**Journal of Theoretical and Applied Electronic Commerce Research**
ISSN 0718–1876 Electronic Version
VOL 16 / ISSUE 1 / JANUARY 2021 / 18-36
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This paper is available online at
www.jtaer.com
DOI: 10.4067/S0718-18762021000100103

# Indicators of Website Features in the User Experience of E-Tourism Search and Metasearch Engines

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Received 30 May 2019; received in revised form 23 September 2019; accepted 10 December 2019

**Abstract**

The continuous growth of e-commerce, combined with new trends in the tourism sector, creates an imperative to conduct analyses and establish suitable models for improving the experience of users who seek tourism products online, using search and metasearch engines. However, few studies analyze web design variables and their impacts on the user experience. Therefore, the present study aims to investigate the influence of content, usability, functionality, and branding for determining user experiences with search engines and metasearch engines dedicated to tourism. The methodology used in this research followed a mixed approach to fulfill the proposed dual perspective, that is, to collect data from websites and evaluate the user experience. To determine the variables to be modeled, the authors use a General Additive Model. Main results reveal two determinant factors that enhance the user experience: usability and branding. With this foundation, this study proposes basic premises of the digital strategy that tourism platforms should follow. As implications for the tourism sector, suggest that e-commerce search and metasearch engines in the tourism industry should devote substantial efforts to implementing interactivity, memorability, personalization, privacy, and security.

**Keywords:** User experience, E-commerce, Tourism search and metasearch engines, GAM

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# 1 Introduction

Access to the use of the Internet produces changes throughout people's daily lives. In the economic sphere, online marketing and the growth of electronic commerce (e-commerce) have altered how business gets conducted, everywhere around the world. With this tool, companies have gained a new way to perform tasks, interact with users, and manage their business [112]. Specifically, in the tourism industry, e-commerce has gained substantial and still growing prominence. According to the European Union report [50] the second more common online purchases during year to the 2016 survey was travel and holiday accommodation (52 % of e-shoppers in the EU). In turn, e-commerce has had significant effects on how tourism goods and services are sold [5], [107], and its adoption and use in the tourism industry has created new opportunities to introduce innovative management practices. Moreover, e-commerce seems likely to continue to grow, due to its potential to reduce costs, enable global coverage, expand the customer base, and improve productivity [30]. From a demand perspective, the number of tourists who use the Internet to search for information and make online reservations provides clear evidence of the popularity of e-commerce among tourists [51], [83]. Some impacts of internet use on travel planning behaviours have been identified in different researches, and for instance, these users tend to spend more in the destination [21], [90] and they consider more destinations [22] compared to those who consult other information sources. Although, friends, family or colleagues and online sources are critical for travel inspiration with a total of 56% of users, 74% of leisure travellers and 77% of business travellers using internet as a planning source [69]. Social networking, video or photo sites are the most popular (83%) along with the search engines with 61%. Search engines are the most popular online planning source for 60% of travellers and the second most popular for 55% of business travellers. Clearly, users tend increasingly to booking online, representing 87% (70% do so via computer, 38% via smart phone and 17% via tablet) and 29% do so via phone call [69]. Phocuswright [107] estimated that the online travel sector to reach $540bn in 2017, up 8% and with $38bn incremental growth, with a gross booking reached of $1.6 trillion (include airline, hotel, car rental, rail, travel package and cruise), making it one of the largest and fastest growing sector in the world, where the online travel agencies (OTAs) are the key. E-commerce supports not only buying and selling but also a wide range of pre-purchase activities [58], such as searching for information about tourist activities or gathering recommendations [70]. In this context, research into online information searches [71] has expanded substantially, especially in the travel and tourism field [103]. In particular, a key question pertains to how best to ensure that users can locate correct and relevant travel and tourism information within the online tourism domain [140], spanning the online space that can be accessed from users' preferred Internet gateways, in the form of search and metasearch engines.

In particular, approximately 70% of online tourism consumers start their search before deciding where or how they want to travel [70]. These new consumer habits generate new action models. For example, tourism websites now provide means for tourism organizations to promote their products and communicate with actual or potential tourists [128]. These websites represent key sources of information for tourists before they arrive at their destination and during their trip too [32], [122], in which sense tourism websites increasingly function as marketing tools [85]. In this role, they promote offerings and provide an important distribution channel for domestic and international tourism [85]. The new intermediaries can be classified into three main groups: metasearch engines (e.g., Trivago that combines more than 260 search engines), search engines (e.g., Airbnb), and social channels (e.g., Facebook, Twitter Instagram) although this acts more as a search for information than an e-commerce channel [140]. The difference between search engines and metasearch engines is that the latter provide comparison functions, by searching across many engines and browsers, but they do not have their own database. Metasearch engines enable website users to search across several search engines and web directories simultaneously and help them find more results without requiring them to move through multiple search engines [63]. Their influence on tourist decisions is growing [69], such that 59% of tourists say that these engines are their preferred sources for travel ideas, information, and comparisons, mainly in relation to airlines, hotels, and car rentals [69]. Despite this growing importance in practice, for both tourism [103] and marketing [125], specific insights about these technological tools in relation to tourism industries in different destinations and sectors remain lacking [142]. Therefore, the current study analyzes how the content, usability, functionality, and branding of search engines and metasearch engines affect the user experience in e-commerce tourism. A literature review first establishes which attributes of web design are relevant to users' experience. The analysis of possible relationships then suggests ways to improve the benefits websites, reflecting the preferences and usage habits of online tourism users.

As its main contribution, this research tries to establish the principal user preference factors of the tourism e-commerce websites, and their attributes, using a mixed approach to study tourism websites from a dual perspective on utilitarian quality (website) and hedonic quality (user). In turn, it identifies the tendencies followed by destination management organizations (DMOs) with their websites and whether they satisfy demands from users and provide good experiences.

Many studies consider e-commerce and its related variables, but little research assesses variables related to website design or their impact on user experiences [54, 98, 102], being this one the biggest contribution of this study. Thus, the analysis of the influence of content, usability, functionality, and branding on user experiences with search engines and metasearch engines for e-commerce tourism is the novelty. Instead, most studies focus on web quality measures and quality assessments of website structures [40]. It may be useful for managers of metasearch and search engines to unravel the key features of a company's digital strategy, then use them to generate specific actions to maintain or improve it.

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To do this, the present study first performs a theoretical review of the terms linked to e-commerce in tourism and the user preference for e-tourism websites. The methodology followed in the empirical part of the work is explained, a mixed approach to fulfil the proposed dual perspective, that is, to collect data from websites (offer perspective - functional quality) and evaluate the user experience (demand perspective - hedonic quality). Results determine the attributes and categories that influence the key factors for e-tourism websites. The main conclusions obtained are shown, among them that the consumers' behaviour is very similar and does not distinguish them. Finally, the limitations of the study and future research are shown.

# 2 Literature Review

Studies of e-commerce in tourism mainly seek to analyze users' behavior, such as online travel planning [52], [76], the frequency of uses of e-tourism and socio-economic factors [131], online hotel bookings [7], [37], and intentions to repurchase [146]. A few other studies evaluate the different processes and functionalities available on tourism webpages. Hernández et al. [62] review the main factors to take into account in an e-commerce website, and Li and Buhalis [86] segment the information by identifying factors that influence tourists' online purchases. Some researchers focus on specific elements of tourism web pages too, such as content [117], performance through specific features [16], [44], accessibility and quality of content and interfaces [5], [40], and usability [110]. These studies take a design perspective.

Before moving forward, it is necessary to define key concepts that will be used throughout this work as e-tourism, e-commerce or e-tourism website. E-tourism means the analysis, design, implementation and application of information and communication technology and e-commerce solutions in the travel and tourism industry; as well as the analysis of the respective economic processes and market structures and customer relationship management [143]. The term e-tourism should include ecommerce feature such as online purchasing, product information, personalization, transaction term and condition, product review, and links [132] or the way tourism organizations conduct their business and, in particular, how distribute their tourism products in the online marketplace [133].

Web design is a key factor for ensuring a good interface that can satisfy consumer needs, and for this reason, the companies must ensure good designs to survive in competitive online markets [54]. Web designs can lead to higher levels of customer satisfaction [77], [78] and thereby increase online purchase intentions [130]. According to this view, a product should facilitate *do-goals*, such that it offers utilitarian quality. The user experience then is synonymous with usability and user-centered design [139]. However, this perspective is insufficient, because it excludes *be-goals* that users pursue during web interactions, which require hedonic quality, as can be achieved when the consumer is able to find and purchase a particular good or service easily [61]. Therefore, research also needs to incorporate experiential factors.

According to Muhtaseb et al. [98], who study user preferences for e-tourism websites, website design informs end-user experiences; in particular, this experience depends fundamentally on four factors: (1) actual content of the site (text, multimedia, images), its structure, and its information architecture; (2) usability, or the general ease of use of all site components and features; (3) functionality, which includes technical and behind-the-scenes processes and applications [111]; and (4) branding, or aesthetic and design-related items available on a website. The scope of these factors is consistent with other proposals by different authors in terms of quality and intentions to use the website, as Table 1 shows. The current study relies on users to evaluate the identified factors subjectively, with the notion that the user experience includes all aspects of product usability and desirability from the user's own perspective [129].

Table 1: User preference for e-tourism websites in prior research

| User preferences | Factors with similar meaning |
|---|---|
| Contents: all the material transmitted and made avaible on an e-tourism website [97] | - Content, linkage, appearance [26], [120].<br>- Easy to use [41], [89], [98], [136].<br>- Entertainment value [89].<br>- Reliability, portability [23], [49]. |
| Usability: a combination of efficiency and effectiveness, in support of user goals and tasks [10]. | - Use [120].<br>- Usefulness [41], [89], [136].<br>- Usability [23], [49]. |
| Functionality: all the processes and behaviors foreseen in the backend. | - Structure [120].<br>- Functionality [23]. |
| Branding: the intelligent, strategic and creative management of all those distinguishing elements of a brand identity (tangible or intangible) that contribute to construct a promise and a distinctive, relevant, comprehensive and sustainable brand experience over time [125]. | - Search and information [3], [120]. |

A positive user experience is vital to commercial success. Bernardo et al. [17] assert that when travel agencies design e-commerce sites, they must recognize that customers want to achieve their goals, in terms of making an appropriate purchase, but also seek to enjoy the purchase experience. Companies therefore should study customers' web use

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behaviors and provide hedonic functionalities; once utilitarian quality is achieved; the hedonic dimension can differentiate a website. In this sense, and to overcome the limitations of previous research that focuses on either design or user perspectives, the current study proposes a mixed approach. Various factors have impacts on the user experience, and they can be evaluated both from a functional perspective, analyzing user preferences attributes and website categories (see Table 2), and from a hedonic perspective, using subjective evaluations of the factors that determine customer satisfaction.

Website content synthesizes various elements, including content, links, appearance, ease of use, entertainment value, reliability, and portability (see Table 1). This factor is critical, because customers use e-tourism websites as information sources. Therefore, they need to be designed to match end users' needs and expectations [67]. Lists of information about a product or destination are not effective in helping tourists plan their trips [43]. Moreover, website content can evoke product images and create a virtual consumer experience, which influences users' perceptions of the company or tourism destination [32]. This crucial element for website design thus can ease the user experience [41], [46], [75] [89], [105]. Several studies also highlight the importance of content in connection with various attitudinal and behavioral outcome variables [55]. For tourism websites, content is a main attribute that leads people to revisit [118] and increases their satisfaction [81] and purchase intentions [24]. A well-organized web page also appears less complex and more user friendly, which enhances the quality of the user experience [99]. Based on the previous findings in the e-tourism setting, is hypothesize that:

*H1: Website contents have a positive effect on the user experience of an e-tourism website.*

Usability is another key pillar [23], [40], [89], [136]. It reflects how easily a user interacts with a website and how easy the user interface feels. It appears equivalent to use, usefulness, or usability (see Table 1). Some evidence indicates a direct relationship between usability and user experience. Calero et al. [23] found that usability, at 47.8%, is the mainly quality characteristic to use to classify web metrics. Vijayasarathy [135] similarly argues that usefulness and ease to use explain intentions to use e-commerce, because they reduce time in the process. Davidavičienė and Tolvaišas [40], studying the quality of e-commerce websites, acknowledge usability as a key element both before and during the purchase. Usability leads to more effective websites, which increase consumer loyalty [98] and improve conversion ratios (i.e., proportion of visitors to the website who actually make a purchase, relative to the total number of visitors). Usability makes it easier for users to determine how to achieve their consumption goals, especially when achieved through good web design, which influences users' affective states and evoke feelings of pleasure through its use [54]. Extending the previous findings, the following hypothesis can be posited:

*H2: Website usability have a positive effect on the user experience of an e-tourism website*

Although attributes that are part of functionality (i.e., access and functional design) are key elements of a positive user experience, functionality is not one of the most important determinants of user experiences with websites [23] and exhibits little significance in electronic service quality models [120], because it is something that users give as inherent to the website. Even if a lack of access or functional design, as manifested in poor development, prevents effective uses of the website, with direct and negative effects on the user's experience, users do not identify them as key elements, because are not perceived in the first instance. As Cunliffe [39] points out, poor website design could result in losses of 50 percent of potential sales, and a negative experience reduces the potential of repeating visits by 40 percent.

Some studies establish functionality as a determinant of the correct functioning of the website; the relevant attributes include multiple functions and their specified properties [3], [13], [83], [147] that satisfy some stated or implied needs [23]. Kaplanidou, Vogt and Morris [76] argue that functionality is not a direct predictor of intentions to travel, but they find an indirect influence through the perceived usefulness of the website. A successful website therefore holds customers' interest, encourages them to participate, and captures information about their preferences [20]. Travellers expect websites to be informative, interactive, and attractive [34], and in turn, functionality depends on the usefulness of the website for users [79]. Based on all of these researches, the next hypothesis is suggested:

*H3: Website functionality have a positive effect on the user experience of an e-tourism website.*

If Branding concept is used in the field of the e-commerce, refers to the process of transforming the website into a unique experience for the user [3], [120]. It gives a clear picture of your company through the information that is presented, the way it is presented, and the user experience of the site [36]. The brand of websites depends on all interactions between the company and the user in the online environment [134]. In the specific e-tourism field, the brand also offers a means for recognition, which provides a cognitive anchor that can reassure customers who face uncertainty [113]. Consumers might rely on trusted corporate or brand names, as a substitute for unavailable product information [87]. Branding becomes particularly relevant due to the nature of online shopping, which prevents customers from feeling or touching products before purchasing them [4]. Tourists who are familiar with a well-known brand might perceive their shopping experiences as better in this context. Therefore:

*H4: Website branding have a positive effect on the user experience of an e-tourism website.*

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DOI: 10.4067/S0718-18762021000100103

With these predictions, this research empirically tests the relationship of the user experience in an e-tourism website with its content, usability, functionality, and branding. In addition, this research seeks to determine which attributes and categories influence these factors in e-tourism websites (see Table 2), to facilitate possible search strategies. Tourism information searches can be individual or collaborative activities [64]. Individual or internal searches for tourism information [73] involve mental process that support information acquisition, selection, judgment, and utilization. Users cannot process all information available, so they turn to strategies to find and select reliable information, using keyword searches, search engines, subject directories or browsing, as well as visiting known sites [64]. Positioning on the Internet is a determining factor, whether it relies on search engine marketing (SEM) or search engine optimization (SEO). Both processes aim to increase visibility, but whereas SEO refers to a process of getting traffic from the free, organic, editorial, or natural search results, SEM implies purchasing ads. Furthermore, SEO uses various strategic tactics to increase the amount of visitors to a website by ensuring a higher placement in the search results page of a search engine. In contrast, SEM is Internet marketing, and it involves researching, submitting, and positioning of a website within search engines to achieve maximum visibility and increase the share of paid and/or organic traffic referrals attained from search engines [114].

A collaborative tourism information process instead features information sharing, to plan trips before, during, and after the visit. Social media constitutes an important information source [140] with powerful impacts on tourists' decision-making process, because they can share information and travel experiences [35]. In online communities, users seek, synthesize, and disseminate information, which they can share using different channels, such as chat, voice, video, blogs, applications, or likes. Users searching for tourism information may collaborate for various purposes [8], such as gathering, verifying, and updating information. However, previous experiences, knowledge, and memories related to web searches and destinations strongly influence online tourism information searches [64].

In summary, users' search strategies reflect both technical and collaborative components, and keyword searches, search engines, subject directories, browsing the web, and visiting known sites are important for sharing information and experience about the trip with other travellers. For this reason, this study seeks to establish the attributes and categories that influence e-tourism websites users, to determinate the appropriate online strategy to follow.

# 3 Methodology

The methodology used in this research followed a mixed approach to fulfill the proposed dual perspective, that is, to collect data from websites (offer perspective - functional quality) and evaluate the user experience (demand perspective - hedonic quality). First of all, it was necessary to identify the dimensions or factors of the user preferences attributes for websites. These factors and attributes were established using a qualitative meta-analysis of the literature about the topic (they are listed in Table 2). Secondly, the study sample was determined following Xian et al. study [141]. A series of keywords combined with the top destinations selected by their earnings from international tourism, resulted in a series of internet website outputs that after a refinement consisted in 99 search and metasearch engines (appendix A). Using a content analysis, each website of the sample was rated on a 5-point Likert scale according to the number of criteria met in relation to the total listed for each factor of the user preference. Summarizing, the meta-analysis in the first phase selected eight more relevant tourist destinations in the world to be used for the search in combination with keywords. In the second, the six search keywords to be used in conjunction with the chosen destinations were selected. And finally, a combination of destinations and selected keywords, with total of 48 terms met all the criteria listed, which were search in the Google search engine.

On the other hand, to obtain data about hedonic quality, the research of Power [109] has been used, which asked each user to evaluate their personal experience with the online travel search and metasearch engines during the previous 12 months. All data is analysed used an exploratory factorial analysis to determine the attributes and categories that influence the key factors for e-tourism websites, completed with a General Additive Model (GAM) to try to relax the assumption of linearity between the dependent and independent.

## 3.1 Dimensions

To analyze the influence of content, usability, functionality, and branding on user experiences with search engines and metasearch engines for e-commerce tourism, this study defines the dimensions to be assessed in relation to each factor by starting with a qualitative meta-analysis [105] of success attributes for destination marketing websites. That meta-analysis reflects the findings of multiple studies pertaining to e-tourism [76], [95], [97], [121], [122]. A further extensive review includes research performed in other fields to help establish the most important attributes and categories for analyzing e-commerce websites. Considering the study focus on the tourism industry, specific variables related to the tourism business were also included. The different attributes identified for each factor are listed in Table 2. For example, the content factor includes four attributes: composition of contents, design and structure, learning, and navigation. Some categories can also be differentiated according to whether they refer explicitly to e-commerce, e-tourism, or both. Although the literature review has been profound and varied, as can be seen in the following table, there being no excessive empirical work that tests the attributes of each factor. There is a paradox that according to the author followed, the same attribute can be framed in different factors, and moreover when the definition of each one is not specific enough to limit its field of action. This is the reason why the authors, even justifying the establishment

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DOI: 10.4067/S0718-18762021000100103

of each theoretical construct based on the reviews carried out, find that certain theoretical contradictions could occur but they are expected to be solved through the empirical analysis.

Table 2: User preference attributes for websites

| Website structure attributes | Definitions | Categories | | Author |
|---|---|---|---|---|
| | | e-Tourism | e-Commerce | |
| | CONTENT | | | |
| Composition of contents | The textual, visual, or aural content encountered as part of the user experience on websites | Organization, layout, heading and style, readability, current and timely information, complexity, informative product page | | [14], [15], [24], [25], [49], [55], [95], [98], [104], [105], [120], [144] |
| Design and structure | How the website is set up and the individual subpages are linked | Website design, homepage, graphical interface, page background, color consistency, | | [14], [15], [24], [25], [46], [54], [88], [95], [98], [100], [104], [105], [120], [144] |
| Learning | Ways to create processes to learn and improve the customer experience with the website | Familiarity, consistency, generalizability, predictability, simplicity | | [14], [15], [24], [46], [49], [88], [89], [94], [98], [104], [105], [120], [135] |
| Navigation | The possibility of movement from one webpage to another page. | Know where they are, easily return, search | | [15], [23], [24], [25], [55], [88], [92], [93], [94], [98], [105], [120], [144] |
| | USABILITY | | | |
| Interactivity (real time, help) | The dialog that occurs between a customer and a computer program. | Computer-mediated, communication, real-time communication, dialogue, interactive decision aids, transaction-related vs. non-transaction related interactivity | | [15], [23], [24], [42], [46], [88], [91], [94], [98], [104], [105], [120], [144] |
| Memorability | The ability to navigate and use a website quickly and easily by the user, each time. | Interface memorability | | [14], [98], [100], [105] |
| Payment method and | The way a buyer chooses to compensate the seller for a good or service, so the seller must manage the formal process of planning, implementation, evaluation, and control of purchases | Visa, Mastercard, Maestro, Visa Electron, American Express, Paypal, Company Card | Visa, Mastercard, Maestro, Visa Electron, American Express, Paypal, Company Card | [15], [23], [24], [88], [120] |
| Purchase management method | | Bill, premium service, possibility of reimbursement | Offline, bill, returns, return costs, administrative costs, premium service, possibility of reimbursement | [15], [88], [105] |
| Performance and availability (easy search) | The online process by which the customer pays for the results obtained, that is, the extent to which an application is operational, functional, and usable for completing or fulfilling a customer's requirements. | Efficiency, product differentiation and comparisons | | [14], [15], [23], [24], [42], [46], [88], [94], [98], [100], [104], [135], [144] |
| Personalization | The process of tailoring pages to individual users' characteristics or preferences. | Recognizing visitors, customization of content, tailoring, explicit and implicit personalization | | [2], [25], [28], [66], [98], [104], [105] |
| Privacy and security | Protection of all types of information, in any form; assurances that any personal information collected and processed (used) also is protected and destroyed legally and fairly. | Personally, identifiable information, transmission of transactional information, lack of control, trust, assurance sales | | [14], [15], [23], [24], [88], [94], [98], [104], [105], [120], [135] |
| | FUNCTIONALITY | | | |
| Access | Opportunity to approach or enter a website and surf it | Accessibility needs | | [59], [70], [105] |

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www.jtaer.com
DOI: 10.4067/S0718-18762021000100103

*Table 2: continuation*

| | | | | |
|---|---|---|---|---|
| Functional design | A paradigm to simplify the design of hardware and software devices | Satisfactory design | | [70], [98], [105], [144] |
| | BRANDING | | | |
| Loyalty system | Structured marketing strategies designed by merchants to encourage customers to continue to shop at or use the services of businesses associated with each program | Mailing, chat, promotions, discount bond, gift card, gift certificate, field collection of questions and/or suggestions | | [1], [84] |
| Package components | A pre-arranged combination of at least two tourist components (accommodation, transport, other tourist services), and sold or offered for sale at an inclusive price, covering a period of more than 24 hours or including overnight accommodation | Flight, accommodation, flight+hotel, flight+hotel+tour, hotel+tour+holidays, holidays, cruises, tour, breaks, destinations, cars, coaches, trains, apartments, leisure activities | Flight, accommodation, flight+hotel, cruises, tour, cars, coaches, trains, apartments | [9], [37], [51], [74], [127], |
| Product browser | Search functionality that allows users to select different options from a database | Filtering by destination, product, category, use browsers, use filters, use some languages | | [9], [37], [52], [82], [101] |
| Product type | Grouping of similar kinds of services | Accommodation, journey, leisure, package holidays | Accommodation, package holidays | [9], [37], [52], [65], [127] |
| Social media | Collective of online communications channels dedicated to community-based input, interaction, content-sharing, and collaboration | Social networks, blogs, collaborative projects, virtual, content communities, applications | | [33], [68], [72] |

The attributes in Table 2 build the factors for the analytical model, measured using the items listed in each sub-category. Similar studies focused on the attributes of the products on offer serve as points of reference [37], [48]. An assessment gauged whether each category existed, rated on a 5-point Likert scale according to the number of criteria met in relation to the total listed for each factor, following a percentage criterion [48]. Therefore, each point of the scale represents the percentage of compliance in the analyzed category. These data reflect utilitarian quality, as suggested by prior research [109].

## 3.2 Sample

Following Xiang et al. [141], the method mimics travellers' use of a search engine to search for destination-related information, to determine what factors compose utilitarian quality. The keywords were entered into a Google search, which in combination with the selected destinations, resulted in the sample used for this study. DeVellis [45] identifies two critical considerations that determine the validity of this sampling method. The predefined keywords must represent the object to be studied in a coherent way, and they must offer the greatest possible coverage. This study used a list of 90 words grouped into six categories [95], [136], [141]: tourism, accommodation, trip, travel, transport, and booking. The use of Google to search for data is justified by its ranking as the search engine with the highest market share [116].

Next, the selection of destinations to be analyzed was based on income earned from international tourism, using data from the UNWTO [138], namely and in order of importance: United States, Spain, China, France, Italy, United Kingdom, Germany, and Thailand. These countries accrued international tourism revenues in 2018 worth $567.7 million, representing 42.3% of the world total.

Finally, the destinations and keywords were combined to create 48 search terms that met all the necessary criteria. To refine the sample, the final listing of websites excluded those that offered a single product or service, such as airline websites and hotels. As a result, the sample consists of 99 search engines and metasearch engine tourism websites that conducted e-commerce (Appendix B). The database was compiled between March and June 2016.

To obtain data about hedonic quality, this study followed Power [109] which asked each user to evaluate their personal experience with the online travel agency, including search and metasearch engines. Seven user experience factors determine customer satisfaction with the competitive pricing, usefulness of information, and availability of booking options, which are the top three in order of importance. This ranking reflects the responses of more than 2,600 consumers who made purchases on travel websites in the previous 12 months. The survey was sent to consumers whose names were randomly selected from data maintained by independent companies, fielded from March 11-31, 2016.

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# 4 Data Analysis and Results

An exploratory factorial analysis sought to determine the attributes and categories that influence the key factors for e-tourism websites. An initial reliability and validity analysis produced the results in Table 3. All the Cronbach's alpha coefficients are above the recommended 0.80 level [11], [19]. The test of convergent validity confirmed that the different item loadings are equal to or above the recommended cut-off level of 0.60 [30]. Four attributes had to be excluded, due to their low representativeness or their failure to meet the validity and reliability parameters: loyalty system, social media, payment and management method, and performance. The four factors are distinct, with variance explained values higher than 55% in all cases. The composite reliability (CR) values [56] are very good; the average variance extracted (AVE) also exhibits values of 0.5 or higher, and the recommended minimum values are 0.5 [11]. Therefore, the exploratory factor analysis can be performed with confidence in the established validity and reliability.

Table 3: Exploratory factor analysis

| FACTOR | Cronbach's Alpha | AVE* | CR |
|---|---|---|---|
| Contents | 0.832 | 0.696 | 0.901 |
| ATTRIBUTES | Component Matrix | % Variance Explained | |
| Learning | 0.862 | 69.598 | |
| Design and structure | 0.856 | | |
| Navigation | 0.788 | | |
| Composition of contents | 0.829 | | |
| FACTOR | Cronbach's Alpha | AVE | CR |
| Usability | 0.914 | 0.553 | 0.828 |
| ATTRIBUTES | Component Matrix | % Variance Explained | |
| Personalization | 0.822 | 54.987 | |
| Interactivity | 0.726 | | |
| Privacy and security | 0.815 | | |
| Memorability | 0.578 | | |
| FACTOR | Cronbach's Alpha | AVE | CR |
| Functionality | 0.808 | 0.932 | 0.965 |
| ATTRIBUTES | Component Matrix | % Variance Explained | |
| Access | 0.977 | 95.496 | |
| Functional design | 0.954 | | |
| FACTOR | Cronbach's Alpha | AVE | CR |
| Branding | 0.913 | 0.662 | 0.852 |
| ATTRIBUTES | Component Matrix | % Variance Explained | |
| Product type | 0.871 | 66.262 | |
| Pack components | 0.905 | | |
| Product browser | 0.641 | | |
| *AVE: average variance extracted<br>** CR: composite reliability | | | |

The simplest approach to test the hypotheses would rely on linear regression models [137]. Linear estimations can provide useful initial insights into the relationship between the explanatory variables and the dependent variable, as well as an intuitive way to interpret coefficients, but their use also has been criticized when the relationships being evaluated are not linear. A General Additive Model (GAM) [60] offers a flexible alternative that relaxes the assumption of linearity between the dependent and independent variables by fitting natural splines for each covariate [115], while maintaining the coherent inference between the explanatory and dependent variables. The technique also has advantages over more restrictive linear models, because the explanatory variables are too complex to be represented by linear functions, that is to say, the structure of the data is complex and it is difficult to define a function which estimates the relationship correctly. Thus it is possible to check for the possible presence of non-linear relationships between covariates and outcomes, without making a priori assumptions about the degree of non-linearity [145]. Analytically, it can be expressed as follows:

$$Y_i = \beta_0 + \sum_{j=1}^{4} s_j(X_{j,i}) + \varepsilon_i \; i = 1, \dots n, \tag{1}$$

**Journal of Theoretical and Applied Electronic Commerce Research**
ISSN 0718–1876 Electronic Version
VOL 16 / ISSUE 1 / JANUARY 2021 / 18-36
© 2021 Universidad de Talca - Chile
This paper is available online at
www.jtaer.com
DOI: 10.4067/S0718-18762021000100103

where $Y$ is the dependent variable, the covariables $X_j$ j = 1,…4 result from the previous factorial analysis, and the error term $\varepsilon$ is assumed to have zero mean and constant variance. The functions **s** are unknown soft functions that verify $E[s_j(X_j)] = 0 \; for \; j = 1, \ldots 4.$

The smoothness of each function s is controlled by a smoothness parameter [6], expressed by the number of degrees of freedom or effective parameters for each function. With these methodological considerations, the GAM was estimated using R software. The confidence band is estimated for the additive model, and every component of the model is identified on the x-axis as a non-parametric: $S_1(X_1)$ for fact1_1, $S_2(X_2)$ for fact2_1, $S_3(X_3)$ for fact3_1, and $S_4(X_4)$ for fact4_1. The shapes of the smooth functions estimated for the four factors appear in Figure 1; despite their wiggly forms, the functions exhibit a global tendency in each case. Thus, for factors 1 (Contents) and 4 (Branding), linear smoothing can be used, but it cannot be for factors 2 (Usability) and 3 (Functionality).

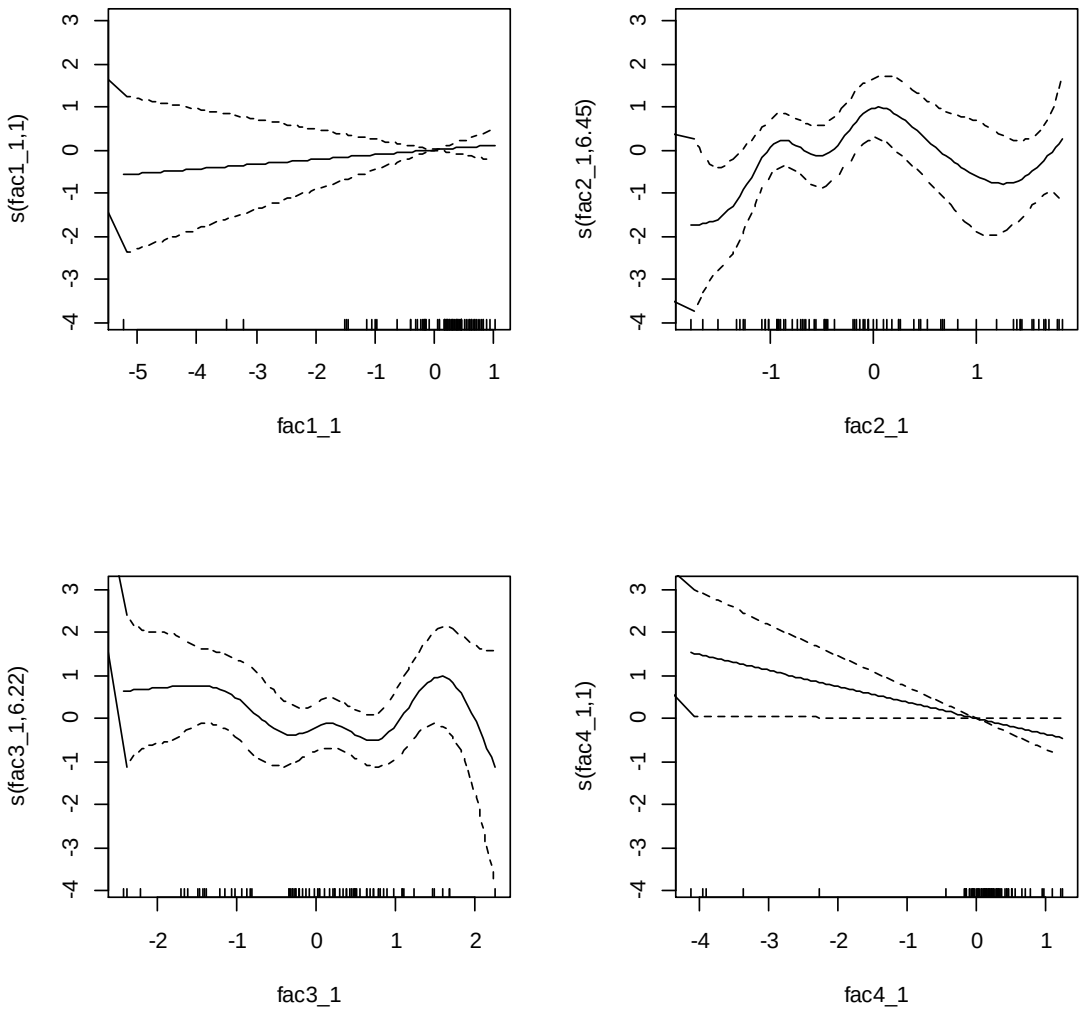


Figure 1: Graph of the non-parametric estimates of each component of the additive model

In relation to the different hypotheses, the p-value selected was p≤0.1. In theory, the value of p is a continuous measure of the evidence, but in practice it is typically trichotomized approximately in highly significant, marginally significant and not statistically significant at conventional levels, with cut-offs at p≤0.01, p≤0.05 and p≤0.10 [13]. Therefore, if p is between 0.1 and 0.9, there is certainly no reason to suspect about the hypothesis tested [57], so we can accept as a successful hypothesis all those with a p value below 0.1, since most of the statistics manuals present a gold rule of 0.1, 0.05 and 0.01 meanings levels [53]. The results in Table 4 show that the usability and branding factors had significant effects on the user experience, in support of H2 and H4. The acceptance of the H2 agrees with several existing works [23], [40], [41], [86], [135], [136]. Usability is a determining factor to achieve a better user's experience, which to acquire higher levels of satisfaction, trust, and loyalty toward a website [77]. Attributes as the personalization, interactivity and the privacy and security become determinative elements of the user experience. A customized website that enhances usability, reflecting the needs and preferences of the user, while respecting the privacy and security of the information, are hallmarks of future success [27], especially when accounting for the ongoing increases in uses of mobile devices for e-commerce [25]. The most important means to improve the user experience thus are customization and website interactivity, which helps customize the contents according to different consumption habits or groups. For this reason, the personalization is a key element, and a lot of users rank it as the second in importance in determining

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an e-tourism website's, at 57.5%, such that customers care about being recognized by the website and being treated as an individual [98].

Moreover, a significant relationship arises between branding and user experience (H4). Branding offers information about tourism products and services, influenced by new trends, so this factor has direct effects on users. The information about the product is fundamental. Products and support for product search are determinants of the navigation experience [80], and websites that provide clear and complete product and price information produce more satisfying experiences [22] and lead to better attitudes [78].

Table 4: Estimate of GAM model

| | Edf | Coefficient | p-value | Level p-value > 0.1 |
|---|---|---|---|---|
| Intercept | | 4.239 | 0.000 | |
| s(Contents) | 1 | 0.402 | 0.5284 | Rejected H1 |
| s(Usability) | 6.455 | 1.997 | 0.0810 | Supported H2 |
| s(Functionality) | 6.221 | 1.451 | 0.2033 | Rejected H3 |
| s(Branding) | 1 | 4.219 | 0.0442 | Supported H4 |
| GCV score | | 2.593 | | |
| Adjusted R-squared | | 0.372 | | |

Notes: The terms (factor name) are smooth functions, to their coefficients are non-parametric.

The relationship between contents and user experience is not significant (cf. H1). Muhtaseb et al. [98] argue that users want the websites they visit to provide fresh, abundant, correct, pertinent, and timely information content, along with clear topics that are easy to understand. However, users might take this for granted when visiting a website, such that only the absence or low quality of contents affects their evaluation, generally negatively. Website designers thus must seek ways to improve consumer satisfaction through website content, in the form of its design and structure [99]. In research based on a classification of 385 metrics using a web quality model, Calero et al. [23] do not identify content as a key metric. Presentation, with 43.9%, is the main factor, followed by content and navigation. Usability does stand out as a determinant for two of three higher-level metrics (usability, operation, presentation, with 149 metrics; usability, maintenance, presentation, with 93 metrics). These results are similar to the findings from this study, but the difference is that learning was not taken into account, despite it representing an attribute of the products on offer. This attribute cites key elements to facilitate the user experience, such as familiarity, consistency, generalizability, predictability, and simplicity [14], [15], [98], [104].

With regard to functionality, the websites do not have statistically significant influences on the user experience (H3). This technical element encompasses processes and applications that are not directly visible to the user [39], and websites made less effort with it than for the other factors. Such efforts are practically limited to meeting standards of correct usage. For the dimension of quality characteristics [23], users identify functionality as one of the least relevant determinants of website quality; they mainly emphasize usability, at the expense of other elements. The vast majority of websites also use badges issued by the World Wide Web Consortium (W3C), which imposes parameters and check points that must be met to achieve accessibility, as reflected in Web Content Accessibility Guidelines (WCAG) 2.0. Although perhaps at one time, "the most important aspect of a website was usability, but now accessibility plays a very important role" [23]. Still, it remains essential to ensure the accessibility of official tourism websites, to eliminate any barriers [119] and make comprehensive information about the accessibility of different tourism elements readily available [119].

# 5 Conclusions

In this paper, it is concluded that on one hand, the tourist search and metasearch engines and based on the current researches, the consumers' behavior is very similar and does not distinguish them. One of these papers shows that the level structure of both types of browsers are similar, even if the interface of metasearch engines can be better than search engines in terms of privacy, security, and personalization/customization [47]. The offer content level as a function of the type of offer and the component (metasearch engines focus on flights and accommodation; search engines have a general offer) shows that the number of search engines is not a determining factor [47]. However, it remains essential to continue improving the user experience, in terms of performing e-commerce operations, such as by reducing search process time and website personalization to meet the needs of users. For this, the number of search engines, and therefore, the main difference between search and metasearch engines, is increasingly determining, as well as establishing the most relevant website design variables that influence the user experience.

On the other hand, the explanatory variables about the user experience of an e-tourism website design are too complex to be explained by linear functions, considering the use of the GAM more appropriate. With this methodology, it was possible to observe the influence of usability and branding factors on user experiences, and the lack of relevance of contents and functionality. This is the main contribution of this paper, which shows a list of factors and attributes that influence directly in the user experience of e-tourism websites. Based on the results in a more concrete way, the user

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experience of an e-tourism website relates positively to its usability, and consequently, e-commerce search and metasearch engines in the tourism industry should devote substantial efforts to implementing interactivity, memorability, personalization, privacy, and security. Users want the websites they consult to securely adapt to their wants and needs (while ensuring privacy), and they expect that the specific profile/interface of the product on offer will be maintained, without having to select it on every visit. To improve usability, some options are to communicate in real time with users, provide interactive decision aids, rely on social media (e.g., social networking, media file sharing on sites like YouTube), offer virtual dialogue, provide recommendations, establish a history setting, and allow users to select advertising preferences. Brand equity has been recognized as a competitive advantage that requires constant maintenance and progress to ensure rewarding, long-term outcomes in marketing environments [126]. Users no longer simply acquire a tourism product or service; they seek experiences. Rich and interactive experiences can improve customers' evaluations of a brand, because they are more affective and cognitively intense [18], and increase the quality and number of comments in social networks. Brand value in virtual contexts yields various positive consequences, including persuasion, attitude beliefs, product beliefs, product awareness, attitude toward the brand, attitude change, purchase consideration, customer confidence, purchase intentions, user satisfaction, and behavioral changes [106].

In general, although there are more and more researches about tourism websites, they are still few little research about the variables related to website design [3], [13], [54], [93], [94], [102], [118], [122], and even less about their impacts on the user experience in the tourism sector [3], [13], [99]. Nowadays, the main success element on the e-commerce tourism is to develop efficient and efficacy processes, which involves planning, decision making, and anticipation of the trip with other people and guarantee accuracy information [61]. Thus, it is fundamental to establish the main attributes of tourism search and metasearch website designs and their influence on the user experience, which can produce new strategies for the industry. Therefore, this involves determining whether to use search or metasearch engines, as well as establishing the main attributes of the website design.

Highlight as important implication by the industry that branding can be a key means to personalize content, because it reflects key product elements, resulting in hundreds of possible combinations and variables, depending on the website visited. It is difficult to manage though, because tourism is critically based on experience. It may be possible to pursue a better use of synergies among tourism products; some websites already share search engines. Contents and functionality do not influence the user experience; users generally just assume their existence. Only their non-existence might have a negative influence on the user experience.

Finally, is very important mentioned that this study has several limitations. First, the low proportion of user experience accounted for probably results from the influence of other variables that could provide a better explanation of the model but that were not included. Some of the variables used to construct the model came from other research domains, due to the lack of specific studies of user experiences with search and metasearch engines in the tourism sector, which complicate the establishment of a robust theoretical framework. Second, the sampling process was limited by the search terms, which could be expanded to include a greater number and wider range of terms. Further research also might test the proposed model in other tourist sectors, as well as continue identifying new elements, such as collaborative customer relationship management (CRM) and new communication models linking supply and demand, which could help improve the representativeness of the model for explaining user experiences.

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**Journal of Theoretical and Applied Electronic Commerce Research**
ISSN 0718–1876 Electronic Version
VOL 16 / ISSUE 1 / JANUARY 2021 / 18-36
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This paper is available online at
www.jtaer.com
DOI: 10.4067/S0718-18762021000100103

# Appendix A: Data Collected: Number of Search Results

| | Accommodation | Trip | Travel | Transport | Booking |
|---|---|---|---|---|---|
| USA | 195,000,000 | 327,000,000 | 574,000,000 | 695,000,000 | 224,000,000 |
| Spain | 118,000,000 | 257,000,000 | 309,000,000 | 234,000,000 | 161,000,000 |
| China | 122,000,000 | 233,000,000 | 470,000,000 | 397,000,000 | 110,000,000 |
| France | 161,000,000 | 378,000,000 | 491,000,000 | 543,000,000 | 173,000,000 |
| Italy | 133,000,000 | 235,000,000 | 362,000,000 | 282,000,000 | 189,000,000 |
| UK | 332,000,000 | 400,000,000 | 843,000,000 | 694,000,000 | 297,000,000 |
| Germany | 147,000,000 | 216,000,000 | 416,000,000 | 551,000,000 | 167,000,000 |
| Thailand | 72,300,000 | 110,000,000 | 162,000,000 | 134,000,000 | 97,800,000 |
| **Total** | **1,119,300,000** | **2,156,000,000** | **3,627,000,000** | **3,530,000,000** | **1,418,000,000** |
| | | | | | |
| Filter 1 | Tourism | | | | |
| USA | 30,100,000 | 82,800,000 | 98,700,000 | 44,700,000 | 43,000,000 |
| Spain | 31,000,000 | 87,500,000 | 110,000,000 | 30,300,000 | 42,300,000 |
| China | 31,300,000 | 63,400,000 | 127,000,000 | 53,000,000 | 30,500,000 |
| France | 36,200,000 | 107,000,000 | 153,000,000 | 48,000,000 | 37,900,00 |
| Italy | 31,100,000 | 77,400,000 | 123,000,000 | 32,500,000 | 45,900,000 |
| UK | 138,000,000 | 259,000,000 | 271,000,000 | 130,000,000 | 195,000,000 |
| Germany | 30,400,000 | 73,400,000 | 110,000,000 | 37,900,000 | 30,600,000 |
| Thailand | 20,700,000 | 35,600,000 | 52,400,000 | 19,100,000 | 24,300,000 |
| **Total** | **348,800,000** | **786,100,000** | **1,045,100,000** | **395,500,000** | **449,500,000** |
| | | | | | |
| Filter 2 | Search or meta-search engine | | | | |
| USA | 11,100 | 14,700 | 29,500 | 17,700 | 16,800 |
| Spain | 12,500 | 11,600 | 24,700 | 17,500 | 13,700 |
| China | 13,600 | 9,730 | 26,200 | 17,000 | 12,600 |
| France | 43,300 | 14,600 | 56,300 | 48,900 | 45,000 |
| Italy | 11,500 | 10,900 | 25,000 | 17,000 | 13,600 |
| UK | 13,000 | 16,200 | 33,100 | 18,200 | 16,300 |
| Germany | 11,800 | 10,900 | 24,700 | 17,500 | 13,500 |
| Thailand | 37,500 | 10,500 | 47,500 | 42,800 | 38,600 |
| **Total** | **154,300** | **99,130** | **267,000** | **196,600** | **170,100** |
| | | | | | |
| Filter 3 | B2C webs | | | | |
| **Total** | **246** | **160** | **426** | **298** | **272** |
| | | | | | |
| Filter 4 | - Without duplicate websites<br>- Without different websites depending on country or domain<br>- Without public administration websites<br>- Without specific business websites (only search or metasearch) | | | | |
| **Total** | **99** | | | | |

**Journal of Theoretical and Applied Electronic Commerce Research**
ISSN 0718–1876 Electronic Version
VOL 16 / ISSUE 1 / JANUARY 2021 / 18-36
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This paper is available online at
www.jtaer.com
DOI: 10.4067/S0718-18762021000100103

# Appendix B: Search and Meta-Search Engines Websites

| Search and meta-search engines | Websites |
|---|---|
| 9FLATS | http://www.9flats.com/ |
| AFFORDABLE TOURS | http://www.webjet.com/ |
| AGODA | http://www.agoda.com/ |
| AIRBNB | https://www.airbnb.com/ |
| AIRCHINA | http://www.airchina.com/ |
| ASIA ROOMS | http://www.asiarooms.com/ |
| ASIA TRAVEL | http://www.asiatravel.com/ |
| ASIA WEB DIRECT | http://www.asiawebdirect.com/ |
| ATRÁPALO | http://www.atrapalo.com/ |
| BACK YARD TRAVEL | http://www.backyardtravel.com/ |
| BAHN | http://www.bahn.com/ |
| B&B HOTELS | http://www.hotel-bb.com/ |
| BED AND BREKFAST | http://www.bedandbreakfast.com/ |
| BOOKING | http://www.booking.com |
| CHEAPFLIGHT | http://www.venere.com/ |
| CHEAPOAIR | http://www.cheapoair.com/ |
| CHINA AIRLINE TRAVEL | http://chinaairlinetravel.com/ |
| CHINA DISCOUNT HOTELS | http://www.china-discount-hotels.com/ |
| CHINA EASTERN | http://hk.ceair.com/ |
| CHINA HOTELS RESERVATION | http://www.chinahotelsreservation.com/ |
| CHINA CONNECTION TOURS | http://www.china-tour.com/ |
| CTRIP | http://english.ctrip.com/ |
| DESPEGAR | http://www.us.despegar.com/ |
| DESTINIA | http://destinia.com/ |
| EASY VIAJAR | http://www.easyviajar.com/ |
| EASYJET | http://www.easyjet.com/ |
| EBOOKERS | http://www.ebookers.com/ |
| EDREAMS | http://www.edreams.es/ |
| ELONG | http://www.china-discount-hotels.com/ |
| EMMA VILLAS | http://www.emmavillas.com/ |
| EUROLINES | http://www.eurolines.co.uk/ |
| EVANEOS | http://www.evaneos.com/ |
| EXPEDIA | http://www.expedia.com/ |
| FARE COMPARE | http://www.farecompare.com/ |
| GERMAN TOURIST HOTELS | http://www.germantouristhotels.com/ |
| HIHOSTELS | https://www.hihostels.com/ |
| HIPMUNK | https://www.hipmunk.com/ |
| HOMELIDAYS | http://www.homelidays.com/ |
| HOSTEL BOOKERS | http://www.hostelbookers.com/ |
| HOSTEL WORD | http://www.hostelworld.com/ |
| HOT WIRE | http://www.hotwire.com/ |
| HOTEL BOOK | http://www.hotelbook.com/ |
| HOTEL CLUB | http://www.hotelclub.com/ |
| HOTEL CONBINED | http://www.hotelscombined.com/ |
| HOTEL SEARCH | http://www.hotelsearch.com/ |
| HOTEL THAILAND | http://www.hotelthailand.com/ |
| HOTELS 2 THAILAND | http://www.hotels2thailand.com/ |
| HOTEL TRAVEL | http://www.hoteltravel.com/ |
| HOTEL URBANO | http://www.hotelurbano.com/ |
| HOTELS.COM | http://www.hotels.com/ |
| HRS | http://www.hrs.com/ |
| IBIS BUDGET | http://ibisbudgethotel.ibis.com/ |
| IN ITALIA | http://www.initalia.it/ |
| JETCOST | http://www.jetcost.com/ |
| KAYAK | http://www.kayak.com/ |
| LAST MINUTE | http://www.es.lastminute.com/ |
| LATE ROOMS | http://www.laterooms.com/ |
| LILIGO | http://www.liligo.com/ |
| LOGITRAVEL | http://www.logitravel.com/ |

**Journal of Theoretical and Applied Electronic Commerce Research**
ISSN 0718–1876 Electronic Version
VOL 16 / ISSUE 1 / JANUARY 2021 / 18-36
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This paper is available online at
www.jtaer.com
DOI: 10.4067/S0718-18762021000100103

| *Table Appendix B: continuation* | |
|---|---|
| LOWCOST HOLYDAYS | http://www.lowcostholidays.com/ |
| LUXURY RETREATS | http://www.luxuryretreats.com/ |
| MAKE MY TRIP | http://www.makemytrip.com/ |
| MEJORES VUELOS | http://www.mejores-vuelos.com/ |
| MINUBE | http://www.minube.com/ |
| MOBISSIMO | http://www.mobissimo.com/ |
| MOMONDO | http://www.momondo.com/ |
| MUCHOVIAJE | http://vacaciones.muchoviaje.com/ |
| OMEGA TRAVEL | http://uk.omegatravel.net/ |
| ONETWOTRIP | http://www.onetwotrip.com/ |
| OPODO | http://www.opodo.co.uk/ |
| ORBITZ | http://www.orbitz.com/ |
| PARK INN | http://www.parkinn.com/ |
| PRICE LINE | http://www.priceline.com/ |
| PHUKET | http://www.phuket.com/ |
| QUNAR | http://www.qunar.com/ |
| RAILEUROPE | http://www.raileurope.com/ |
| RATESTOGO | http://www.ratestogo.com/ |
| ROOM 77 | https://www.room77.com/ |
| ROUTEPERFECT | http://www.routeperfect.com/ |
| RUMBO | http://www.rumbo.com/ |
| SAWADEE | http://www.sawadee.com/ |
| SLEEP IN ITALY | http://www.sleepinitaly.com/ |
| SKYSCANNER | http://www.skyscanner.com/ |
| STATRAVEL | http://www.statravel.co.uk/ |
| TRAVEL EUROPE | http://www.traveleurope.com/ |
| TRAVEL JUNGLE | http://www.traveljungle.fr/ |
| TRAVELOCITY | http://www.travelocity.com/ |
| TRAVELSUPERMARKET | http://www.travelsupermarket.com/ |
| TRAVELZOO | http://www.travelzoo.com/ |
| TRIPADVISOR | http://www.tripadvisor.com/ |
| TRIVAGO | http://www.trivago.com/ |
| VENERE | http://www.venere.com/ |
| VIGGIARE | http://www.viaggiare.it/ |
| VOYAGES-SNCF | http://uk.voyages-sncf.com/en/ |
| VUELING | http://www.vueling.com/es/reserva-tu-vuelo/busca-tu-vuelo |
| VUELOS BARATOS | http://www.vuelosbaratos.es/ |
| WEB JET | http://www.webjet.com.au/ |
| WEGO | http://www.wego.com/ |
| WIMDU | http://www.wimdu.es/ |
| WOTIF | http://www.wotif.com/ |
| YOU VUELOS | http://www.youvuelos.com/ |
| ZINGARATE | http://www.zingarate.com/ |