by applications in the tourism domain. Thus, the objective is not to provide a model capturing the common user properties in the Social Web, such as in related studies (Plumbaum, Wu, De Luca, & Albayrak, 2011), but a model that reflects the users' profile aspects relevant to tourism applications and location based services (LBS). A preliminary assumption within this investigation is the vision that all stakeholders in the tourism domain (both businesses and holiday travellers), could profit from the combination of recommender systems and personal data retrieved from the Social Web.

The remainder of the paper is structured as follows. Section 2 provides an overview of the recommenders in tourism by presenting a few approaches and highlighting the opportunities of user modelling in that context. Section 3 describes the methodology that was used to produce a tourism specific user model as well as the requirements of such a model. The results of following the aforementioned methodology towards the creation of the user model are presented in Section 4. Section 5 concludes the paper and defines the next steps of this approach.

## 2 Tourism recommendations and personal data

The majority of the recommender systems in tourism follow the same workflow pattern. The personalisation procedure consists of roughly three stages; a) the initialisation phase, in which the user explicitly specifies personal information and preferences; b) the analysis phase, which is responsible for the matching of user's preferences with the available business entities, points-of-interest (POIs) etc.; and c) the representation of the recommendations to the user. The feedback from the traveller is used to improve the future results and refine the produced user model. The initial step cannot be skipped in any way from the various recommendation systems

that are available in the Web sphere, because it is crucial for the proper exploitation of the algorithms that lie at the backend. In most cases, this step is required only at the initialisation of the platform, making the usability of those platforms user friendly. Examples of recently launched systems, just to name a few, are the *Nara* (nara.me), which is a restaurant recommender, the *Sightsplanner* (tallinn.sightsplanner.com) for Tallinn related recommendations and the *Supe* system (Parundekar & Oguchi, 2012), which personalises the GPS devices of the car drivers.

*Nara* is a recommender Web based application that aims at providing the users with personalised suggestions for restaurants in various cities. The workflow that is followed consists roughly of three major steps. Firstly, the user explicitly specifies three restaurants in one of the cities that the system is functional. Based on this information, the system is able to make initial recommendations about other restaurants that may be interesting to the user. Then, the user can train the system by liking or disliking the recommendations. The recommendation aspect relies on neural network computing techniques. This illustrates the major difference from pre-existing approaches, as it has been communicated by the CTO of the company and disseminated by online Semantic Web news portals (Zaino, 2012).

*Sightsplanner* is a route recommender system for tourists, helping them specify their visiting plan in the city of Tallinn according to their traveller-profile and interests. Travellers access the system via its web interface and explicitly specify their visiting interests regarding various categories (i.e. events, museums & arts, architecture & city, eating out etc.) in terms of visit frequency. Sliders from “less” to “more” in the Web interface help the users to indicate the level of interest they have in activities from each category. Thus, upon visiting the website, the tourists must specify their interests by using the “less” to “more” sliders or choosing one of the predefined profiles. Afterwards, the system calculates the visitor’s time in the city in conjunction with the interests and the characteristics of the various points-of-interest that are stored in the database of the platform. The POIs stored in the database stem from the scraping of six web portals (Luberg, Järv, & Tammet, 2012). The results are then presented to the users, which in turn, helps them decide their route.

*Supe* stands for Semantic User Preference Engine and has, as its main objective, the improvement of the in-vehicle navigation system experience. The Toyota InfoTechnology department wanted to leverage the POI results of the GPS devices to personalised POI search results by using Semantic Web technologies. The semantics’ pillar helps them to define and understand the preferences of the driver as well as the POIs and furthermore use certain formulas to calculate the level of similarity between them. Therefore, the system presents to the drivers a list of POIs according to the places they have visited and prefer. A preference model is stored in the GPS device and synchronised with a replica in the cloud, which reflects the behaviour of the driver till that moment, and can be used in the future during a search of POIs.

The diversity of approaches affects the effectiveness of the systems and the suitability of the results for the traveller. *Nara* is using a highly-sophisticated recommendation methodology, *Sightsplanner* is using predefined traveller-profiles and *Supe* combines a recommendation methodology and data from GPS devices. These systems were

presented to illustrate the diversity in the recommendation approaches and emphasize at the connection points rather than evaluate them.

Regarding the aforementioned presentation of a few recommendation approaches, the lack of a unified user model is easily spotted. The personal data of the users that populate the user models is stored and trapped in the proprietary data warehouses of the systems and is not available for reuse by other systems even after a hypothetical approval of the individual. Systems like *Sightsplanner*, require user's input about his/her preferences in every use of the system, which causes an overhead of the whole procedure in terms of time from the user's side. Additionally, systems like *Supe* could benefit from a user model that aggregates the interests of the users and makes them available in an open and interoperable manner. Considering the other way around, GPS data could enrich the user model of travellers with valuable information for future use. Thus, a unified user model could help all the above-mentioned systems to have a better knowledge about the user and benefit from each other.

The objective of the current work is to study the important characteristics that a user model should describe for a tourism-related recommendation framework and to furthermore propose an approach for bringing the personal data of the users that are scattered in the social networks closer to the recommender systems. An open user model could lower the borders among the recommenders and allow both the personalisation frameworks and the users to profit from the information. Capturing the personal data of the travellers under the umbrella of an aggregated user model facilitates the information exchange, reuse and enrichment in a user-centric manner. Thus, the question that is supposed to be answered at the end of this study is the following: *"Is personal data the hidden gem of the social networks for the recommenders?"*

## 3 Requirements analysis and Methodology

Considering the popularity and character of available social networks, the current study focuses on two platforms, Facebook and Foursquare. In June 2012, Facebook claimed to have 550 million daily active users (Facebook, 2012), making it a perfect source for extracting personal data. According to the official blog posts of the platform in 2012 (Foursquare, 2012), Foursquare exceeds 20 million users, a highlight being the functionality of the platform. The users broadcast the places they have visited via the "check-in" mechanism, creating lists of ToDos, writing tips and exploring new places around their current position according to their preferences. A recent study (Vasconcelos, Ricci, Almeida, Benevenuto, & Almeida, 2012) explains how the various features of Foursquare are exploited by the users and provides first pieces of evidence of the "social" opportunity that lies on Foursquare.

Both platforms, Facebook and Foursquare, have a proprietary, structured way of tracking the interests and recent activities of the users. This personal data stems from the behaviour of the user and describes his/her decisions in the past. Defining an all-in-one user model that could be used in any application, like the General User Model Ontology – GUMO, has already been proposed and discussed (Heckmann, Schwarzkopf, Mori, Dengler, & Kröner, 2007). In contrast to GUMO, which is a generic user modelling ontology that aims to fully cover user's life, the proposed

model focuses on those attributes that could be exploited and used in the field of tourism. Taking into consideration the type of locations (e.g. museums, spas, archaeological places) that users visit, as well as the activities that they prefer in their trips, the recommendation systems are able to propose and make personalised suggestions for future trips at any phase of the traveling process (i.e. pre-trip, during trip, post-trip). For example, as presented in Section 2, the *Nara* framework relies on the restaurants that were marked by the users as their favourite and *Supe* relies on the visited POIs of the user. Thus, it is crucial to have the means to store and exchange among the various systems, the location based preferences of users.

### 3.1 Requirements of a User Model in Tourism

In order to provide user-related information for an application of the adaptive Web, the user model should reflect and cover various dimensions of the users' profile and behaviour. The dimensions proposed in the current model were decided according to the requirements of the various recommendation systems, such as the systems that were already discussed, and other studies in the field. Kang et al. (Kang, Kim, & Cho, 2006) describe a recommendation system for tourist POIs, and consider in the stored user information, attributes like the current location, preferences of activities and hobbies. The following list depicts the attributes of a user model that are considered to be crucial for solutions in the tourism domain.

- *Basic user characteristics* that describe the person, i.e. name, email, as well as demographic data about the user, i.e. age, marital status, family members, hometown and current location.
- Things like *activities, products, places* that the user is interested in and are interlinked with the trip lifecycle. For instance, the fact that user A likes the Pulp Fiction movie is irrelevant, while if user A likes the city of Innsbruck or skiing then it should be gathered by the user model as it is useful for a recommendation system suggesting touristic entities.
- *Historical data* (i.e. activities, visited places) about the user is needed to infer implicitly the preferences of the user during past trips. In the area of social networking, this data is known as "check-ins". Considering past activity of the user, the recommendation mechanism is able to improve the effectiveness of the suggestions by personalising the results. The Supe system presented in Section 2 relies only on the POIs that users visit regarding the captured personal data.
- The *time dimension* in the model is also important for a framework in the context of the adaptive Web. In particular, it is a key-factor in order to adapt the recommendations to reflect the current needs and preferences of the users (e.g. by using the recently visited POIs).
- *User's wishes* about future trips, including destinations and activities, are positively affecting the recommendation systems by providing specific spots and activities that users would like to experience.

Except for the attributes that should be modelled within the user model, some best practices have to be followed and adopted in order to strengthen the presence of the developed model in the adaptive Web ecosystem. Thus, the user model should:

- *be open, flexible and concrete.* The needs of applications and systems are constantly changing according to the requests from the users and the functionality that is supported by the competitors. Moreover, new social networks appear that could enrich with the usage data the user models. Thus, a flexible and simple user model could help to easily establish mappings between the schema that is used by the new system and the user model, and smoothly enclose the new data in the existing model; and
- *comply* as much as possible *with the different standards* that are used in the tourism domain (e.g. OTA) in case something specific is needed. Furthermore, reusing existing vocabularies and ontologies is of highest priority. This practice could facilitate the integration of different usage data in the user model and make it reusable across different applications.

The next step is to define the methodology that was followed towards building the user model for tourism.

### 3.2 Building the User Model

The motivation of this study is close to the concept of cross-system user modelling as it has been described by Abel et al. (Abel, Herder, Houben, Henze, & Krause, 2011) in the scope of the *Mypes* system. *Mypes* is a service-based system that allows the aggregation and enrichment of user profiles. Their work focuses on the most common profile attributes like first name, last name, profile photo, homepage, location, education etc. In contrast, the proposed approach does not aim to cover the whole set of attributes that people share in the social networks, but to exploit the personal data that exists and could be used in travel and tourism applications.

The bottom-up methodology that led to the development of the user model is depicted in Fig. 1, including a simple activity diagram. The *first step* consists of studying the documentation that is available online for the developers that are willing to use the APIs of the platforms. The documentation references of Facebook (developers.facebook.com/docs/reference/api/user/) and Foursquare (developer.foursquare.com/docs/) give an outline of the schemas that are used by the platforms. After studying the documentation, the *second step* is to experiment with the APIs of the platforms and understand the functionality of the used models as well as the relation of the various features among the platforms in order to be able to produce the mappings that are needed in the scope of unifying the used models into one. The *next step* is to specify the personal data and attributes that can be extracted from the platforms towards populating a unified user model that fulfils the requirements listed in sub-section 3.1. *Finally*, the extracted attributes from the different networks should be mapped by specifying the relations among them.

The aforementioned methodology should produce a simple and flexible user model that could be used across different systems with a threefold role: i) facilitate the extraction of personal data for the users from various social networks and aggregation of them into one model; ii) facilitate the interoperability among the various existing

recommender systems and any new ones; and iii) provide an approach to the users to control their personal data and benefit from the pieces of data that they are sharing on the Web, by consuming personalised services.

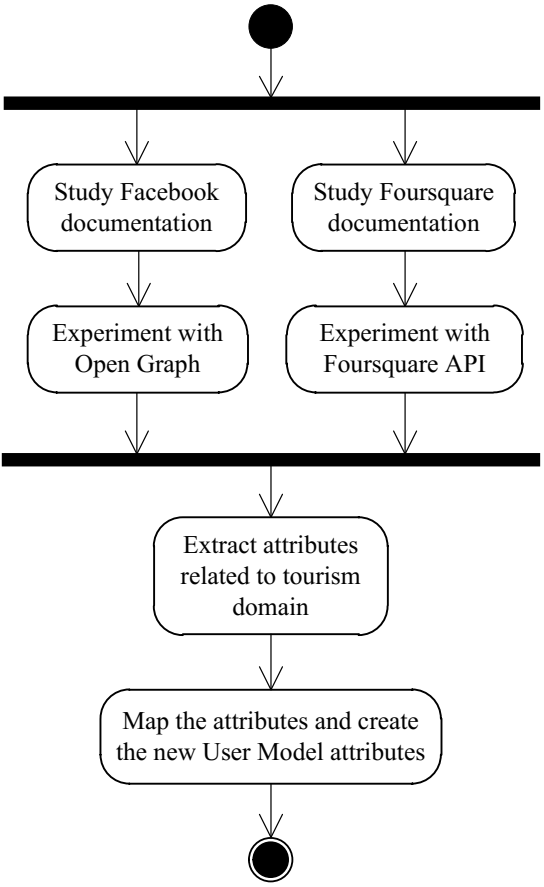


**Fig. 1.** Bottom-up methodology for creating user models by aggregating existing models of the Social Web

## 4 The user model

In this respect, a mash-up has been created, see Table 1, showing and comparing the various features and attributes that are provided by Facebook and Foursquare and are related to the tourism domain.

Categories of entities that are interesting for usage in touristic applications are those that refer to places, businesses and activities related to trips (e.g. city, attraction, things to do, hotel, restaurant/café, travel/leisure, food/beverage, museum/art gallery,

club, sport etc.). Thus, the main focus was to include mainly this kind of information in the user model, rather than general properties. The only demographic personal information that is included in the model is the name, the email and the marital status of the user. The marital status is retrieved from Facebook (as Foursquare does not support that) in case the user is explicitly mentioning that in his/her profile. It could be important in case the recommendations refer to a trip that the user is traveling with his/her family. In that case, the existence of the user models for the other members of the family could help the system to suggest points of interests and destinations that fulfil the preferences of the whole family. Examining in detail the schemas of the two platforms, we realise that Foursquare does not include any information regarding the hometown of the user but only the current residence.

**Table 1.** User model dimensions

| User model dimensions | Facebook | Foursquare | Comments |
|---|---|---|---|
| Personal information | ✓ | ✓ | Name, Email |
| Marital status | ✓ | × | Spouse, Children |
| Hometown | ✓ | × | |
| Current city | ✓ | ✓ | |
| Visited POIs | ✓ | ✓ | Coordinates, Name, Category |
| POIs to Explore | × | ✓ | POIs saved in ToDo lists |
| Interests | ✓ | × | |
| Liked locations | ✓ | × | |
| Activities | ✓ | × | |

Furthermore, Foursquare supports the creation of To-Do lists, in which users make notes about POIs that they would like to visit in the future. This information could enable recommenders to suggest POIs aligned to the To-Do list of the user in case the destination of user's trip matches with the location of POIs in the To-Do lists. Finally, regarding the aspects that should be covered by the user model, there are three more in Table 1, i.e. *Liked locations*, *Interests* and *Activities*. This information is gathered from the Facebook graph, from which the modelling framework should filter out irrelevant data and include only tourism related statements.

Foursquare's reputation as a Location Based Social Network (LBSN) has been built on the check-in mechanism, which produces a timeline populated with the POIs that the user has visited (mentioned as *Visited POIs* in Table 1). This functionality is also supported by Facebook, albeit slightly differently at the User Interface level (i.e. users report the visited places and POIs by writing a new status message and defining their location), still the same at the data level as it is shown below in Table 2.

Following the steps in methodology of Fig. 1, an example of the mappings between the various extracted features of the platforms is presented in Table 2. In this example, the description of POIs in Facebook is mapped to the representation in Foursquare. In Table 2, *period "."* (e.g. "place.name") implies a part-of relationship and the *type* column indicates if the attribute represents a *class (C)* or a *property (P)* of a class. For example, instances of the *place* class are included in the POI descriptions and the *name* is a property of the class with a literal value specifying the name of the POI.

**Table 2.** Mappings at the data level for the visited places

| **Facebook** | **Foursquare** | **Type** | **Comments** |
|---|---|---|---|
| place | venue | C | Object for POI |
| place.name | venue.name | P | Name of POI |
| place.location | venue.location | C | Location object of POI |
| place.location.latitude | venue.location.latitude | P | Latitude |
| place.location.longitude | venue.location.longitude | P | Longitude |
| place.location.address | venue.location.address | P | Address |
| place.category | venue.categories | P | Categorisation of POIs |
| created_time | createdAt | P | The timestamp that the check-in took place |

Studying the data of Table 2, it is evident that the modelling gap between the two platforms is not hindering the initial idea of the presented approach, but supports it. Specifically, all the attributes reflect the same information and only minor differences exist, like the different timestamp format (i.e., Facebook follows the ISO 8601 format, e.g. "2012-09-05T07:36:03+0000", and Foursquare the epoch timestamp of UNIX, e.g. "1346771004") that could easily be transformed into another format.

The results presented in Table 1 demonstrate the pilot for producing the user model, while it is preferable to use ontologies for the description of the model in order to profit from the semantic representation of the knowledge and the hierarchical structure of the described concepts. Following the best practices for creating ontologies, the proposed model reuses pre-existing vocabularies and ontologies that fulfil the needs of the approach, like the FOAF vocabulary (www.foaf-project.org) (*foaf:* namespace), the Weighted Interest vocabulary (xmlns.notu.be/wi) (*wi:* namespace), the Basic Geo vocabulary (w3.org/2003/01/geo/) (*geo:* namespace), while the namespace of the concepts that are created for the proposed model are under the *umt:* namespace. The proposed model is called UMT, which stands for *User Model for Tourism*.

The UML class diagram of Fig. 2 presents the proposed model by covering the concepts specified in Table 1. In the core of the model there is the user's class (*foaf:Person*), which has datatype properties like name (*foaf:name*), email

(*foaf:mbox*) and the various social media accounts (*foaf:account*). The visited places of the user are linked with the *umt:hasVisited* object property while the POIs that she/he would like to visit in the future are reflected by the *umt:hasToDo* property. The hometown and the current city of the user are represented by the properties *umt:hasHometown* and *umt:hasCurrentLocation*, respectively. All the user's activities and interests that can be retrieved from Facebook are modelled by using the *wi:WeightedInterest* class of the Weighted Interest vocabulary. Furthermore the liked places are captured by the *umt:likesLocation* property. Finally, the *foaf:knows* could be specialised by the sub-properties *SpouseOf* and *ParentOf* from the *relationship* vocabulary (vocab.org/relationship), in order to reflect the family relationships of the user with the partner and children, respectively.

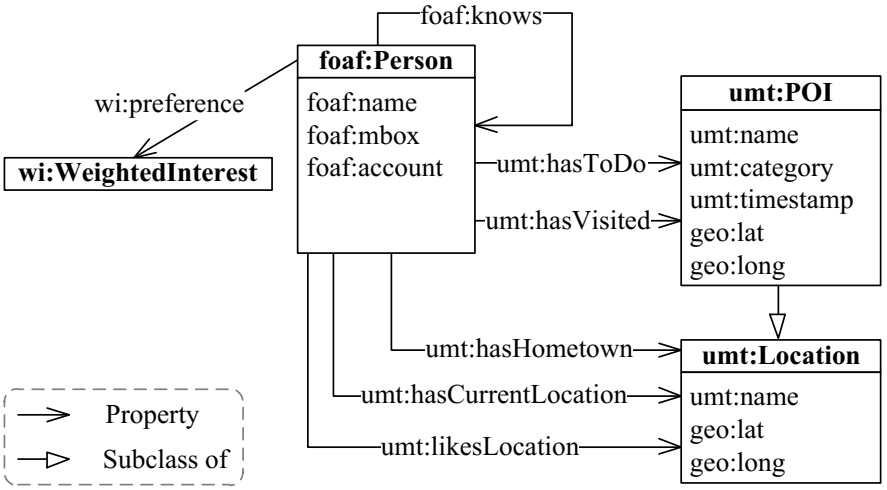


**Fig. 2.** Proposed user model (UMT) for travel and tourism applications

The presented approach assumes that the user explicitly defines the various personal accounts of the social networks, so there is no need to follow any identity disambiguation process (Rowe & Ciravegna, 2010) in order to find and merge the different social network accounts of the user.

## 5 Conclusion

This paper analyses the personal data produced by the users as a result of sharing their interests, preferences and activities of their daily life on the Social Web, and specifies the part of it that specifically relates to tourism. Moreover, this data is lifted to a user model that could be used by recommender systems in the tourism domain to solve the "cold start" problem and offer more targeted services. The objective was to specify a simple and reusable model across the different platforms.

In this respect, a methodology was defined and followed towards extracting tourism related properties from Foursquare as the major Location Based Social Network (LBSN), and Facebook as the largest Social Network. These properties were mapped

and a preliminary version of the user model was created and presented in the scope of the paper. Studying only two networks could be a limitation of the approach, however the rest of the related networks have similar models (e.g. Google Places). Moreover, according to a recent study (Lindqvist, Cranshaw, Wiese, Hong, & Zimmerman, 2011) users mostly check-in to places that they want to show and share with their friends like museums and restaurants, while they avoid check-ins to doctors and places where they are not proud of being (e.g. fast food restaurants). Thus, this data could be reliable to extract indications about the preferences of the users. Moreover, as presented in Section 2, the *Supe* system exclusively exploits the visited POIs of the drivers in order to recommend POIs in the future (Parundekar & Oguchi, 2012), which amplifies the idea of exploiting the personal data in LBSN networks.

Therefore, the presented user model does not intend to cover all the aspects of the Social Web like the Generic User Modeling Ontology (GUMO) approach (Heckmann, Schwarzkopf, Mori, Dengler, & Kröner, 2007). GUMO is a comprehensive user model described by using ontologies and tends to cover all the attributes and dimensions of the Social Web in order to be easily connectable with the Web 2.0 environment. In addition, the presented approach does not intend to focus only on the needs of the social networks like the Social Web User Model (SWUM) approach (Plumbaum, Wu, De Luca, & Albayrak, 2011). SWUM covers the common attributes among the various social networks in order to support an easy data sharing between applications. On the other hand, the proposed UMT model aims to aggregate the personal data of the users that are scattered in the Social Networks and the Location Based Social Networks in order to capture personal data useful for applications and recommenders in the tourism domain.

Next steps have already been considered, including the finalisation of the model, evaluation of the approach following various paradigms and the consideration of the extraction of personal data from the Google Places users' check-ins by exploiting the Google Latitude API interface. In principle, the functionality of the proposed model is not limited to the studied networks and it is easily mapped to the data schemes of other systems. Furthermore, this study provides pieces of evidence for the opportunities that lie in Social Networks, particularly in the personal data of the users, and proposes an approach for the exploitation of this data in tourism by the introduction of a methodology of creating user models and presenting a User Model for Tourism based on existing Semantic Web technologies.

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# Between Online and Offline Channels: Internship Information Search by Tourism and Hotel Management College Students

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## Abstract

Accompanying with the Internet wave, a plethora of literature about online and offline information search behaviour has emerged, in particular in the domains of consumer and travel research. However, little scholarly attention falls into how tourism and hotel management college students search internship information. The current study attempts to investigate this under-researched context. Drawing on the findings from a self-administered survey with 146 tourism and hotel management college students in Hong Kong, this study confirms that the Internet is a major channel for students to search internship information whilst offline channel has not been abandoned. Moreover, students with internship experience exhibited a higher tendency to search internship information through company websites.

**Keywords:** online; offline; internship; channel; source; information.

## 1 Introduction

The Internet presently becomes a major channel for people to search information. Accompanying with the wave of the Internet, a vast body of literature about online and offline search behaviour has emerged in recent years. While relevant studies are not scant, generalisability of their findings is questionable as people select different channels depending on information they search (Jun, Vogt, & MacKay, 2007). In this regard, it may not be adequate to conclude findings about selection of information channels in one context to another context and, hence it is worthwhile to extend investigations about people's online and offline search behaviour across domains. While most previous studies pertinent to online and offline information search fall into the realm of consumer service and product (Kim, Lehto, & Morrison, 2007; Seock & Bailey, 2008), there appears to be a lack of relevant research on internship information search in the domains of tourism and hospitality.

Internship, for college students, is a useful platform as they can establish connections with industry practitioners, which in turn facilitates their job searching process after graduation. Internship is beneficial to industry practitioners too as they source appropriate candidates at a low cost. Therefore, internship serves as a platform for both students and industry practitioners to assess whether they fit the other party's needs and expectations. Given a wide range of online and offline sources (e.g.,

L. Cantoni and Z. Xiang (eds.), *Information and Communication Technologies in Tourism 2013*, DOI: 10.1007/978-3-642-36309-2_44,

company websites, social media, newspapers, job fairs, company brochures, and others), practitioners should understand and prioritise the sources that college students use to obtain internship information as it increases the chance of soliciting good candidates.

As surfing the Internet is a prevalent daily activity among college students nowadays (Gemmill & Peterson, 2006; Niemz, Griffiths, & Banyard, 2005), it should not be surprising that they search internship information online given lesser time and efforts are incurred in online search. Under this pre-condition, it is unclear whether offline channel would be ignored by the students. The existing literature indicates that information search activities are primarily driven by people's desire to reduce their uncertainty in decision making (Jeng & Fesenmaier, 2002). In order to reduce the uncertainty, people would maximise the obtained information by accessing multiple channels (van Dijk, Minocha, & Laing, 2007). As such, it appears that both online and offline channels would be adopted by the college students to search internship information, albeit the former may be more prevalent. The present study makes an attempt to testify this postulation.

Much existing research on information search behaviour examined the impacts of individual differences, where gender is a popular research variable (Kim et al., 2007; Moon, 2004; Seock & Bailey, 2008). In fact, many previous studies across disciplines have revealed differences in cerebral functions and cognitive responses between male and female (Everhart, Shucard, Quatrin, & Shucard, 2001). Following this rationale, this study examines whether college students' likelihood of searching internship information online would vary with their corresponding gender. The findings would provide insights for practitioners on the effectiveness of distributing their internship information online when their internship positions are opened to specific gender.

In addition to gender, people's knowledge about the information they search for can be another factor that affects information search behaviour (Moon, 2004). However, the association between the knowledge level of the subjects and the level of information search was highlighted, and empirical examination has only been conducted within the domain of consumer behaviour (Brucks, 1985). Hence, this study makes an initial attempt to examine whether college students' knowledge about the industry is associated with their likelihood to search internship information online. The findings would provide implications for practitioners on whether the Internet is an appropriate distribution channel to reach the students with better knowledge about the industry.

The importance of an internship program in tourism and hospitality can be manifested in two aspects. First, among various academic programs, the tourism and hospitality program is one of which values internship as a critical curriculum for its students (Beggs, Ross, & Goodwin, 2008). This is not surprising given the fact that tourism and hospitality is a multifaceted discipline stressing on industrial practices. Second, while tourism and hospitality practitioners are threatened by the diminishing enthusiasm of tourism and hotel graduates to remain in the industry, tourism and hotel management schools strive to plan carefully on their internship program in order to tackle the threats (Lam & Ching, 2007). A pleasant internship experience in the tourism and hospitality organizations helps nurturing the students' interests to join the

industry after graduation (Lam & Ching, 2007). Hence, for the well-being of the tourism and hospitality industry in the long-run, it is essential to gain a thorough understanding of perception on internship among tourism and hotel management college students so that a meticulous internship plan can be worked out between schools and industry. In this regard, students' internship information search behaviour deserves more scholarly attention as the searching work is always the beginning phase of internship program.

To examine the postulations in this study, a survey was conducted among students majoring in tourism and hotel management. The objectives of the present study are threefold: 1) to compare the propensities of using online and offline channels to search internship information by tourism and hotel management college students; 2) to investigate whether both channels are adopted or either one would be dropped; and 3) to examine whether students' gender and knowledge about the industry are associated with their tendency of conducting online search.

# 2 Theory

## 2.1 Online and Offline Channels

Traditional economic theories advocate that utilization of a resource prevents other resources from being utilised (Baumol & Blinder, 2008). This advocacy set the ground for the conventional models about information search behaviour that people select information sources by assessing the costs and benefits of each source (Allen, 1977; Hardy, 1982; Orr, 1970). The rationales of these early models can be extended to explicate the use of online and offline channels nowadays. People compare the costs and benefits of online and offline channels, and decide which channel should be prioritised. Time and effort have been maintained as major factors that affect choice of channels (Li, Kuo, & Rusell, 1999). In terms of searching time and effort, the online channel is generally more advantageous than the offline channel. For instance, people tend to go for the online channel when temporal factor is a concern (Nicholson, Clarke, & Blakemore, 2002).

Although the online channel seems more prevalent than the offline channel in this Internet era, it is not necessarily true across situations (Nicholson et al., 2002). The decision between using online and offline channels also varies with individuals. As suggested by the renowned Technology Acceptance Model (Davis, 1989), perceived ease of use affects people's intention to use information technology. Hence, it is unreasonable to assume that people like elders who do not know how to use computers would exhibit intention to search information through the online channel. To the elders, the time and effort on learning how to pursue online search can be much greater than searching information offline. In contrast, from youngsters' perspectives (e.g., college students), online search makes more sense as the Internet plays an important role in their daily lives (Anderson, 2001). As the current study focuses on tourism and hotel management college students' information search behaviour, the following hypothesis is proposed:

**Hypothesis 1**: The online channel is more likely to be used by tourism and hotel management college students to search internship information than the offline channel.

While previous studies about information search explain how people make a choice among available channels (Allen, 1977; Hardy, 1982; Orr, 1970), they have not examined people's decision between single and multiple channels. A major motivation for people to conduct information search is to reduce their uncertainty on subsequent decision making (Moorthy, Ratchford, & Talukdar, 1997; Urbany, Dickson, & Wilkie, 1989). When the corresponding situation is of high concern to the information seeker, the seeker tends to rely on multiple channels, rather than a single channel (van Dijk et al., 2007). For instance, a study about people's job search behaviour revealed that active job seekers (i.e., people who are highly concerned about finding a job) use both online and offline channels to search for employment opportunities (Kuhn & Skuterud, 2000). This is not surprising as people who have strong intention on job search (i.e., active job seekers) would perceive that more channels lead to a higher chance of getting into an interview (Mau & Kopischke, 2001). Given that internship is a prominent milestone on the road to graduation, college students who are looking for internship opportunities should be comparable to the active job seekers. Therefore, the following hypothesis is proposed:

**Hypothesis 2**: Tourism and hotel management college students' adoption of the online channel is positively associated with that of the offline channel.

### 2.2 Gender and Online Information Search

While people's propensities to use online and offline channels have been suggested to vary with individual differences (Moon, 2004), gender is always a critical one as it has constantly been maintained as a significant moderator of information process and decision making (Kim et al., 2007). The reason is that the brains of men and women function in different ways (Everhart et al., 2001). Therefore, it should be reasonable to assume different information search behaviour between male and female. Online information search seems to be more popular among men than women as men are generally more easily motivated to adopt new technology, and more enthusiastic in using the Internet than women (Jackson, Ervin, Gardner, & Schmitt, 2001). However, empirical studies showed conflicting findings that women were more likely to search information online than men (Kim et al., 2007; Seock & Bailey, 2008). This is not unreasonable as women tend to reach a decision through exhaustive information search; whereas men tend to make decision quickly with limited information (Kim et al., 2007). In this sense, disregard what the information channels or sources are, women may exhibit a higher tendency on information search than men. As a result, a hypothesis is proposed as follows:

**Hypothesis 3**: In internship information search, female tourism and hotel management college students are more likely to use the online channel than male tourism and hotel management college students.

### 2.3 Knowledge and Online Information Search

As discussed earlier, people search information in multiple sources in order to reduce their uncertainty during the decision making process. This implies that people who

possess better understanding about the topic they are searching for and hence have less uncertainty upon decision making may be less reliant on multiple channels than the counterparts who have less understanding. In other words, people's prior knowledge about the topic they are searching helps facilitate the searching process (Brucks, 1985). Additionally, people with more knowledge about the topic being searched may simply search information from a single channel. Earlier discussion indicates that the online channel should be more preferred to the offline channel as the former incurs less time and effort. In this regard, following Moon's (2004) suggestions, people with higher knowledge level may have a higher probability to search information online.

The current study posits that students' knowledge about the tourism and hospitality industries may affect their likelihood on utilizing the online channel. Students who are more knowledgeable about the industries might realise the presence of personal (e.g., social networking sites and blogs) and collective sources (e.g., online forums and online discussion boards) in the online space, which in turn would facilitate and heighten the likelihood to do online search. In this regard, senior students may have better knowledge about the industry than their junior counterparts as the former has received more education and training in the fields. Students with internship experience may also have more knowledge about the industry than those without internship experience as the former has already gone through a similar information search process prior to their past internship experience and has worked in the industry before. As a result, the following hypotheses are formulated:

**Hypothesis 4**: Senior tourism and hotel management college students are more likely to search internship information through the online channel than junior tourism and hotel management college students.

**Hypothesis 5**: Tourism and hotel management college students with internship experience are more likely to search internship information through the online channel than counterparts without internship experience.

# 3 Methods

## 3.1 Participants and Procedure

Participants in this study were recruited from college students majoring in hotel and tourism management in a Hong Kong university. Of a total of 164 self-administered questionnaires, 157 valid samples were used for data analysis after excluding seven incomplete questionnaires.

## 3.2 Measures

Online and offline channels can be considered as an umbrella dimension of information search. Under each channel, people can obtain information through different sources. In the realm of job search, the sources can be formal or informal (personal) (Fountain, 2005). Examples of personal offline sources are face-to-face and phone communication, which are all about personal communication. In this Internet era, similar personal communication can be pursued online like email and social networking sites. Regarding the formal sources, offline examples are company

brochures and third-party media like newspapers, magazines, TV programmes, radios, and job fairs; whereas online examples would be company websites and third-party media like online newspapers, online magazines, weblogs, and Internet forums. Based on these examples, formal sources can be further categorised into two major types: company and collective (i.e., third-party media). As three individual sources (i.e., personal, collective, and company) can be established for both online and offline channels, a total of six channel-sources were formulated including online-personal, online-company, online-collective, offline-personal, offline-company, and offline-collective.

A structured questionnaire with two sections was designed to collect quantitative data from the participants. The first section measures college students' likelihood of use of the six channel-sources in searching internship information using a 7-point Likert scale anchored with 1 being "very unlikely" and 7 being "very likely". In the second section of the questionnaire, respondents are asked to indicate if they had any internship experience, their year of study, and their gender.

### 3.3 Data Analysis

Before testing the hypotheses, identification of outliers and checking of data normality were pursued. After deleting outliners, 146 samples were retained in this study (Osborne & Overbay, 2004). Normality check indicated that the measures were negatively skewed as the $Z_{skewness}$ values are less than -1.96 (Hair, Black, Babin, & Anderson, 2010). To redress this problem, the data were squared, which was recommended to cater the problems of negative skewness (Hair et al., 2010).

In order to conduct the analysis with respect to the students' seniority, junior students encompassed those who were in the first or second year; whereas senior students consisted of those who were in the third or fourth year.

## 4 Results

The results of Principal Component Analysis (PCA) show that two factors are extracted with Eigenvalues of 2.135 and 1.328, respectively. Bartlett's Test of Sphericity indicates that at least some of the variables are significantly correlated with each other ($\chi^2$ (15) = 168, $p$ = .000) and, thus performing PCA is appropriate. Using .5 as the factor loading cut-off point, all three online source items load on the first factor while the remaining three offline source items load on the second factor. No cross-loading item was found. Hence, the validity of instruments can be deemed adequate. Regarding the reliability of instruments, the Cronbach's alpha values of online and offline factors are .576 and .608, respectively. Both values are smaller than the generally accepted benchmark (i.e., .7). However, according to O'Leary-Kelly and Vokurka (1998), if the instrument is newly developed, a value greater than .5 is acceptable. Thus, the reliability of the instrument can be deemed acceptable. Based on these results, the scores of online and offline channels were calculated by averaging the scores of their respective measurement items.

**Table 1.** Difference and correlation between the use of online and offline channels (n = 146)

| | | Paired *t*-test | | Pearson correlation test |
|---|---|---|---|---|
| **Online M (SD)** | **Offline M (SD)** | **Difference** | ***t*-value** | **Correlation coefficient** |
| 33.64 (7.19) | 29.38 (8.43) | 4.26 | 5.443* | .274* |

*Note.* **M** and **SD** represents the mean and standard deviation value of respondents' likelihood of using the channel-source for searching internship information. * $p < .01$

Table 1 shows the results of the first and second hypotheses. The result of paired samples *t*-test indicates a significant difference between the use of online and offline channels to search internship information by the participated students ($p < .01$). The tourism and hotel management college students expressed a higher propensity to search online ($M = 33.64$) than offline ($M = 29.38$). Therefore, the first hypothesis is supported. This is not surprising given the fact that most college students are familiar with online information search. They would perceive that their time and effort devoted to online search are less than offline search.

The result of Pearson correlation test indicates a significant, though weak ($r = .274$), positive correlation between the use of online and offline channels ($p = .01$). The result implies that the more the online channel is used, the more the offline channel is used. Hence, the second hypothesis is supported. The finding reflects that tourism and hotel management college students would use various channels to search for internship information. While the students perceive that lesser time and effort are important criteria on selecting channels, they may not solely rely on a single channel like the online channel, but would also adopt the offline channel to gain more information so as to reduce uncertainty about missing out on any internship opportunity. This also reflects that online and offline channels complement each other when the students search internship related information (Subrahmanyam, Reich, Waechter, & Espinoza, 2008).

**Table 2.** Differences in the use of online channel and sources by individual differences

| | **Online** | | **Online-personal** | | **Online-company** | | **Online-collective** | |
|---|---|---|---|---|---|---|---|---|
| **Individual differences** | **M (SD)** | ***t*-value** | **M (SD)** | ***t*-value** | **M (SD)** | ***t*-value** | **M (SD)** | ***t*-value** |
| **Gender** | | | | | | | | |
| Male (n = 32) | 34.94 (7.70) | | 37.09 (9.93) | | 34.06 (10.95) | | 33.66 (10.24) | |
| Female (n = 114) | 33.27 (7.03) | | 34.36 (9.58) | | 33.70 (9.89) | | 31.76 (9.30) | |
| Difference | 1.67 | 1.157 | 2.73 | 1.415 | .36 | .178 | 1.90 | .995 |
| **Seniority** | | | | | | | | |
| Junior (n = 105) | 33.55 (7.74) | | 35.06 (9.80) | | 33.23 (10.47) | | 32.36 (9.51) | |
| Senior (n = 41) | 33.87 (5.62) | | 34.71 (9.52) | | 35.20 (9.03) | | 31.71 (9.63) | |
| Difference | -.32 | -.241 | .35 | .195 | -1.97 | -1.058 | .65 | .372 |
| **Internship experience** | | | | | | | | |
| Yes (n = 120) | 34.23 (7.02) | | 35.08 (9.34) | | 34.77 (9.67) | | 32.83 (9.64) | |
| No (n = 26) | 30.94 (7.48) | | 34.38 (11.38) | | 29.23 (10.98) | | 29.19 (8.42) | |
| Difference | 3.29 | 2.141* | .70 | .332 | 5.54 | 2.583* | 3.64 | 1.778 |

*Note.* **M** and **SD** represents the mean and standard deviation value of respondents' likelihood of using the channel-source for searching internship information.* $p < .05$; The Levene's tests show equality of variances in all the above independent samples *t*-test ($p > .05$).

A series of independent samples *t*-tests were performed to examine the variations of the likelihood of using the online channel and various online sources with gender, students' seniority, and internship experience. As shown in Table 2, two out of the twelve tests show significant results. While Hypothesis 3 proposed that female tourism and hotel management college students are more likely to use the online channel to search internship information than the male counterparts, the results in this study do not corroborate the hypothesis where no significant difference was found between male and female in the independent samples *t*-test ($p = .249$). Insignificant differences were also found in their likelihood to use sources including online-personal, online-company, and online-collective ($p = .159$, .859 and .322, respectively). Although it was maintained that women are more exhaustive in information search than men (Kim et al., 2007), the findings from this study imply

that the argument may not be valid across situations. A plausible explanation is that internship is a paramount mission for tourism and hotel management college students so that even male students would pursue the search in an exhaustive manner.

Since senior students are expected to have better knowledge about the industry than junior students, this study hypothesised that senior tourism and hotel management college students are more likely to search information through the online channel (Hypothesis 4). Contrary to our expectation, the hypothesis is not supported ($p$ = .810). Also, there is no significant difference in the likelihood to search information through the three online sources between senior and junior students ($p$ = .845, .292 and .710, respectively). These findings reflect that senior and junior students majoring in tourism and hotel management are equally likely to use the online channel to search internship information, no matter which sources they use.

In contrast, the hypothesis about tourism and hotel management college students with internship experience are more likely to search information through the online channel than the students without internship experience is corroborated (Hypothesis 5: $p$ = .034). A major contributor to the significant difference in this result is that students with internship experience ($M$ = 34.77) are more likely to use online-company than the counterparts without internship experience ($M$ = 29.23, $p$ = .011), given the fact that no difference was found at the 5% significance level on the other two sources including online-personal and online-collective ($p$ = .740 and .077). The results are coherent with our expectations. Students with internship experience should have more company names in their mind given that they might have already gone through a sophisticated searching process prior to their past internship experiences and that they have a higher chance to learn the companies (including the one they worked before) in the tourism and hotel industry during their past internship experiences. With the company names in mind, students can access their required information online with less effort and thus would have a higher propensity to pursue the online search. As prior knowledge about the companies is the major concerning factor within the realm of internship experience, it should be reasonable that online-company, but not online-personal or online-collective matters.

## 5 Conclusions

The findings of this study confirm that the Internet is a major channel for tourism and hotel management college students to search internship information. However, the emergence of the online channel has not replaced the offline channel as the students tend to maximise the obtained information, which in turn minimises the uncertainty by diversifying their information channels during the search process. In this regard, it is possible that online and offline channels are being used as a complement to each other. Hotel and tourism management schools and practitioners should prioritise the promotions of internship information through the online channel. If their resources are sufficient, universities and practitioners are suggested to extend the promotions to the offline channel as well.

To operationalise students' knowledge about the tourism and hotel industry, this study used tourism and hotel management college students' seniority and internship experience as proxies. However, only internship experience moderates students'

likelihood to utilise online channel where students with internship experience exhibit a higher tendency to use the online channel, more specifically online-company as a source of internship information. Based on these findings, tourism and hotel employers are suggested to deliver their internship information through their websites if they prefer to recruit students with internship experiences.

While this study provides certain insights for tourism and hotel management schools and practitioners to plan the internship program, specifically on disseminating the internship information, it has to be cautioned that the study was conducted in one hotel and tourism school in Hong Kong. The results may not be generalisable to other schools or regions. A natural extension of this study is to replicate this methodological approach in other schools and regions, which may also help identifying potential moderators of the results for future studies. Moreover, this study operationalised students' knowledge about the industry with students' seniority and internship experience. Future studies may examine other proxy variables like students' academic performance. Finally, in view of the small sample size in this preliminary study, future studies can enlarge the sample size in order to increase the generalisability of results.

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## 7 Acknowledgements

The authors would like to thank the three anonymous reviewers for their constructive comments on an earlier version of this paper.

# Online Channel Use and Destination Advertising Response

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## Abstract

Understanding the relationship between use of online information channels and response to destination advertising is one of the most important challenges facing destination marketing organizations. The results of this study indicate that the use of information sources and online channels differs substantially for each major component of the travel planning process (e.g., whether or not to take a trip, where to visit, and what to do there). Further, the results of these analyses indicate that travellers use online information sources differently and this use significantly affects their response to destination advertising. Thus, the results of this study provide essential guidance regarding potential strategies for designing and implementing online destination advertising programs.

**Keywords:** Online information channels, destination advertising response, facets-based advertising model

## 1 Introduction

Much research has been devoted to understanding and modelling travel decision making behaviour and advertising response. While several frameworks for explaining travel decision making exist, it is generally accepted that a key component of travel decision making is the need for information. It has been shown that travellers generally base their decisions on a wide variety of information sources, ranging from personal experience, advice of friends and relatives, travel agencies, industry service providers (such as hotels and airlines), and the Internet. Among these sources, the Internet has become one of the most popular in the United States, with approximately 168 million Americans using the Internet to plan their leisure travel (U.S. Travel Association, 2012).

For tourism organizations and marketers it is especially important to understand how travellers navigate through this new "information ecosystem" while making their travel related decisions, and how their choices in information sources ultimately influence their travel behaviour. Unfortunately, it is not well understood how traveller's choice of information channel affects their response to destination advertisements. Furthermore, as the travel decision is a composite of a number of decisions (i.e. trip facets) including where to visit, how to travel, where to stay, where to eat, and what to do, a clearer understanding is needed of how travellers respond to the information, that is the advertising, they see on the various online channels.

L. Cantoni and Z. Xiang (eds.), *Information and Communication Technologies in Tourism 2013*, DOI: 10.1007/978-3-642-36309-2_45,

## 2 Destination advertising, travel decisions and the Internet

Park, Nicolau, and Fesenmaier (2012) proposed the Destination Advertising Response (DAR) model as an improved framework that includes a range of factors affecting destination advertising response. In particular, the DAR model is a facets-based advertising model that considers the influence of advertisement on each major aspect of the trip decision process, and estimates each facet's contribution to overall visitor spending. The core part of the model is a four stage hierarchical process (see Figure 1). In the first stage, the potential traveller is exposed to destination advertising which results in the formation of an attitude towards that advertising. In the second stage this attitude towards the destination advertising influences the individual's attitude towards the destination. These first two stages are drawn from traditional advertising response models for consumer goods such as those developed by MacInnis and Jaworski (1989) and Mehta (1994).

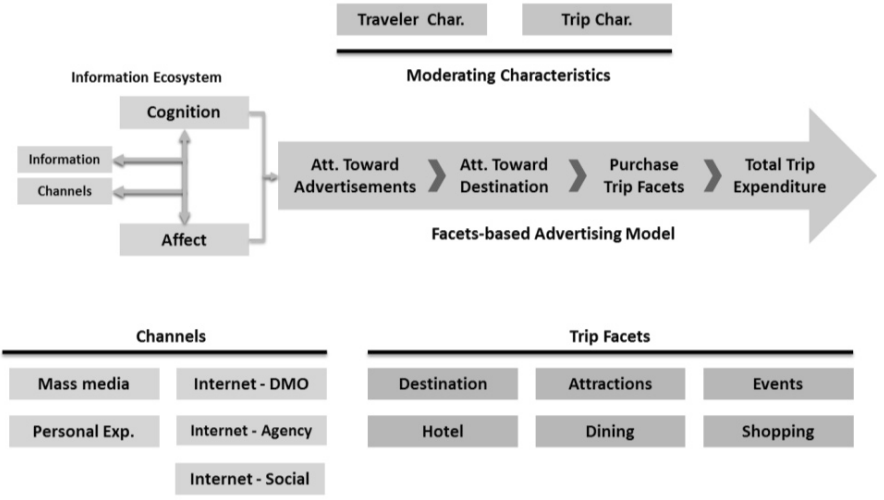


**Fig. 2:** The Destination Advertising Response (DAR) Model

The DAR model, however, differs from traditional advertising response models in the third stage where the potential traveller considers not only whether or not to visit the advertised destination, but also whether or not to make time for and/or purchase reservations for (or somehow plan for attending/participating in) individual trip components. Examples of individual trip components include overnight accommodations, attractions or special events that might be visited, restaurants that might be patronized and/or stores and shops at which the traveller might go shopping. These trip decisions typically follow a strong hierarchical structure whereby travel decisions of higher priority, such as destination and accommodations, are made in the

earlier stages of travel while decisions such as restaurants and shopping venues are postponed until arriving at the destination (Choi, Lehto, Morrison, & Jang, 2011). In the final stage of the DAR model, it is postulated that advertising response should be evaluated in terms of their overall contribution to total trip expenditures. Importantly, the model incorporates the role of traveller characteristics including travel party size and previous experience at the destination, and trip characteristics such as business versus leisure travel and length of trip in moderating the destination advertising response process, as these characteristics affect the relationships between advertising and the respective trip decisions (Moutinho, 1987).

Finally, the information ecosystem, which refers to the various information sources and channels in which individuals use to plan their trip, is considered an important moderator of the relationship between destination advertising and trip decisions (Grønflaten, 2009). Recently, Stienmetz, Park, and Fesenmaier (2012) demonstrated that travellers respond differentially to destination advertising in terms of their purchase of/attendance to attractions, restaurants, accommodations, event, shopping, and visitor centre visits as compared to destination choice. This study also found that visitor spending varied significantly for each of the travel components. What remains less understood, however, is the role (i.e., the use and impact) of the various online channels that travellers use in searching for and purchasing travel-related products.

## 3 Methods

The goals of this study are to: 1) better understand key differences in travellers who choose to use online information sources as compared to those who do not; 2) describe the extent to which online channels are used for making the trip related decisions; and 3) better understand how the various information sources and online channels influence destination advertising response and traveller behaviour.

Frequency analysis and cross tabulations using chi-square testing were first performed to identify the degree to which various information sources and online information channels were used for travel planning. Then using logistic regression analysis, the DAR advertising response model was estimated to identify the factors effecting whether or not (yes/no) travellers were influenced by the information they saw, heard or read for six major destination components (i.e., destination decision, attractions, restaurants, accommodations, events, and shopping) related to the destination. The same DAR-defined independent variables representing attitudes toward the information, traveller characteristics and trip characteristics were used for each of the six models. Additionally for this study, travellers' use of various information sources and online information channels were incorporated into the model estimation procedure.

Travellers' responses to destination advertising were obtained using an online survey of American travellers who had requested travel-related information as part of 40 destination marketing programs that were conducted by 20 different state and regional tourism offices located throughout the United States between March 2010 and September 2011. The web-based travel survey was distributed to all inquirers based upon the date of contact (within 3 months of the request for travel information) and the destination from which information was requested. It is important to note that the

advantages of online surveys (e.g., low cost, fast response, and wide accessibility of the Internet) enable tourism advertising researchers to send questions to the population of people who requested travel information, and, therefore, largely eliminate the use of complex structured sampling procedures (Hwang & Fesenmaier, 2004). It is argued, however, that this approach enables us to obtain a sizeable sample which ensures robustness of the parameter estimates (i.e., underlying behavioural response), which in turn enables us to evaluate the relative impact of the hypothesized variables on advertising response.

Respondent email addresses were obtained separately for each of the 40 destination advertising campaigns and in total 264,317 online surveys were successfully delivered to U.S. travellers age 18 years and older. This aspect of the methodology is important in that it avoids selection bias based on destination, which leads to a more precise analysis of tourist demand as it includes not only those people who travel and purchase, but also those who do not. In order to increase response rate, a three-step process was followed: 1) an initial invitation was sent out along with the URL of the survey; 2) four days later a reminder was delivered to those who had not completed the survey; and 3) the final request for participation was sent out to those who had not completed the survey one week later. A $100 Amazon.com gift card was provided to one randomly selected respondent for each destination as an incentive to participate in the study. These efforts resulted in 18,602 responses. However, after controlling for missing values the final data includes 17,785 usable responses, which represents a 6.7 per cent response rate.

It is also important to note several limitations to this approach. First, because of the relatively low response rate, the threat of a non-response bias exists. However following Park and Fesenmaier (2012) who used a two-step weighting scheme to estimate non-response bias in similar data, it is argued that any systematic bias which exists is typically limited to within ± 3 per cent of response estimates. Another concern is that the distribution of online channel users may be influenced by the online survey methodology used for data collection. While this is a valid concern, it is important to note that 96 per cent of American travellers use the Internet to plan their travel (U.S. Travel Association, 2012).

# 4 Results

## 4.1 Differences between online and offline travellers

Among the 17,785 respondents, 48.6 per cent visited the targeted destination at least once during this time, which equates to 8,650 respondents. Because this research focuses on assessing the influence of online information channel choice and destination response, these 8,650 respondents represent the base sample that is analysed. Of these, 74.5 per cent visited websites to research and request additional travel information about the destinations they visited, leaving 25.5 per cent of visitors not using websites for travel related information search.

Significant differences were found in the traveller characteristics between those that visited various destination related websites and those that did not. As can be seen in Table 1, major differences include previous experience with the destination

($\chi^2$=29.625, df=4, p=.000) age ($\chi^2$=37.087, df=5, p=.000), and household income ($\chi^2$=33.406, df=8, p=.000). There are also notably significant differences in the trip characteristics between those that saw websites and those that did not, in travel party size ($\chi^2$=36.320, df=3, p=.000), when the trip was planned ($\chi^2$=139.431, df=5, p=.000), the length of the trip ($\chi^2$=59.186, df=5, p=.000), and travel companions ($\chi^2$=27.146, df=5, p=.000). There was no significant difference, however, based on gender ($\chi^2$=.176, df=2, p=.675).

**Table 1:** Traveller/Trip Characteristics of Online Channel Users and Non Users

| | | Did Not Use Online Channels | Used Online Channels | Overall |
|---|---|---|---|---|
| **Previous destination experience** | Once | 10.4% | 13.1% | 12.4% |
| | 2 – 5 times | 38.6% | 39.2% | 39.1% |
| | 6 – 10 times | 18.1% | 20.6% | 19.9% |
| | 11 or more | 30.7% | 25.8% | 27.0% |
| | None | 2.2% | 1.3% | 1.5% |
| **Age** | 18 – 24 years | .9% | .7% | .7% |
| | 25 – 34 years | 4.8% | 5.1% | 5.0% |
| | 35 – 44 years | 10.0% | 11.2% | 10.9% |
| | 45 – 54 years | 25.4% | 28.1% | 27.4% |
| | 55 – 64 | 32.1% | 34.9% | 34.2% |
| | 65 or older | 26.8% | 20.0% | 21.7% |
| **Annual household income** | Less than $10,000 | 2.2% | 1.2% | 1.4% |
| | $10,000 to $19,999 | 3.0% | 1.9% | 2.2% |
| | $20,000 to $29,999 | 6.2% | 5.0% | 5.3% |
| | $30,000 to $39,999 | 10.3% | 8.3% | 8.8% |
| | $40,000 to $49,999 | 9.3% | 9.3% | 9.3% |
| | $50,000 to $59,999 | 12.4% | 11.2% | 11.5% |
| | $60,000 to $69,999 | 10.4% | 10.8% | 10.7% |
| | $70,000 to $79,999 | 9.7% | 11.5% | 11.0% |
| | $80,000 and over | 36.6% | 40.7% | 39.6% |
| **Gender** | Female | 61.6% | 62.1% | 62.0% |
| | Male | 38.4% | 37.9% | 38.0% |
| **When trip was planned** | Never planned | 6.6% | 2.5% | 3.6% |
| | Day of trip | 5.0% | 2.2% | 2.9% |
| | 1 – 6 Days before | 19.5% | 15.5% | 16.5% |
| | 1 – 4 weeks before | 31.7% | 34.8% | 34.0% |
| | 5 – 8 weeks before | 18.9% | 23.3% | 22.1% |
| | 3 months or longer | 18.4% | 21.6% | 20.8% |
| **Length of trip** | Day trip | 16.9% | 10.8% | 12.4% |
| | 1 night | 13.1% | 11.2% | 11.7% |
| | 2 nights | 24.8% | 27.8% | 27.1% |
| | 3 – 5 nights | 28.2% | 31.3% | 30.5% |
| | 6 -10 nights | 11.4% | 13.3% | 12.8% |
| | 11 or more nights | 5.6% | 5.5% | 5.5% |

### 4.2 The information ecosystem

Frequency analysis was conducted to identify the nature of the information used by travel planners in terms of the primary information sources and the online channels used for making the main trip decisions. The results of this analysis are summarized in Table 2.

**Table 2:** Frequency of Use of Information Sources by Travel Decision

| Travel Decision | Primary Information Source | Frequency of Use |
|---|---|---|
| **Whether to actually take the trip** | Personal experience | 54.6% |
| | State/local travel office | 4.3% |
| | TV/radio | .7% |
| | Magazine/newspaper | 1.9% |
| | Internet websites | 13.0% |
| | Friends/relatives | 21.9% |
| | Not sure | 3.6% |
| **Primary destinations visited** | Personal experience | 40.1% |
| | State/local travel office | 8.7% |
| | TV/radio | .7% |
| | Magazine/newspaper | 3.5% |
| | Internet websites | 20.5% |
| | Friends/relatives | 24.3% |
| | Not sure | 2.2% |
| **Places or attractions visited** | Personal experience | 32.1% |
| | State/local travel office | 13.6% |
| | TV/radio | 1.0% |
| | Magazine/newspaper | 5.3% |
| | Internet websites | 27.9% |
| | Friends/relatives | 17.2% |
| | Not sure | 2.9% |
| **Restaurants or shops visited** | Personal experience | 33.5% |
| | State/local travel office | 8.9% |
| | TV/radio | 1.1% |
| | Magazine/newspaper | 5.9% |
| | Internet websites | 21.6% |
| | Friends/relatives | 19.9% |
| | Not sure | 9.0% |
| **Overnight accommodation** | Personal experience | 29.8% |
| | State/local travel office | 6.7% |
| | TV/radio | .3% |
| | Magazine/newspaper | 1.9% |
| | Internet websites | 35.2% |
| | Friends/relatives | 17.4% |
| | Not sure | 8.7% |

In particular, Table 2 shows that personal experience is the most dominant information source in that it is the primary information source for most travel related

decisions; the one exception is the accommodation decision whereby Internet websites are the most popular source of primary information. The Internet appears to be an important secondary source for many aspects of the travel experience; friends and relatives are also another important source for destination information while other elements of the information ecosystem such as traditional TV, radio, and print media are less valued by travellers.

Frequency analyses were also conducted to identify the use of specific online channels by American travellers. Table 3 presents the frequency of use of the various online channels among those that use the Internet to plan travel (n=5,534). As shown in Table 3, not all online information channels are used equally. Websites provided by a city or an attraction were the most frequently used online channel (81.0%), followed by official websites (62.4%), and company websites such as airlines and hotels (53.0%). Web 2.0 channels that produce user generated content such as review sites, media sharing sites, and social networking sites were found to be the least popular online channels used for travel information. The results also indicate that beyond a primary source of information (i.e. the Internet), there are numerous online channels that American travellers use when making travel related decisions.

**Table 3:** Popularity of Online Channels for Travel Planning

| Type of Online Channel | Frequency of Use |
|---|---|
| Other sites provided by a city or attraction | 81.0% |
| Official Website | 62.4% |
| Company websites such as airlines or hotels | 53.0% |
| Review sites such as TripAdvisor.com | 38.2% |
| Online travel agency websites such as Expedia.com | 33.0% |
| Newspaper or magazine sites such as Conde Naste Traveller | 23.4% |
| Travel guidebook sites such as Fodors or Lonely Planet | 17.4% |
| Social networking sites such as Facebook.com | 16.1% |
| Media sharing sites such as YouTube.com | 8.5% |

Analyses were also conducted to assess the types of information sought. As can be seen in Table 4 there are many types of information sought through the online channels and seem to correspond directly with specific travel facet decisions.

**Table 4: Popularity Information Sought by Travellers Using Online Channels**

| Type of Information Sought | Frequency of Use |
|---|---|
| Info. about a certain city or place within destination | 87.1% |
| Attractions to visit in the destination | 85.3% |
| Things to do in the destination | 83.9% |
| Hotels or other types of accommodations | 75.3% |
| Maps and/or driving instructions | 72.9% |
| Dining and entertainment in the destination | 72.8% |
| Museums and other places to visit in the destination | 72.0% |
| Local events calendars | 68.5% |
| General aspects of the destination | 55.9% |
| Stores or other places to shop in the destination | 54.9% |
| Sports and/or other outdoor activities in the destination | 46.0% |
| Brochures that could be downloaded | 39.2% |

### 4.3 The role of primary information source and online channel choice and destination advertising response

The conversion rate for each destination facet was calculated as the ratio of those that were exposed to destination advertisements and those that were influenced by the advertisements to visit specifically featured destination facets (i.e. attractions, restaurants, hotels, events, and shopping). Table 5 summarizes the results of this analysis and indicates that choice of attractions and restaurants are the two facets that are most influenced by destination advertising while destination choice is the least influenced by destination advertisements.

**Table 5:** Probability of Advertising Influence on Trip Facet Decisions

| Trip Facet | Conversion Rate |
|---|---|
| Visiting a featured attraction | 70.8% |
| Visiting a featured restaurant | 53.0% |
| Staying at featured accommodations | 43.5% |
| Visiting a featured store or shop | 42.6% |
| Attending a featured event | 39.0% |
| Destination choice | 15.0% |

The last step of the study examined the impact of use of the various online channels on travel advertising response for each trip decision. Specifically, six logistic regression models were estimated in which advertising response (yes/no) for each facet (destination decision, attractions, restaurants, accommodations, events, and shopping) was the dependent variable. The six logistic regression analyses were estimated using a two-step procedure where the base model was first estimated which included the independent variables following the DAR framework: trip purpose, trip length, previous destination experience, travel party size, timing of trip planning, distance from destination, gender, age, and perceptions of the online channels. These core endogenous and exogenous variables were dummy coded (0/1).

As reported in Table 6, the results of the analyses indicate that while all base models are statistically significant improvements over the constant-only models, the core independent variables alone explain relatively little of the variation in overall response to destination advertising. Indeed, the core independent variables explain as little as 4.9 per cent of the variation in advertising response for destination decisions and as much as 11.3 per cent of the variation in advertising response for accommodation decisions.

**Table 6:** Logistic Regression Model Fit for each Destination Decision

| | Destination Decision | | | | | |
|---|---|---|---|---|---|---|
| | **Dest.** | **Attr.** | **Event** | **Shop** | **Rest.** | **Hotel** |
| **Core Model** | | | | | | |
| Pseudo $R^2$ | .049 | .115 | .101 | .063 | .064 | .113 |
| Chi-square, df=37 | 135.26*** | 401.96*** | 370.548*** | 231.74*** | 234.00*** | 423.35*** |
| **Extended Model** | | | | | | |
| Pseudo $R^2$ | .112 | .211 | .169 | .141 | .160 | .230 |
| Chi-square, df=52 | 317.09*** | 766.60*** | 637.00*8* | 530.82*** | 611.82*** | 901.42*** |
| Δ Pseudo $R^2$ | .063 | .096 | .068 | .078 | .096 | .117 |
| Δ Chi-square, df=15 | 181.83*** | 364.645*** | 266.46*** | 299.08 | 377.82*** | 478.06*** |

Note: ***p<.001

In the second step of the logistic regression analyses, variables were included which reflect dominance of various information sources (e.g., personal experience, state/local travel office, TV/radio, magazine/newspaper, Internet websites, and friend/relatives) in each of the trip decisions. Variables representing the use of the online channels (destination websites, other websites, online travel agencies, travel company websites, travel guidebook websites, newspaper and magazine websites, review websites, media sharing websites, and social networking websites) were also incorporated into the analyses. As seen in Table 5, the explanatory power for the extended online channel models increased significantly. The smallest improvement in explained variance (6.3 per cent) was found with the destination choice model, and the largest improvement in explained variance was found for the accommodation choice model (11.7 per cent).

The parameter estimates for each of the six extended models are reported in Table 7. In particular, the regression coefficients are reported in exponentiated form, and can be interpreted as the change in the odds ratio of advertisement response for every one unit change in the explanatory variable while holding all other variables constant. For example in the destination decision model, the weekend getaway variable is statistically significant and the exponentiated value of the coefficient is 1.36, indicating that if a traveller is taking a weekend getaway, then the likelihood of destination advertising influencing their destination choice increases by 36 per cent. Exponentianted coefficients with values less than one are interpreted as decreases in likelihood. For example, for attraction decisions, the length of stay – one night variable is statistically significant with an exponentiated value of .73. This can be

interpreted that if a traveller stays one night in the destination, he/she is 27 per cent less likely to be influenced by destination advertisements to visit a featured attraction.

Table 7 also shows that the variables which significantly affect the likelihood of advertisement response for each facet decision are different. Interestingly, it appears that the destination decision is influenced by information on very few online channels. For every one unit increase (on a scale of zero to five) in a traveller's preference of relying on personal experience to make travel planning decisions, there is a 20 per cent decrease in the likelihood that they will be influenced by advertisements to visit a destination. However, for every one unit increase in a traveller's preference to use state or local tourism offices as a primary information source there is a 27 per cent increase in the likelihood that they will be influenced by destination advertising. The two online channels that both positively change the likelihood of being influenced by advertising to visit a destination are destination websites (Exp(B) = 1.33) and newspaper websites (Exp(B) = 1.32).

Decisions to attend events, as well as places to go shopping and restaurants, are influenced substantially by online information. The results of the regression analyses indicate that there are seven online channels that have a statistically significant and positive impact on the likelihood of advertising response along with five, six, and six statistically significant primary sources of information for each of these facets respectively.

**Table 7:** Logistic Regression Analysis of Information Source and Online Channel on Facet-level Response to Destination Advertising

| | **Destination Decision** | | | | | |
|---|---|---|---|---|---|---|
| | **Dest.** | **Attr.** | **Event** | **Shop** | **Rest.** | **Hotel** |
| **Variable** | Exp(B) | Exp(B) | Exp(B) | Exp(B) | Exp(B) | Exp(B) |
| Constant | 0.37 | 0.17** | 0.07** | 0.03** | 0.05** | 0.01** |
| Vacation | 1.15 | 1.24* | 1.00 | 1.05 | 0.10 | 1.32** |
| Weekend Getaway | 1.36** | 1.52** | 1.45** | 1.17* | 1.24** | 1.49** |
| Special/sporting event | 0.75 | 1.25 | 3.32** | 0.91 | 0.89 | 1.04 |
| Visit family/friends | 1.11 | 0.87 | 1.03 | 1.15 | 1.05 | 0.91 |
| Business | 0.10 | 1.01 | 0.94 | 1.07 | 1.42* | 1.46* |
| One night | 0.98 | 0.73* | 0.78 | 0.66** | 0.90 | 2.58** |
| Two nights | 0.92 | 0.85 | 0.88 | 0.79* | 1.15 | 2.60** |
| 3-5 nights | 0.76 | 0.99 | 0.92 | 0.75* | 1.09 | 2.56** |
| 6-10 nights | 0.54** | 1.21 | 0.91 | 0.76 | 1.09 | 2.03** |
| 11+ nights | 0.41** | 0.83 | 0.88 | 0.86 | 0.96 | 1.66* |
| Once | 0.78 | 0.94 | 1.06 | 0.83 | 0.64 | 0.76 |
| Two to Five times | 0.69 | 0.96 | 1.28 | 0.94 | 0.76 | 1.00 |
| Six to Ten times | 0.75 | 0.94 | 1.37 | 1.02 | 0.86 | 0.86 |
| Eleven or more times | 0.49* | 1.07 | 1.76 | 1.05 | 0.90 | 0.79 |
| 2 people | 0.89 | 0.99 | 0.70** | 1.01 | 1.26 | 1.62** |
| 3-5 people | 1.17 | 1.37* | 0.80 | 1.08 | 1.25 | 1.64** |

| | Destination Decision | | | | | |
|---|---|---|---|---|---|---|
| | **Dest.** | **Attr.** | **Event** | **Shop** | **Rest.** | **Hotel** |
| 6+ people | 0.92 | 1.22 | 0.74 | 0.93 | 0.95 | 1.51* |
| Plan day of trip | 0.72 | 0.63 | 0.69 | 0.97 | 0.59 | 0.79 |
| Plan 1 -6 days before | 0.56* | 0.78 | 0.89 | 1.16 | 0.79 | 0.90 |
| Plan 1-4 weeks before | 0.55* | 0.62* | 0.89 | 0.90 | 0.70 | 0.73 |
| Plan 5-8 weeks before | 0.49** | 0.60* | 0.87 | 0.99 | 0.67 | 0.81 |
| Plan 3+ mo. Before | 0.45** | 0.47** | 0.97 | 0.80 | 0.65 | 0.68 |
| Lives next to state | 1.42** | 0.88 | 0.66** | 1.03 | 0.89 | 1.21* |
| Lives distant from state | 1.0 | 1.04 | 0.67** | 0.88 | 0.98 | 1.19 |
| Female | 0.92 | 1.03 | 1.07 | 1.19** | 1.12 | 1.11 |
| 18 – 24 years | 0.43 | 0.60 | 1.43 | 1.61 | 1.23 | 0.77 |
| 25 – 34 years | 1.28 | 0.71 | 0.72 | 0.67* | 0.78 | 0.75 |
| 35 – 44 years | 1.12 | 0.68** | 0.98 | 0.87 | 0.57** | 0.70 |
| 45 – 54 years | 1.15 | 0.83 | 1.06 | 1.11 | 0.86 | 1.02 |
| 55 – 64 years | 1.08 | 0.99 | 1.03 | 1.11 | 0.95 | 0.88 |
| Ad Attitude - Attractive | 0.93 | 0.99 | 0.87 | 0.85 | 1.23 | 1.09 |
| Ad Attitude - Shows features | 0.77 | 1.42* | 1.15 | 1.04 | 0.96 | 0.85 |
| Ad Attitude - Trustworthy | 1.07 | 1.41** | 1.19* | 1.27** | 1.19* | 1.12 |
| Ad Attitude - Think about dest. | 0.98 | 1.12 | 1.09 | 1.39** | 1.09 | 1.30* |
| Ad Attitude - Think about places in destinaton | 1.17 | 1.77** | 1.30 | 1.32* | 1.55** | 1.07 |
| Ad Attitude - Informative | 0.96 | 1.11 | 1.14 | 1.47** | 1.14 | 1.04 |
| Ad Attitude - Helpful | 1.30 | 1.48** | 0.94 | 1.05 | 1.07 | 1.69** |
| Online channel - dest. website | 1.33** | 1.64** | 1.34** | 1.28** | 1.37** | 1.00 |
| Online channel - other websites | 1.03 | 1.82** | 1.63** | 1.35** | 1.21* | 0.90 |
| Online channel - travel agency | 1.09 | 0.88 | 1.02 | 1.06 | 1.12 | 1.22** |
| Online channel - company website | 0.85 | 1.03 | 1.09 | 1.20** | 1.51** | 2.54** |
| Online channel - travel guidebook | 1.17 | 1.39** | 1.44** | 1.076 | 1.23* | 1.03 |
| Online channel - newspaper | 1.32** | 1.43** | 1.45** | 1.64** | 1.62** | 1.46** |
| Online channel - review site | 0.96 | 1.08 | 1.22** | 1.15* | 1.22** | 1.02 |
| Online channel - media share site | 0.90 | 1.25 | 1.29* | 1.32* | 1.16 | 1.13 |
| Online channel - social network | 1.16 | 1.36** | 1.57** | 1.74** | 1.59** | 1.28* |
| Info source - personal experience | 0.80** | 0.98 | 1.14* | 1.30** | 1.37** | 1.29** |
| Info source - state/local office | 1.27** | 1.46** | 1.31** | 1.56** | 1.51** | 1.65** |
| Info source - TV/radio | 1.12 | 1.13 | 1.25 | 1.43** | 1.57** | 1.15 |
| Info source - magazine/newpaper | 1.07 | 1.61** | 1.27** | 1.51** | 1.70** | 1.39** |
| Info source - Internet websites | 1.06 | 1.21** | 1.19** | 1.37** | 1.54** | 1.52** |
| Info source - friends/relatives | 0.88 | 1.09 | 1.14* | 1.31** | 1.35** | 1.20** |
| Pseudo $R^2$ | 0.112 | 0.211 | 0.169 | 0.141 | 0.160 | 0.230 |

Note: *p<.05, **p<.01

For events, the most important online channel is unofficial destination or city websites (Exp(B) = 1.63), followed by social networking sites (Exp(B) = 1.57). State or local tourism offices (Exp(B) = 1.31) are the most influential source of primary information for making event decisions. For shopping, the top online channels are social networking sites (Exp(B) = 1.74) and newspaper websites (Exp(B) = 1.64), while the top primary source of information is state or local tourism offices (Exp(B) = 1.56). For restaurant decisions, the most influential online channels are newspaper websites (Exp(B) = 1.62) and social networking sites (Exp(B) = 1.59), and the most influential source of information is magazines and newspapers (Exp(B) = 1.70).

Interestingly, the average number of online channels that influence traveller's decisions to visit a featured hotel or attraction is slightly less as compared to events, shopping, and restaurants. For attractions, five online channels influence the likelihood of advertisement response where the top two information sources are both official destination websites (Exp(B) = 1.82) and unofficial destination websites (Exp(B) = 1.64), and the most influential source of information is magazines and newspapers (Exp(B) = 1.61). There are four online channels that increase the likelihood of a traveller staying at featured accommodations; the top online channels are hotel websites (Exp(B) = 2.54) and newspaper websites (Exp(B) = 1.46), and the most influential information source is state and local tourism offices (Exp(B) = 1.65).

## 5 Conclusions

The results of this study indicate that there is a complex information ecosystem used by travellers to make a wide variety of facet-based trip decisions, and that different online channels are preferred for different types of decisions. The results of the logistic regression analyses confirm that when evaluated within the DAR framework, primary information sources and online channel choice can explain a significant amount of the variation in destination advertising response for each major facet decision. Further, the study indicates that there are important differences in traveller characteristics and trip characteristics that differentiate use of the Internet as a primary information source. Importantly, this study indicates that for each travel facet there is a unique profile of online channels that can be leveraged to increase the likelihood of positive response to destination advertising.

These results suggest industry professionals interested in increasing total overall advertising response should utilize newspapers and magazines as a primary source of information used by travellers. Also, friends and relatives remain a powerful source of information. These findings suggest that for both on and offline travellers, destination professionals may wish to adopt a customer relationship management strategy that considers the lifetime value of a visitor not only in terms of direct economic impact, but also in the indirect economic impact that comes from recommendations and referrals. Finally, the results indicate that destination marketers wishing to tailor their online marketing mix to maximise destination advertising response should develop distinctive and integrative strategies for each type of trip decision. For instance, while social networking sites may not be appropriate for trying to influence someone's decision to visit a destination, they may be quite effective in influencing travellers' behaviour while they are at the destination.

It is important to note that this research was conducted through a predictive lens; that is, the observed patterns in information source and online channel use that influences the likelihood of advertisement response that are reported here provide little explanation as to why certain information sources and channels are more likely than others to result in advertisement response. Also, a limitation of the logistic regression analysis conducted here is that interaction effects were not considered, though it is reasonable to expect that individuals use multiple information sources and online channel when planning their travel. Therefore, future researchers may want to examine the extent to which various explanatory variables and interaction terms explain variation in advertising response. Finally, some work has been done to investigate how situational factors such as trip phase mediate information search strategies, but more work in this area is needed. A better understanding of how online search strategy and channel choice impact traveller response to each facet decision during all phases of travel is needed.

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# A Methodology to Collect Information on Future Hotel Prices using Internet Distribution Systems

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## Abstract

Specialised Internet Distribution Systems (IDS) offer an opportunity to design a sound methodological framework to monitor, collect and process data on hotel prices. IDS publish real-time prices enabling automatized information gathering. Thus, representative market snapshots can be taken in a reliable, robust and cost-efficient way. A modelling hotel dynamic pricing system based on data collected from IDS is developed. It provides information about current and future hotel prices. As an application example, an isotonic model is used to show the day of the booking plays a significant role in price and availability when booking a hotel room within 15 days in advance.

**Keywords**: Hotel prices; Internet Distribution Systems; survey; futures prices.

## 1 Introduction

Competitive Intelligence based on Internet is one of the most robust trends that is triggering the awakening of a growing interest in the field of strategic management and eScience (Teo and Choo, 2001; du Toit, 2003). This concept integrates both technology and market surveillance. As result, it provides an excellent tool to anticipate and estimate consumer habits on a changing environment (Shih, Liu and Hsu, 2010).

In the field of Tourism, managers demand good information in order to make decisions. Competitive Intelligence organises the information, sorts it, and analyses and evaluates it providing easy and valuable information to final users. An essential aspect of the Competitive Intelligence in the area of tourism consists in pointing out the competitors and helps the manager with the following key questions: What is happening in the market? Which are the current trends? Who are the competitors? How are our products positioned in the minds of consumers? Which needs are important to consumers? Are the needs being met by the products on the market?

The implantation of Internet opens a wide and interesting point of view. The development of specialised webs offering a huge variety of tourism prices and services represents a new scenario, full of opportunities. Unfortunately, this phenomenon does also carry a dark side: an overload of information. Nowadays, an overload of information on the web due to the proliferation of Internet sales and the increase of marketing channels is being detected. As a result, current organizations

L. Cantoni and Z. Xiang (eds.), *Information and Communication Technologies in Tourism 2013*, DOI: 10.1007/978-3-642-36309-2_46,

cannot effectively manage or control the rapidly growing information utilizing traditional tools (Gretzel, 2011; Xiang and Gretzel, 2010).

In general, on the supply side, the most fundamental policy of service companies is based on pricing policies. Price is one of the most effective variables that managers can manipulate to encourage or discourage demand in the short run (Aziz, Saleh,, Rasmy and ElShishiny, 2011). In the case of hotel room rates, there are studies that analyse how the provider can change the price over time concerning hotel booking: Tso and Law (2005) observed different rates for the same product on different internet channels; Guadix, Cortés, Onieva and Muñuzuri, (2010) propose a model based on customer groups; and Abrate, Fraquelli, and Viglia, (2012) examine the inter-temporal pricing structure in a sample of European hotels. Concerning hotel prices index, there are two types of indicators: those ones calculated by National Statistical Institute, as Instituto Nacional de Estadística (2009), and those ones elaborated by private companies (Trivago, 2012; Expedia, 2012).

From a consumer point of view, dynamic pricing provides an opportunity to purchase products at different prices at different times. With electronic commerce, business can be conducted anywhere, at any time, especially in the field of tourism (Buhalis and Law, 2008). In such conditions, the decision of the customer to purchase airline seats or hotel rooms on the internet depends on several factors such as information quality (Wong and Law, 2005), time, past experiences (Kim and Kim, 2004) and frequency (Magnini and Karande, 2011). But the most important factor influencing hotel selection is price (Tanford, Raab, and Kim, 2012; Lockyer, 2005; Tso and Law, 2005); Noone and Mattila (2009) pointed out that willingness of customers to book depends on the price presentation on the internet.

In this context, customers choose a destination and then select accommodation based on price and available rooms (Wu, Zhang, and Fujiwara, 2011), using the most convenient distribution channel. Internet channels allow cost reduction in the final price, detailed information for consumers and the ability to instantly acquire the product (Ravinder, 2002; Kim and Kim, 2004). Specialised worldwide online hotel reservation agencies like Booking.com cover most of the top level category hotels and tourists use them surpassing other purchasing channels including travel agencies and telephone contacts (Wong and Law, 2005; Magnini and Karande, 2011). In particular, 46.2% of Spanish tourists and 49.0% of foreigners use these types of commercial distribution when travelling to Spain (Instituto de Estudios Turísticos, 2011a, 2011b).

Therefore, it seems natural to develop a specific tool that collects and analyses the internet information on hotel prices. Previous works concerning this topic like those of Abrate et al. (2012) or Tso and Law (2005) only cover case studies, but they do not provide a systematic methodology to deal with hotel prices. Official Statistical Institutes with a long experience in this field, like (Instituto Nacional de Estadística, 2009; Statistics Canada, 2012; Statistics New Zeland, 2011; Statistics Norway, 2012), are more focused on measuring past prices than in future prices. In this paper, a methodology to collect online hotel prices using Internet Distribution Systems is detailed in the next section. And an example of application analysing future prices are developed in the third section. Finally, the conclusion section points out the main innovation of this system with respect other approaches.

## 2 Methodology for collecting statistical data from Internet Distribution Systems

The IDS suppose an attractive channel for hotels that can use this online sales channels to offer an effective way to reach out and interact with consumers, any time the consumer wishes. The role of the IDS in the hotel market is so big that nowadays some businesses only accept reservations through them. Moreover, in situations of overbooking or rather elevated occupancy rates, on line reservations are definitively prioritized as opposed to phone bookings, which provide no assurance that such clients would eventually turn up. The fast rate at which this distribution system grew during the first decade of this century forced hotels that had not planned to sell online to join the system, even with the only purpose of keeping up with the competition.

One of the keys to IDS's success is that its partners are forced to offer their lowest prices through this site, allowing and rewarding their clients to report lower prices found elsewhere, punishing the hotels if such requisite is not met. Also booking.com's search engine offers results that by default are ordered depending on how much of the reservation commission a hotel shares with booking.com. Every hotel is required to share part of the income, but those willing to share more are shown first.

With this overall vision of the IDS mechanism, an underlying domain model was designed. The framework that determines the domain model for collecting hotel prices is the variability and behaviour of the hotels offer in terms of price and occupation in the Internet Distribution Systems (IDS). The domain model on the hotel offer includes the following facts or data items that are observed from the web in each sample: hotel name, hotel category (number of stars), standard double room rate, availability, location, request date, booking date and channel. Additionally, the number of bedplaces and main room facilities of the hotel are obtained from administrative registers. The collecting procedure is automatized. Every 24 hours, data is collected from IDS channels, processed, analysed and disseminated to stakeholders. Basically, it comprises the following phases. Figure 1 shows the entities, attributes relationships and phases of this domain.

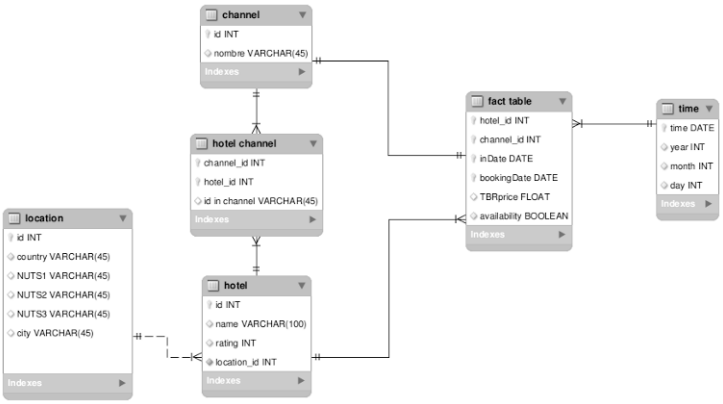



**Fig. 1.** Domain model diagram for collecting hotel prices.

The collecting procedure is automatized. Every 24 hours, data is collected from IDS channels, processed, analysed and disseminated to stakeholders. Basically, it comprises the following phases (Fig. 2).

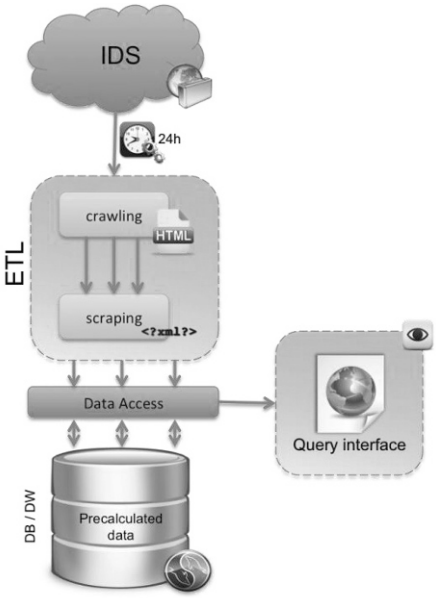



**Fig. 2.** Main phases for collecting and processing the data

The extraction step is based mainly on crawling techniques that perform searches queries on Internet Distribution System websites. The query begins by forming a special URL belonging to a certain IDS with added parameters depending on the specifics of that particular request. These searches will be for a specific place on a specific date, so these customizable parameters are the region id and the check-in date. If the IDS requires a check-out date this will be the day after the check-in date. The result of this page is a HTML page, the standard response for a web request. Usually the first request will not return all possible results since the amount of viewable results per page is finite. Therefore, additional requests are generated to retrieve information about all the hotels on that region

This response is converted to XHTML. The reason to transform HTML pages to XHTML is that even though both are tag languages that can describe the same, XHTML is much stricter. Whereas HTML can be dirty and malformed and still be considered valid, XHTML, being an extension of XML, follows stricter rules. Thus, it is easier to process XHTML documents by standard tools, like XPath expressions, because the document does not contain unexpected elements. The XHTML page is parsed to obtain certain pieces of information, such as the total number of hotels, the maximum amount of hotels viewable per request, prices of rooms and availability for the requested date. In general, data extracted by XPath expressions need some cleaning or processing, because this data is the same found in the original HTML

page and it is meant to be viewed by humans. A typical fail is that it is not atomic enough, mixing several pieces of data in the same tag, and it needed to be divided and filtered before proceeding to the next phase.

Finally, objects obtained in the scrapping step are loaded in the data base described in Fig. 1. As mentioned before, data regarding a specific region is collected once a day, asking for a double room and several days in advance. In general, it asks for the price and availability of an overnight for the following 28 days. That is, it checks out the future price variation and availability during the next month. This is a fact that improves official hotel prices indexes: Whereas these indexes analyse past prices (see, for instance, the methodologies of Instituto Nacional de Estadística (2009), Statistics Canada (2012), Statistics New Zeland (2011) or Statistics Norway (2012)), this just in time requests allow to know future prices.

## 3 Example of application: Hotel dynamic pricing

With this system it is very easy to collect huge information on hotel prices. Such data base allows different studies and applications (Alzua-Sorzabal et al, 2012). In this section we present a research note on future hotel price variation.

Room rates and availability vary from day to day. What sets markets with dynamic pricing apart from others is that discounts can be offered at any time without notice, whereas in the clothing sector, for example, there are pre-determined dates for sales and consumers know that they can find lower prices on products at those times. Luck or chance is therefore a determining factor in finding lower prices in online markets for products with dynamic pricing. Thus, it is pertinent to conduct studies such as this which try to reduce uncertainty and detect dynamic pricing behaviour patterns of products such as hotel rooms. This information enables consumers to optimise the waiting time before making a purchase (optimal patience) to obtain the best price, while reducing uncertainty and chance.

From a consumer point of view, dynamic pricing provides an opportunity to purchase products at different prices at different times. More specifically, the objective of this section is to detect the optimal time to purchase a hotel room once a destination is chosen. From the customer's point of view, does time play a significant role in price and availability when booking a hotel room? When should the tourist book the room: the day before, one month before, or is there no pattern in the dynamic pricing? To answer these research questions, mid- to high-end hotels in Bilbao, Spain, where observed for eight months between July 2011 and March 2012. For each of the 212 days in this period, the booking price for a double room was collected 28, 27,…, 0 days in advance via IDS channels. The IDS channels observed were Booking.com and Activehotels.es. Due to a failure in the crawling system, for two weeks in August some of the data was missing. Ultimately, the database contained a total of 133,368 valid records.

The average price considering different lags in the booking day was estimated. In particular, if $t_0$ represents the target day, ranged from July 2001 to March 2012, and $l$= -28,-27, ... , 0, then $p^l_{t0}$ is taken to be the geometric mean of the prices of a double room for the day $t_0$ when it was booked with $|l|$ advanced booking days.

For each day $t_0$, we define the price variation rate

$$\Delta_{t_0,l} = \left( \frac{p^0_{t_0}}{p^l_{t_0}} - 1 \right) \cdot 100 \qquad l = -28, -27, \ldots, 0$$

This rate represents the price variation (in percentage) that we would have if we wait until the target day instead of purchasing $|l|$ days in advance.

The effect of time lag for each day is given by

$$\Delta^{t_0,l+1}_{t_0,l} = \left( \frac{p^{l+1}_{t_0}}{p^l_{t_0}} - 1 \right) \cdot 100 \qquad l = -28, \ldots, -1$$

This rate measures the variation between two consecutive booking days in advance, in relative terms (percentage). The analysis of the evolution of both types of rate as a function of the number of advance booking days will show any pattern changes in the booking price. Therefore, we can obtain the optimal time of the purchase scenario.

Figure 3 shows the price variation rate $\Delta_{t0,l}$ for mid- to high-end hotels in the city of Bilbao. Our interest is to obtain a model that explains the price variation rate in terms of the booking day in advance,

$$\Delta_{t_0,l} = g(l) + \epsilon_{t_0,l} \qquad (1)$$

With $\epsilon_{t0,l}$ the error of the model.

In a simple linear model, the explanatory function $g$ can be estimated by the linear regression of the observed $\Delta_{t0,l}$. This model yields the following formula

$$\hat{g}_{linear}(l) = -0.64l + 6.16 \qquad (2)$$

Results are shown in Fig. 3.

The linear regression model assumes a constant increase of the variation rate for each day, which is obviously not a natural assumption. In particular, the estimation of the variation rate would strictly increase indefinitely when $|l|$ increases. Later we will give more reasons that disappointing the use of the linear model. Nevertheless, the model can be taken in advance in order to show a non-increasing trend between the lag and the price variation rate. Using this information, data can be modelled using isotonic regression techniques. An overview of these methods may be found in Barlow et al. (1972) or Robertson et al. (1988). New developments in estimation and testing hypotheses can be found in Colubi et al. (2006) or Wang and Li (2008). Some problems in the field of tourism management have been solved using these techniques (Torres et al., 2005; Torres and Domínguez-Menchero, 2006; Valdés et al., 2007). One of the main advantages in this context is that they split the time intervals where the price remains constant. This information is relevant to making an optimum purchasing decision.

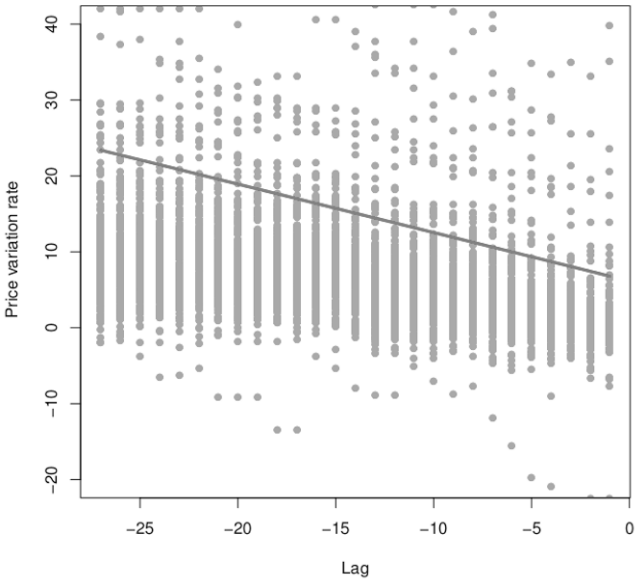



**Fig. 3.** Price variation rate in terms of the number of booking days in advance, with a linear regression model.

Thus, we can assume that the explanatory function $\mathrm{g}$ in Eq. 1 is non-increasing. Let $n_l$ be the number of observations of $\Delta_{t0,l}$ at lag $l$ for all target day $t_0$, and $\bar{I}_l$ the mean of the observations. Then, the isotonic estimator of $g$ is:

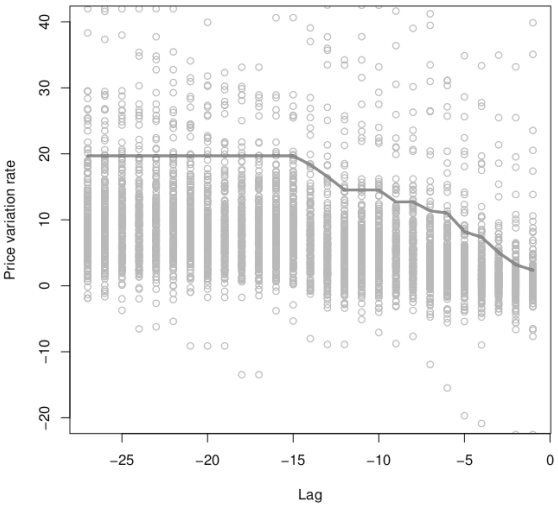
$$\hat{g}_{isotonic}(l) = \max_{j \geq l} \min_{i \leq l} \frac{\sum_{l=j}^{k} n_l \bar{I}_l}{\sum_{l=j}^{k} n_l} \qquad (3)$$

This expression is known as the max-min formula and the function is defined as lineal between adjacent points (Barlow et al., 1972). Some recent algorithms have been undertaken to process with additional restrictions in the field of tourism (Domínguez-Menchero and González-Rodríguez, 2007). In this research the R statistics language version 2.15 (R Development Core Team, 2011) was used. See de Leeuw et al. (2009) for further details of the implementation of this algorithm in R.

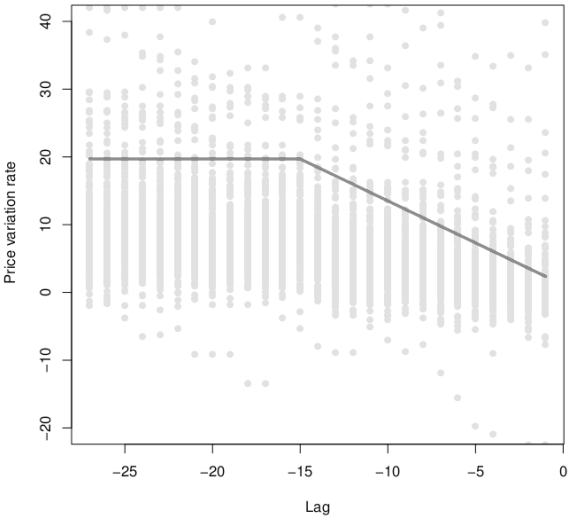
In practical applications, it is desirable to have an explicit equation which is as simple as possible. Since the isotonic regression is piecewise linear, its aspect can be simplified by eliminating small variations or constance intervals. In this case, we have considered a line between the points $(l, g_{antitonic}(l))$ with $l$=-15,-1. Therefore, the simplified two-piece isotonic model is:

$$\hat{g}(l) = \begin{cases} -1.24l + 101.12 & if\ l \leq -15 \\ 119.70 & if\ l \geq -15 \end{cases} \qquad (4)$$

In more complicated scenarios we can use the testing procedure described in Colubi et al. (2006) to check the suitability of the proposed simplification. Figure 4(a) shows the isotonic regression model and Figure 4(b), its simplified version.




(a) Original model




(b) Simplified two-piece model

**Fig. 4.** Isotonic regression model.

The analysis shows, in the first place, that up to 15 days prior to arrival the price tends to remain stable, as depicted in Figures 4(a) and 4(b). This can also be seen in Table 2, which shows the price variation rates. This table also shows the rates per day. If we calculate the geometric mean with $1 \leq l \leq 15$ we can see that for each day after the first 15 days the price goes up 1.21%.

If the customer's strategy is to wait to as long as possible to book, the best strategy would be to book exactly 15 days in advance. The data in Table 2 shows the outcome of any other decision.

**Table 2.** Main Price variation rates in function of the lag (%).

| **Lag** | **Rate variation** | | **Lag** | **Rate variation** | |
|---|---|---|---|---|---|
| $\|l\|$ | *Target day* | *Per day* | $\|l\|$ | *Target day* | *Per day* |
| 1 | 2.36 | 2.36 | 9 | 13.51 | 1.12 |
| 2 | 3.60 | 1.21 | 10 | 14.74 | 1.10 |
| 3 | 4.83 | 1.20 | 11 | 15.98 | 1.09 |
| 4 | 6.07 | 1.18 | 12 | 16.07 | 1.08 |
| 5 | 7.31 | 1.17 | 13 | 17.22 | 1.07 |
| 6 | 8.55 | 1.15 | 14 | 18.46 | 1.06 |
| 7 | 9.80 | 1.14 | 15 | 19.70 | 1.05 |
| 8 | 11.03 | 1.13 | $\geq$16 | 19.70 | 0.00 |

The results clearly reject other models such as the linear model, which, although simpler, are not capable of extracting the information obtained with the isotonic model presented here. More specifically, as mentioned earlier, a linear regression assumes a constant decrease in price as we move away from the target day, which is absurd. Even if we use it to decide about a short period of time it is useless. Suppose it is 30 days prior to arrival. The linear regression for the Bilbao statistics would mean a 0.75% price increase for every day we delay the booking, which is at considerable variance with the actual trend obtained from our model. Most notably, up to 15 days prior to arrival it predicts an 8.27% increase as compared to the 0.0% in our model. Linear regression would call for a sooner-the-better strategy, which, as described earlier, is not the most advantageous.

## 4 Conclusions

Several authors remark the importance of electronic commerce in the field of Tourism. On the one hand, some authors have used such channels to analyse the dynamic of hotel prices, but they do not develop an automatic system that monitors, collects, processes and disseminates such information. On the other hand, official statistical institutes have a broad experiencing analysing prices variation, but their methodologies do not focus on future prices and usually provide monthly aggregated data. The statistical framework developed in this paper allows an automatic procedure to collect information on hotel prices elsewhere. A representative sample of hotels and prices can be collected by gathering information from different IDSs, without

elevated costs in terms of time, human or economic resources. Moreover, this method provides future daily prices which are more relevant to stakeholders.

Concerning collecting data about future hotel prices, it is showed the day of booking plays a significant role in price and availability when booking a hotel room within 15 days in advance. Therefore, it is statistically significant to collect data one month in advance, regardless of further dates.

Future work will be centred on testing hotel prices of IDS channels with those provided by official statistical institutes and to verify the stability of the model's performance across a universe of periods.

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# Distribution Channels and Management in the Swiss Hotel Sector

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## Abstract

This research investigates how the hospitality sector in Switzerland has embraced the new world of (online) distribution. It analyses the role of existing distribution channels, and gives insights into channel management methods used. Data is gathered through an online survey among Swiss hotels resulting in 196 usable questionnaires. Findings show that direct booking channels remain the dominant sales tools in Switzerland, although their proportion in the distribution mix has been decreasing steadily in the last years. The Internet Distribution System channel reaches 16.4% and thus is the channel with the highest growth rate in 2011. A cluster analysis on multi-channel distribution strategies results in four groups: multi-channel distributors, electronic distributors, real time distributors, and traditional distributors. Further, it is shown that more than half of the hotels manage rates and availabilities manually and only one out of four hotels has implemented a channel manager able to manage different channels.

**Keywords:** hotel, distribution, channel management, Switzerland, OTA, IDS

## 1 Introduction

The Internet has been acknowledged as a powerful tool in terms of the whole marketing mix in tourism (D. Buhalis, 2003). Hence, it does not only provide opportunities in terms of product and service presentation, pricing, and promotion but it also offers selling opportunities including getting direct feedback from customers. In the hospitality industry Internet Distribution Systems (IDS) are playing a major role in selling hotels' allotments all over the world (Ku & Fan, 2009). In spite of the potential that the Internet provides, it has been exploited mostly by big international brands (O'Connor & Frew, 2002); many small and medium-sized enterprises (SME) in the hotel sector are challenged by the vast amount of opportunities and the variety of alternative distribution systems (Toh, Raven, & DeKay, 2011). Hoteliers of SMEs have generally been slow and reluctant in adopting and in investing in new technologies resulting in a loss of competitive advantage. Even if the growing importance of the Internet as a distribution channel is recognised (Li, Pan, Zhang, & Smith, 2009), many SMEs still not even fully exploit their own website – the most traditional online channel – as a tool for selling hotel rooms and as a way to gain

L. Cantoni and Z. Xiang (eds.), *Information and Communication Technologies in Tourism 2013*, DOI: 10.1007/978-3-642-36309-2_47,

competitive advantage (Law & Jogaratnam, 2005). Actually academic studies demonstrated that hotels' websites often lack quality for instance in terms of user-friendliness, navigational structure, content quality, and up-to-datedness (e.g., Chung & Law, 2003) resulting in poor online distribution power. Consequently many SMEs have to rely on third-party websites which allow users to compare different products across multiple suppliers (Rao & Smith, 2006). Furthermore, there are many studies dealing with the development of the Internet in the hospitality sector, e.g. website evaluation (Law & Cheung, 2006), intermediation and remediation (P. Brewer, Feinstein, & Bai, 2006), pricing (Tso & Law, 2005), and the potential of online distribution (Morosan & Jeong, 2008). However, there is hardly any research looking at (online) distribution channels in terms of multi-channel management or studying behavioural patterns of hoteliers on the operational level of the distribution process (e.g., Rong, Li, & Law, 2009).

## 2 Literature Review

The rise of Information Communication Technologies (ICTs) and especially the increasing importance of the Internet in the tourism domain radically reshaped the demand and supply practices within the whole industry (D. Buhalis, 2003); particularly focusing on hospitality, the Internet had an unprecedented impact on hotels' marketing and distribution (Law, 2009). Ever since the 1980s, ICTs have been changing the way in which business is conducted in the hospitality and tourism industries (e.g., Dimitrios Buhalis & Law, 2008; O'Connor & Frew, 2002): the development of Computer Reservation Systems (CRS – 1970s), Global Distribution Systems (GDS – 1980s), and the advent of the Internet (1990s) generated not only a paradigm shift but an actual change in the operational practices in the industry (Dimitrios Buhalis & Law, 2008; Ip, Leung, & Law, 2011). Already in 2009, PhoCusWright stated that in the last ten years the online travel market experienced a faster growth compared to the entire travel market; however, it is interesting to note that hoteliers have been quite reluctant in adopting new technologies (Law & Jogaratnam, 2005). As stated by Buhalis (2003, p.221) the lodging sector is "the most under-automated segment of the international travel industry" and hoteliers have been hesitant to use ICTs, and the vast advantages the web can bring to them "are yet to be implemented at property level" (D. Buhalis, 2003, p. 221). Lately, Morosan and Jeong (2008) noticed the slow but inexorable effort of hotel managers to keep up and bridge this technology gap. Hoteliers need some time to understand that the Internet emerged as a new marketing environment ready to accommodate the information-intensive characteristic of the industry (Morosan & Jeong, 2008), fostering customized marketing activities in general (Lau, Lee, Lam, & Ho, 2001), and engaging in sales activities by using cheaper online distribution channels in particular (O'Connor & Frew, 2004). This is true even if a substantial portion of hotel reservations continue to be accounted for by third parties which are not purely computer mediated such as direct connections with agencies and corporate clients (PriceWaterhouseCoopers, 2003).

In 2002 online distribution was already been seen as a promising progressive shift away from traditional sales channels (Kasavana & Singh, 2002; O'Connor & Frew, 2002). Brewer et al. (2006) identified and prioritized issues and challenges hotels can

face with online room distribution: (i) rate control, (ii) staff education, (iii) customer loyalty, (iv) hotel website interface, and (v) control of the hotel image. Recently, Toh, Raven, and DeKay (2011) summarized the main reasons pertaining to the growth of the Internet for hotel bookings: (i) the Internet is a valuable channel for intangible goods purchases, (ii) customers expect goods purchased on the Internet to be cheaper, (iii) the Internet allows for quick price comparisons and decreased search costs, and (iv) the Internet allows customers to bypass travel agencies and connect directly to the seller. Technology-mediated reservation represents a large part of hotel reservations (O'Connor & Frew, 2002), but there is no evidence that traditional channels (e.g. mail, phone and fax) – which are seen as inefficient and expensive by both hoteliers and final customers (O'Connor, 2001) – as well as travel agency mediated reservations are generally declining (Grønflaten, 2009; Hong-bumm, Seonok, & Hye-young, 2012). Therefore, the issue of the Online Travel Agencies (OTA), arisen in the 1990s (e.g. Expedia and Travelocity), is still crucial for the online distribution landscape. According to Kracht and Wang (2010, p.736) advances of ICT have "not reduced the number of intermediaries in the distribution channel, but rather resulted in an increasingly complex array of intermediaries." Online intermediaries have become more and more powerful and relevant for hotels in terms of Internet readiness (Morosan & Jeong, 2008) and in terms of economic force. This development puts hotels in the disadvantaged position of having to sell large portions of their offers at discounted rates and often with high commission rates through third party intermediaries (Carroll & Siguaw, 2003). However, considering that the Internet is the most powerful marketing tool in the hospitality industry online pricing strategies must not be controlled by third party distribution channels but by hoteliers because they understand consumer behavior and their willingness to pay (Enz, 2003). Discussions about pricing and online distribution have been led by academics (e.g., Enz, 2003; Kracht & Wang, 2010) but also industry and consultancy companies reflect on these topics. Given the rapid evolution of the online travel market in the past few years, the large majority of members of the Swiss hotel industry association (*hotelleriesuisse*) has launched their own website and become involved in online sales. Since 2003, regular surveys have been carried out among the members of *hotelleriesuisse* to analyze the influence of ICT on the distribution in the hotel industry (Schegg & Fux, 2010).

Given the context described above, this paper aims at investigating the distribution pattern and challenges in Switzerland, particularly focusing on the following research questions:

*RQ1: What are the predominant booking channels for hotels in Switzerland?*
- *RQ1.1: What is the role of online distribution channels for the Swiss hospitality market?*
- *RQ1.2: Are there differences between hoteliers concerning the mix of distribution channels?*
- *RQ1.3: How do hoteliers select/evaluate distribution channels?*

*RQ2: How do Swiss hoteliers manage distribution – are there differences in terms of how various clusters of hoteliers approach price- and availability-management?*

# 3 Research Design

## 3.1 Data collection

An online questionnaire has been developed. It contains one question concerning how bookings are distributed among available direct (telephone, fax, walk-in, etc.) and indirect (tour operator, tourism office, GDS, OTA etc.) distribution channels; hoteliers specified how much each channel accounts for in percentages. One question asks for the market shares of used OTA such as Booking.com, Expedia, and HRS. Further questions query if hoteliers offer price parity on diverse channels; how much commission they pay, and selection criteria for OTA. Next, hoteliers are asked if they manage online distribution channels manually, by using software, a hotel reservation system, an agency, or other possibilities. The final part comprises questions about star rating, the size of the hotel in terms of rooms offered, amount of overnight stays, its location, main target group (i.e., leisure or business travelers), and amount of opening days in the year 2011. The Institute of Tourism of the University of Applied Sciences of Western Switzerland (HES-SO Valais) was responsible for data collection. In collaboration with *hotelleriesuisse* the online survey was sent to 2,035 Swiss hotels, which are all members of *hotelleriesuisse*. In 2010, the tourist accommodation statistics reported an annual average of 4,827 open hotels and health establishments in Switzerland; corresponding to 128,865 rooms and 245,251 beds available (Federal Statistical Office, 2011). Members of *hotelleriesuisse* represent 65% of hotel beds and generate 77% of overnight stays in Switzerland. Data gathering was conducted between December 2011 and January 2012; hence, the data is representing the year 2011.

## 3.2 Data Analysis

Data is analysed in a descriptive way answering the above mentioned research questions. In order to identify different segments the Typology Representing Network TRN-32 toolkit (Mazanec, 2008), which implements the neural gas algorithm, is used (Martinetz & Schulten, 1991). Two cluster analysis trainings have been accomplished. The segmentation basis for the first one is usage of various channels of distribution, i.e., traditional distribution (telephone, fax, letters, walk-ins), electronic requests (e-mail, web booking form), online booking (GDS, IDS/OTA, direct booking on hotel website, hotel chains with CRS, social media), and tourism partners (tour operators, DMO national-local, event & conference organizers). The basis for the second a posteriori analysis is distribution channel management approaches. In order to profile the clusters ANOVAs and cross-tabs applying Monte Carlo simulation to account for cells with low counts are applied (95% confidence interval; number of samples: 10,000).

# 4 Results

## 4.1 Sample description

The response rate of the online survey was 10.1% (n=201). After data cleaning 196 questionnaires were considered for the analysis. Demographically respondents can be classified in the following categories: 10.3% one to two star hotels, 53.8% have three stars, 19.0% four stars, 4.9% five star hotels, and 12.0% are not rated or have no stars.

The structure of the sample reflects the situation in the population of members of *hotelleriesuisse* very well (e.g., the proportion of Swiss three star hotels is 53.0%). On average hotels have 49.8 rooms while the smallest hotel has 6 rooms and the largest 600. In terms of opening days the mean is 320.3. Half of all hotels indicated being a resort hotel and 34.7% said to be a city hotel. 61.7% specified leisure travellers as their main target group; 32.7% focus on business travellers.

### 4.2 Predominant booking channels (RQ1)

Direct booking channels (telephone, fax, walk-ins, e-mail, form or booking engine on own website) are the dominant sales tools for the hotels (67.0%) in Switzerland (Fig. 1). Traditional booking channels are playing an important role within the sample: telephone, fax, letters, walk-ins account for 29.6% of the total reservations followed by email (23.4%). On average, today 26.3% of bookings in Switzerland are generated electronically in real-time through IDS/OTA (16.4%), Internet booking engines on hotel websites (6.3%), GDS (2.1%), CRS of hotel chains and hotel cooperations (1.5%) or social media platforms (0.1%). About one quarter of all enterprises generate more than 30% of all sales through IDS whereas 18% of the hotels get between 20% and 30% of the bookings through this channel.

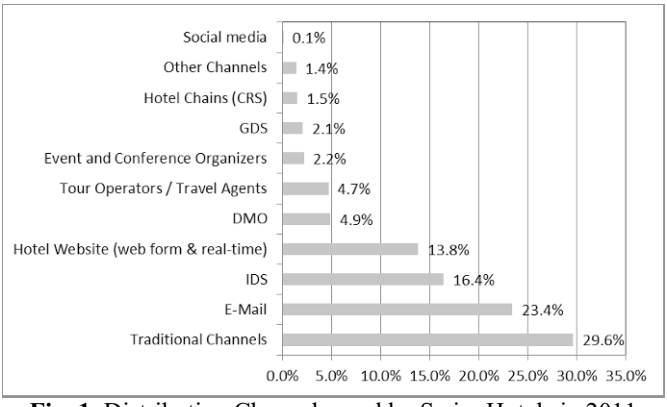


**Fig. 1.** Distribution Channels used by Swiss Hotels in 2011

Looking in more detail at the IDS channel, it can be observed that Booking.com (52.3%) is the most popular online distribution channel for Swiss hoteliers followed by HRS (9.4%) which also owns Hotels.de (3.9%) and Tiscover (0.4%). In 2011, classical intermediaries (such as tourism organizations or tour operators) accounted for 12.5% of all bookings.

The clustering procedure based on how hoteliers tap potential of traditional channels, electronic inquiries, online bookings, and if they still take advantage of tourism partners (RQ1.2) results in four distinct segments with a weighted simple structure index (wSSI) of 0.48. The uncertainty reduction for 50 replications yields 96.57%. The following cluster descriptions are based on the prototype tables provided by TRN32 (Mazanec, 2008). There are significant differences between the groups concerning, the location of the hotel ($p=0.003$), and with respect to whether a hotel

focuses on business or leisure travellers (p=0.007). Regarding the star-rating category the p-value is 0.057; thus, it is not significant at a 95% confidence level. Variance analysis shows significant results for the amount of opening days (p=0.011) and the amount of rooms available (p=0.003). Descriptions of the groups (cluster sizes in brackets) are presented below (please refer to Table 1 for further details):

**Table 1.** Profiles of distribution channel clusters

| | Multi-channel (36.22%) | Electronic (27.55%) | Real time (13.78%) | Traditional (22.45%) |
|---|---|---|---|---|
| Ø amount of rooms | 71.4 | 33.1 | 32.7 | 43.6 |
| Ø number of opening days | 332.2 | 313.0 | 339.0 | 297.4 |
| Share of leisure guests | 60.6% | 80.8% | 64.0% | 46.5% |
| Share of city hotels | 50.7% | 18.5% | 44.0% | 27.3% |

- *Multi-channel distributors* (36.22%): This group taps full potential of all possible distribution channels. In more detail, they take equal advantage of traditional distribution channels (i.e., telephone, fax, letter, and walk-ins), electronic inquiries via e-mail and reservation from, real-time online reservation (i.e., GDS, IDS, real-time booking via the hotel's website, CRS, and Social Media), and tourism partners such as tour operators, travel agencies, and DMOs. The majority of hotels located in cities belong to this group and on average these are the largest hotels offering 71.4 rooms.
- *Electronic distributors* (27.55%): The by far most important channels of distribution are email and online reservation forms on the hotel website. However, this majority of electronic requests is supplemented by reservations through traditional channels. Concerning location this group is characterised mainly by resort hotels.
- *Real time distributors* (13.78%): This group highly relies on online reservations in real-time. All other channels do play a minor role only. 64.0% of hoteliers dealing with this distribution approach are mainly addressing leisure travellers and nearly half of the hotels are located in cities.
- *Traditional distributors* (22.45%): Compared to "Electronic distributors" this group also takes advantage of electronic requests but the majority of reservations are done via the traditional channels namely telephone, fax, letter, and walk-ins. The majority of this group are resort hotels focusing on leisure and business travellers.

The main criteria for choosing a certain internet distribution system (see RQ1.3) is its sales strength, that means the hotels are looking for players with high booking volumes and strong marketing activities which are popular among customers in the target markets (important to very important for 94.7%). Other important factors are the popularity of the platform in the target market (91.0%) and its marketing strength and/ or market presence (89.5%). It is of interest to note that hotel presentation (i.e. pictures, video, texts, and maps) is important but it ranks below the first positions

(77.2%); the same is true for costs (i.e., fees and commissions – 82.3%) and booking technology (74.9%). Other dimensions related to technology, support, additional benefits, administrative issues rank in low positions (Fig. 2).

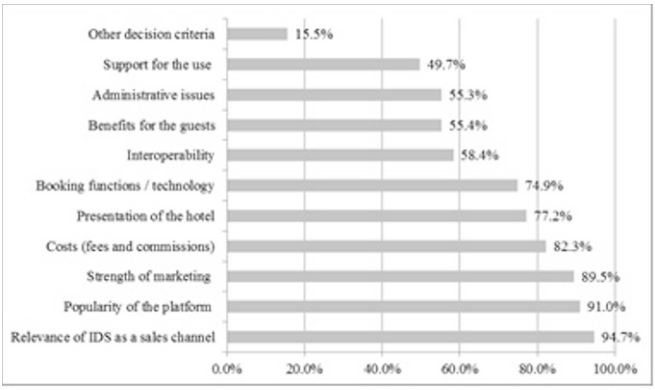


**Fig. 2.** Reasons to choose an Internet Distribution System

### 4.3 Management of distribution channels (RQ2)

When asked about their self-managed channels (RQ2), Swiss hoteliers responded as follows: 79.1% have their own website and half of them (50.8%) use an own Internet booking engine on their website. Addressing new forms of distribution such as mobile and social media channels, the answers are quite astonishing: Only 18.4% of the interviewed hoteliers have a mobile version of the website, 8.0% have got a dedicated mobile application, and 54.2% have a Facebook page. More than half of the questioned hotels (56.1%) manage their rates and availabilities manually on Internet booking platforms. There is an above-average use of "channel manager" software in 4-5 star hotels, hotel chains, business hotels as well as urban hotels. Only one out of four hotels has implemented a "channel manager" (40.3%) able to manage different distribution channels with the result of 16.9% of hoteliers selling their products on several channels offering different rates. The clustering procedure based on various modes of managing multi-channel distribution (RQ2.1) results into five groups with a wSSI of 0.80. The uncertainty reduction for 50 replications yields 92.40%. There are significant differences between the groups concerning the amount of nights sold in the year 2011 ($p=0.021$), the location of the hotel ($p=0.007$), and the star rating category ($p=0.020$). ANOVAs also show differences for the amount of opening days ($p=0.006$) and the number of rooms available ($p=0.015$). There is no evidence for a difference with respect to whether a hotel focuses on business or leisure travellers ($p=0.183$). Please note the group size of the five clusters is provided in brackets (see also Table 2 for more details).

- *Pure manual management* (44.90%): This group – which is the largest of the five segments - handles channel management completely manually and does not make use of any other approach at all.

- *Semi-manual management* (8.67%): This segment also manages channels manually but in combination with hotel IT systems (front office and/ or CRS). This approach is no option for five star hotels and one to two star hotels don't go for it either.
- *Channel management* (28.57%): This segment trusts in channel manager systems but some also manage channels manually which could be interpreted as manual checks of the software results. This is the predominant way for city hotels and hotels that have sold more than 20,000 nights in 2011.
- *Hotel IT management* (11.22%): This group relies strongly on hotel software systems such as the front office or CRS to manage rate and availabilities in multiple channels but also highly trusts in channel managers. Hotels belonging to this group are generally city hotels and have sold more than 10,000 nights in 2011. The segment is characterized by a high proportion of five star hotels, an average size of 68.1 rooms, and 353.2 open days per year.
- *Outsourced Management* (6.63%): This smallest group of hoteliers outsources the channel management task to an agency.

A cross-tab between usage of distribution channel clusters and channel management clusters shows significant results ($p<0.001$) indicating that more than 40% of the "Multi-channel distributors" manage distribution channels using channel management software. 46.2% of hoteliers who outsource channel management and 59.1% of "Hotel IT management" are "Multi-channel distributors". 75.9% of "Electronic distributors" do "Pure manual management" and more than half of "Traditional distributors" are composed by "Pure manual channel management".

**Table 2.** Profiles of channel management clusters

| | Pure manual (44.90%) | Semi-manual (8.67%) | Channel (28.57%) | Hotel IT (11.22%) | Outsourced (6.63%) |
|---|---|---|---|---|---|
| Ø amount rooms | 32.8 | 51.5 | 67.6 | 68.1 | 52.5 |
| Ø number opening days | 302.6 | 330.8 | 329.5 | 353.2 | 325.0 |
| Share of 4-5* hotels | 13.1% | 20.0% | 32.6% | 30.0% | 41.7% |
| Share of city hotels | 19.8% | 41.2% | 49.1% | 57.1% | 38.5% |

## 5 Discussion and conclusion

Comparing predominant booking channels revealed in this study (RQ1) with data mentioned in a German-speaking publication by Schegg and Fux in 2010 shows that direct booking channels (telephone, fax, walk-ins, e-mail, form or booking engine on own website) have been remaining the dominant sales tools for Swiss hotels (67.0% in 2011 compared to 75.4% in 2002) since 2002. Their proportion in the distribution mix has been steadily decreasing though (Schegg & Fux, 2010). The trend towards online booking channels is unbroken (RQ1.1). The sales channel with the highest growth rate is IDS which could multiply its market share within the last five years. What also emerges from the data is that in Switzerland online distribution is

dominated by Booking.com (52.3% of the IDS channel). Table 3 summarizes the development in the course of time.

**Table 3.** Evolution of booking shares in hotel distribution channels (data: Schegg & Fux, 2010 and present study)

| Distribution Channels (2002 - 2011) | 2002 (n=202) | 2005 (n=94) | 2006 (n=100) | 2008 (n=184) | 2009 (n=198) | 2010 (n=211) | 2011 (n=196) |
|---|---|---|---|---|---|---|---|
| Traditional Channles | 44.0% | 42.8% | 35.6% | 35.9% | 31.2% | 30.2% | 29.6% |
| E-Mail | 16.7% | 23.2% | 25.5% | 26.2% | 27.4% | 25.7% | 23.4% |
| IDS | 2.2% | 3.0% | 4.0% | 5.7% | 10.6% | 13.6% | 16.4% |
| Hotel Website | 12.6% | 11.1% | 13.8% | 13.3% | 12.7% | 15.2% | 13.8% |
| DMO | 5.8% | 6.1% | 6.5% | 6.1% | 5.1% | 6.2% | 4.9% |
| Tour Operators / Travel Agents | 9.8% | 7.1% | 6.3% | 6.7% | 7.4% | 4.4% | 4.7% |
| Event and Conference Organizers | 3.3% | 2.9% | 2.8% | 2.5% | 2.4% | 1.7% | 2.2% |
| GDS | 2.1% | 1.7% | 3.1% | 2.4% | 2.0% | 1.4% | 2.1% |
| Hotel Chains (CRS) | 2.3% | 1.6% | 1.5% | 1.0% | 0.9% | 1.3% | 1.5% |
| Other Channel | 0.6% | 0.4% | 0.5% | 0.3% | 0.2% | 0.3% | 1.4% |
| Social media | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.1% |

Further, market shares of the classical intermediaries (i.e. DMO, tour operators, travel agents, event organizers) have been declining over the last years and reached just 12.5% of all bookings in 2011 compared with 19% in 2002 (Schegg & Fux, 2010). The importance of travel agents and tour operators in the Swiss market has been nearly halved in nine years (from 9.8% in 2002 to 4.7% in 2011). The market share of the tourism organizations has been slightly declining over the last years and is now below 5% of all bookings. Generally, the discussion about cooperation among different stakeholders within the destination leading to a successful strategic and operational marketing is vivid (Bornhorst, Brent Ritchie, & Sheehan, 2010; Sheehan, Ritchie, & Hudson, 2007), especially when dealing with the use of ICTs (Dimitrios Buhalis, 2000; Fernández, Cala, & Domecq, 2011; Gretzel, Yuan, & Fesenmaier, 2000). This is a source for debates also in Swiss tourism destinations. Many hotels question the sense of using an expensive destination management system (DMS) by the local or regional tourism organisations which generates relatively few booking, loses market shares and cannot cope with the big international players in terms of marketing, technology, and strategy. Data of the present study also shows that "strength of marketing", "popularity of the platform" and "relevance of the IDS as sale channels" are the first three key factors that Swiss hoteliers pointed out for choosing an adequate IDS (RQ1.3), thus supporting the ongoing discussion between Swiss destination managers and hoteliers. Today SME hoteliers are challenged by methods available to manage multiple channels, but they also struggle with decisions regarding which channels to use. The cluster analyses show that in the Swiss hotel market many enterprises already heavily rely on multi-channel distribution (36.22%; RQ1.2) but they often still focus on a pure manual management of the various channels (44.90%; RQ2). The latter observation is in line with results from an US

survey in 2004 showing that 64% of represented properties' (n=209) channels were managed manually making real-time decisions difficult (K. P. Brewer & Kang, 2004). According to these authors many independent operators state that maintaining channels is a huge challenge because they lack experienced staff and do not have enough time for this task and they fear to lose control over the rate, inventory, or property descriptions across various channels. Thus, implications for practitioners at Swiss level are twofold: First, destination managers assisting hoteliers pertaining to sales should be aware about hoteliers' challenges and decision making process while choosing a distribution system that matches distribution strategies accordingly. Second, hoteliers should foster their presence and their management of the different channels, in particular concerning Internet distribution channels in order to save time, money, and resources. It is highly recommended to improve the coordination of the online (and offline) selling presence also in terms of rates offered. The challenges of the increasingly complex distribution with respect to rates on multiple channels and updating and coordination of room availabilities can be solved by using channel managers or modern front office systems that interface with IDS and GDS. These systems automatically update availabilities. To be competitive in a dynamic and global business environment, hotels need to increase their competencies with respect to the use of the new media (e.g., online marketing, social media, and website). At the same time hotels have to strive for cost efficiency, for example by stimulating direct bookings (e.g., via their web booking engine). Future work on the topic has to focus on more rigorous time series analysis in order to reveal developments also in terms of changing patterns regarding distribution management strategies. Moreover, the growing power of OTA/ IDS and the possible dependency of hotels is a recurrent topic in the industry and raise fundamental questions which should be addressed by academia: Can or should the (fragmented) hotel sector fight against an oligopoly of global booking portals? Is the increasing power of the "new online" intermediaries a thread (e.g., unfair market practices, high commissions, and decreasing profit margins) or an opportunity (e.g., efficient global online market reach) for individual hotels? Another research stream should focus on the performance and in particular on profitability of different distribution strategies.

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# Erratum to: What did they say about us? Message Cues and Destination Reputation in Social Media

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**Erratum to:**
**Chapter "What did they say about us? Message Cues and Destination Reputation in Social Media" in: L. Cantoni and Z. Xiang (Eds.), *Information and Communication Technologies in Tourism 2013*, https://doi.org/10.1007/978-3-642-36309-2_15**

In the original contribution the names of the authors were misspelled.

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The updated online version of this chapter can be found at
https://doi.org/10.1007/978-3-642-36309-2_15

L. Cantoni and Z. Xiang (eds.), *Information and Communication Technologies in Tourism 2013*, DOI: 10.1007/978-3-642-36309-2_48,