Digital Technologies, 2016, Vol. 2, No. 1, 1-8
Available online at http://pubs.sciepub.com/dt/2/1/1

DOI:10.12691/dt-2-1-1

Evaluation of Two Major Online Travel Agencies of US Using TOPSIS Method

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Abstract Nowadays, online services for tourism are a necessity. Tourism companies need a standard website for providing online services if they don't want to fall behind their competitors. Having a website has become so important and crucial that during recent years, many travel agencies have been stablished that only work online and do not have physical address and do not use any of traditional methods. So this website should be based on a scientific and approved framework if company wants to be successful in this very competitive market. In this study, two major online agencies of US that are considered as each other's main competitors, are examined and analyzed using TOPSIS method and based 6 main criteria. And at the end, the results are presented and some suggestions are given that can help improve these websites.

Keywords: *website evaluation, online travel agencies, AHP, TOPSIS, tourism*

Cite This Article: Morteza Soleymaninejad, Milad Shadifar, and Ayoub Karimi, "Evaluation of Two Major Online Travel Agencies of US Using TOPSIS Method." *Digital Technologies*, vol. 2, no. 1 (2016): 1-8. doi: 10.12691/dt-2-1-1.

1. Introduction

The globalization of economic activities and widespread availability of the Internet across the world has led multinational firms to use their corporate Web sites to communicate and transact extensively with visitors from different parts of the world ([1,2]). In today's world that is called era of communication and information, no industry can advance and progress in very competitive industry at global or even local level without using modern technologies of ICT and following changes in digital world and tourism industry is no exception. Even now, in tourism field, ICT is one of the fundamental bases and has a deciding and crucial role in national and international competitions and role of these technologies are developing and expanding at an unbelievable pace [3]. More than 80% of tourists use internet for gathering information before going on the trip and according to statistics published by WTO, in very near future, countries without suitable infrastructure for ICT are practically removed from the international competition in tourism [4].

It is widely accepted that the Internet can serve as an effective marketing tool in tourism ([5,6]). It is a valuable tool for both suppliers and consumers for information dissemination, communication, and online purchasing. Maintaining an effective website has thus become vital for a business to strengthen its customer relationships and gain a larger market segment [7].

A website offers a business not only a platform to promote products or services but also another avenue to generate revenue by attracting more customers. Unfortunately, not all websites successfully turn visitors into customers. The effective evaluation of websites has therefore become a point of concern for practitioners and researchers ([8,9]). As the number of online customers increases day by day, travel-related website providers should consider how to capture customer preferences explicitly [10]. Researchers indicated that service quality can help create differentiation strategies between providers [11] and may be one of the critical success factors of any Internet business [12]. Moreover, excellent online service will result in desirable behaviors such as word of mouth promotion, willingness to pay a price premium and repurchasing [12]. Thus, for travel agencies desiring to survive and thrive on the Internet, and willing to invest in online services, it is critical to understand precisely in advance how online customers will evaluate their full service offer and which service quality dimensions are valued most [13].

Website quality plays an important role in attracting and retaining customers — underpinning website effectiveness ([14,15]). Academic researchers have long advocated the importance of assessing website effectiveness. Lu and Yeung [16], who were pioneers in the field, proposed a framework for evaluating website performance, in which the usefulness of a website is estimated based on its functionality and usability. Evans and King [17], Stern [18] and Stout [19] stated that website performance can be determined by network statistics such as hit rate and log analysis.

However website quality is a relatively ill-defined concept ([20,21]). The existing scientific research discusses the meaning of website quality in terms of a variety of

different aspects. For example, Barnes and Vidgen [17] examine website quality in terms of usability, site design, information quality, trust and empathy; Yoo and Donthu [22] identify ease of use, aesthetic design, processing speed and security; Wolfinbarger and Gilly [24] examine Web site design, reliability, privacy / security and customer service; Parasuraman, Zeithaml and Malhotra [25] include efficiency, system availability, fulfilment and privacy; and Flavian, Guinalıu and Gurrea[26] utilize usability, trust and user satisfaction.

In the context of tourism, Jang [27] stated that online information search will become a major trend among travelers; with online reservations for travel products and services becoming an important application [28]. In brief, website evaluation is of interest to academic researchers and industrial practitioners. Law and Bai [29] found that published articles have presented various approaches and made efforts to improve the quality of commercial websites.

So considering the importance of websites, it is crucial to make sure they meet the standards and are of high quality and the best way to do this is to evaluate the website based on some criteria and rank it with other rival websites to find the strengths and weaknesses of website [30]. Then these weaknesses can be fixed which will in turn help the company to attract more customers and increase its share of the market. Especially this can be important for major online travel agencies like Expedia, Priceline and other similar ones that have a close competition with each other over market share.

In the next section, we will have a review of literature and different evaluation methods and criteria used for analyzing websites. Then research's methodology and framework and after that scoring, evaluating and ranking mechanism of these two websites is discussed. The next part is results and discussion and finally conclusion and some suggestion for improving these websites are provided.

2. Evaluation of Website Quality

With regard to the factors that mark a successful website, most managers perceived content related issues (e.g. ‘useful information’), ease of use, and security as the most important factors. They also found that website effectiveness may vary significantly between the different tourism sectors (e.g. hospitality, destination management, and airline). Therefore, the industry should not adopt common criteria without determining which are the most appropriate criteria for evaluation within the sector under consideration ([31]).

Liu and Arnett [32] surveyed Webmasters for Fortune 1000 companies to ascertain the factors critical to website success with consumers. The result was five factors: quality of information (which refers to relevant, accurate, timely, customized and complete information); service (measured by quick response, assurance, empathy, and follow-up); system use (including security, correct transactions, customer control over transactions, order tracking, and privacy); playfulness (typically enjoyment, interactivity, presence of attractive features, and flow or concentration); and design of the website (in terms of hyperlinks, customized search functions, speed of access, and ease of correcting errors).

WebQual™. Loiacono, Watson and Goodhue [33] designed an instrument to evaluate retail website quality. The instrument assessed 12 components of retail web quality: informational fit-to-task, interactivity, trust, response time, design appeal, intuitiveness, visual appeal, innovativeness, flow-emotional appeal, integrated communications, business process, and viable substitute.

SiteQual. This instrument was developed by asking students in two marketing classes to generate appropriate questions. Using a process of exploratory and confirmatory factor analysis this was whittled down to 9 items measuring ease of use, design, processing speed, and security [33].

eQual 4.0. eQual 4.0 (previously called WebQual 4.0) has been iteratively developed over time. The authors have used the instrument on student and customer samples to assess the quality of a number of different types of Web sites. In Barnes and Vidgen [34], a total of 380 student respondents evaluated online bookstores, using an instrument with 22 questions. Based on exploratory factor analysis, five dimensions emerged: usability, design, information quality, trust and empathy.

.comQ. Wolfinbarger and Gilly [35] used focus groups, sorting and a customer panel to develop the .comQ instrument. Using concepts and attributes from both the service quality and retailing literatures, their scale contains 14 attributes in four factors: Web site design (including personalization), reliability (including accurate product description, on-time delivery, and order accuracy), privacy/security, and customer service (referring to solving problems, willingness to help and prompt answers to queries).

Kim and Stoel [36], in their more simplified instrument, include three of the factors of Loiacono [37] plus three slightly different factors — entertainment, web appearance and transaction capability.

E-S-Qual and E-RecS-Qual. These two scales were developed for assessing the full cycle of service quality for online B2C e-commerce Web sites. The E-S-Qual scale developed in a 22-item scale of four dimensions: efficiency, fulfilment, system availability, and privacy. The second E-RecS-QUAL scale contained three dimensions (responsiveness, compensation, contact) with an 11-item scale [38].

3. Research Methodology

According to previous works and opinion of some experts in field website design, 6 factors were chosen as main criteria for evaluation. Then the weight of these criteria were calculated using AHP method. After that, each of these two websites, Expedia and Priceline, were evaluated using these 6 factors and TOPSIS method was used for analyzing the results and final ranking. More details is given about each of these steps in following sections [39].

1- Criteria and Evaluation Factors

As mentioned before, 6 factors were chosen as criteria for this evaluation which are as this:

I. Visibility and Findability: It means how easy it is to find the website using search engines.

II. Visual Design and Content: Elegant design, interesting appearance, high quality media (photos, videos, audios and etc.), updated content, newsletter, customer reviews and etc. are in this category.

III. Functionality and Accessibility: Evident navigation method, ease of access to different section of the website, proper functioning of different parts (images, videos and etc.), being responsive (mobile friendly) and compatibility with different devices and browsers are considered in this part.

IV. Technology: Good CMS, fast response to emails and good support, online purchase feature, reliable web hosting and server and security and privacy are main factors that should be considered in this section.

V. Online Bookablity: Availability of purchase button on all sections, secure and instant payment methods integrated in the website itself and supporting different payment methods should be evaluated as part of this criterion.

VI. Customer Engagement: Being active on TripAdvisor website and encouraging your customers to take part in these reviews and comments, having an account and being active on YouTube, Facebook, Tweeter, Google Plus and other social networks and having direct links to your account on these websites are measured as part of this factor.

You can see all criteria in Figure 1

Figure 1.

2- Research Framework

Some questionnaires were distributed among experts of web designing to rate these criteria against each other and then AHP method was applied the results to calculate the weight of each criterion. These experts either had at least three years of experience in this field or have a license or degree related to web designing [40]. Then Expedia and Priceline websites were evaluated by the same experts and TOPSIS method was applied to results of these questionnaires and final results and ranking was calculated. See the framework in Figure 2:

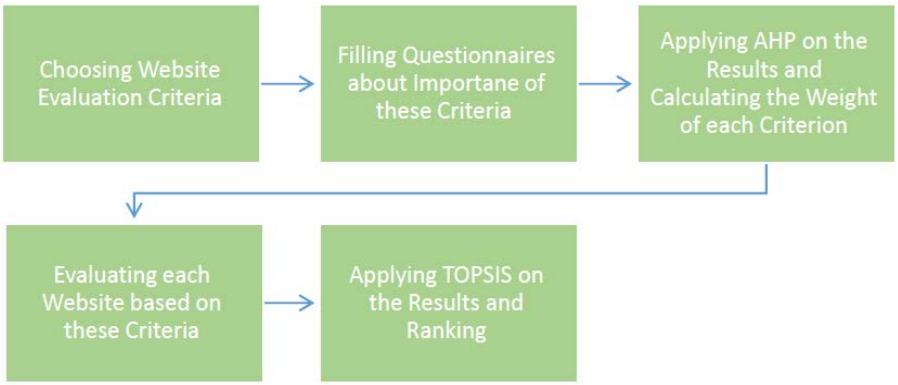

Figure 2.

3- Introduction of Expedia and Priceline

There are many online travel agencies, but Expedia and Priceline are two of the major and famous ones and are considered as each other's main competitors, so this study is aiming to compare these two with each other based on these criteria. Both these companies are based in US, but work on a global scale.

I. Expedia was launched in 2001 by Rich Barton and Lloyd Frink as an Internet-based travel website company with headquarters in Bellevue, Washington. It also has localized sites for 30 countries. It books airline tickets, hotel reservations, car rentals, cruises, vacation packages and various attractions and services via the World Wide Web and telephone travel agents. The site uses multiple global distribution systems like Amadeus or the Sabre reservation systems for flights and for hotels, Worldspan and Pegasus, along with its own hotel reservation system for contracted, bulk-rate reservations ("Expedia (website)", n. d.).

II. Priceline is an American company and a commercial website that claims to help users obtain discount rates for travel-related purchases such as airline tickets and hotel stays. The company is not a direct supplier of these services; instead it facilitates the provision of travel services by its suppliers to its customers. It is headquartered in Norwalk, Connecticut, United States. Priceline was founded by Jay S. Walker, who left the company in 2000. Hong Kong company Cheung Kong Holdings later purchased a significant portion of Priceline's stock ("Priceline.com", n. d.).

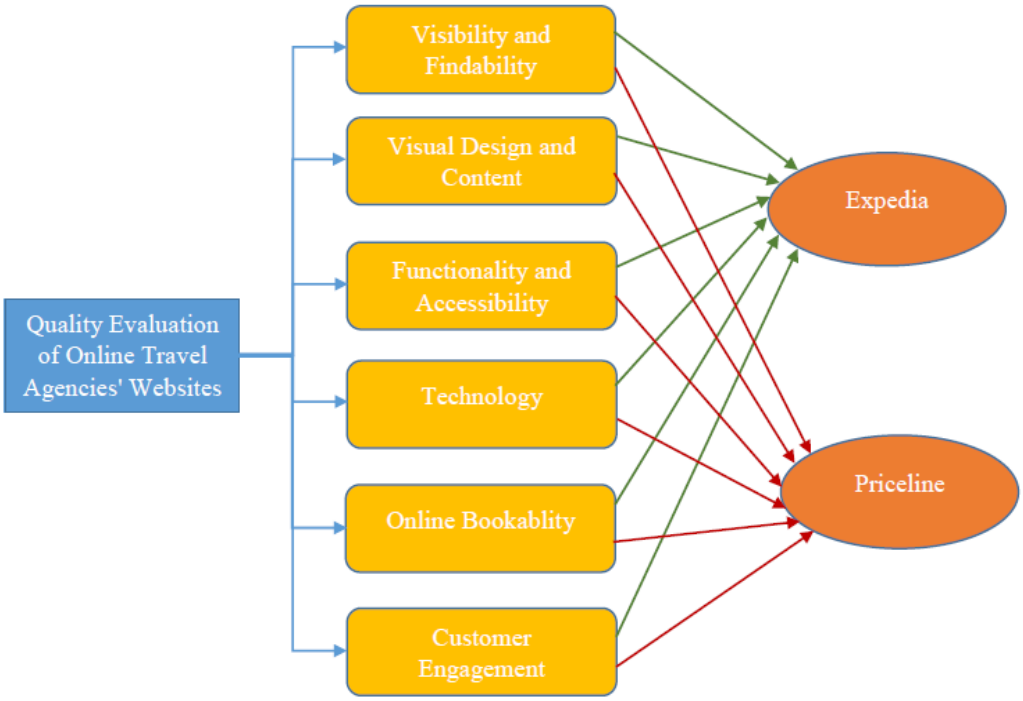

Figure 3.

4- Analytic Hierarchy Process

The analytic hierarchy process (AHP) is a structured technique for organizing and analyzing complex decisions, based on mathematics and psychology. It was developed by Thomas L. Saaty in the 1970s and has been extensively studied and refined since then. It has particular application in group decision making and is used around the world in a wide variety of decision situations, in fields such as government, business, industry, healthcare and education.

Users of the AHP first decompose their decision problem into a hierarchy of more easily comprehended sub-problems, each of which can be analyzed independently. Once the hierarchy is built, the decision makers systematically evaluate its various elements by comparing them to one another two at a time, with respect to their impact on an element above them in the hierarchy. In making the comparisons, the decision makers can use concrete data about the elements, but they typically use their judgments about the elements' relative meaning and importance. It is the essence of the AHP that human judgments, and not just the underlying information, can be used in performing the evaluations.

The AHP converts these evaluations to numerical values that can be processed and compared over the entire range of the problem. A numerical weight or priority is derived for each element of the hierarchy, allowing diverse and often incommensurable elements to be compared to one another in a rational and consistent way ("Analytic Hierarchy Process", n. d.).

5- TOPSIS

The **Technique for Order of Preference by Similarity to Ideal Solution** (**TOPSIS**) is a multi-criteria decision analysis method, which was originally developed by Hwang and Yoon in 1981 with further developments by Yoon in 1987 and Hwang, Lai and Liu in 1993. TOPSIS is based on the concept that the chosen alternative should have the shortest geometric distance from the positive ideal solution and the longest geometric distance from the negative ideal solution. It is a method of compensatory aggregation that compares a set of alternatives by identifying weights for each criterion, normalizing scores for each criterion and calculating the geometric distance between each alternative and the ideal alternative, which is the best score in each criterion. An assumption of TOPSIS is that the criteria are

monotonically increasing or decreasing. Normalization is usually required as the parameters or criteria are often of incongruous dimensions in multi-criteria problems. Compensatory methods such as TOPSIS allow trade-offs between criteria, where a poor result in one criterion can be negated by a good result in another criterion. This provides a more realistic form of modelling than non-compensatory methods, which include or exclude alternative solutions based on hard cut-offs ("TOPSIS", n. d.).

The TOPSIS process is carried out as follows:

Step 1:

Create an evaluation matrix consisting of m alternatives and n criteria, with the intersection of each alternative and criteria given as xij, we therefore have a matrix $(xij)\times n$.

Step 2:

The matrix $(xij)m\times n$ is then normalized to form the matrix $R=(rij)m\times n$ using the normalization method $rij=xij\sqrt{\Sigma xij2mi=1}$,$i=1,2,\ldots,m,j=1,2,\ldots,n$

Step 3:

Calculated the weighted normalized decision matrix $T=(tij)m\times n=(wjrij)m\times n,i=1,2,...,m$ where $wj=Wj\Sigma Wjnj=1/,j=1,2,...,n$ so that $\Sigma wj=1nj=1$ and Wj is the original weight given to the indicator $vj,j=1,2,...,n$.

Step 4:

Determine the worst alternative (Aw) and the best alternative (Ab): $Aw=\{\langle\max(tij|i=1,2,...,m)|j\in J-\rangle,\langle\min(tij|i=1,2,...,m)|j\in J+\rangle\}\equiv\{twj|j=1,2,...,n\}$,

$Ab=\{\langle\min(tij|i=1,2,...,m)|j\in J-\rangle,\langle\max(tij|i=1,2,...,m)|j\in J+\rangle\}\equiv\{tbj|j=1,2,...,n\}$,

Step 5:

Calculate the L2-distance between the target alternative i and the worst condition Aw

$diw=\sqrt{\Sigma(tij-twj)2nj=1},i=1,2,...,m,$

And the distance between the alternative i and the best condition Ab $dib=\sqrt{\Sigma(tij-tbj)2nj=1},i=1,2,...,m$

wherediw and dib are L2-norm distances from the target alternative i to the worst and best conditions, respectively.

Step 6:

Calculate the similarity to the worst condition: $siw=(diw+dib)/,0\leq siw\leq 1,i=1,2,...,m.$

$siw=1$ if and only if the alternative solution has the worst condition; and

$siw=0$ if and only if the alternative solution has the best condition.

Step 7:

Rank the alternatives according to $(i=1,2,...,m)$.

4. Results Analysis and Discussion

For this study, these two websites were evaluated during December 2014. First, some questionnaires about importance of each criterion was given to experts and their answers were gathered and analyzed and weight of each criterion was calculated using AHP method. Table 1 shows the result of one of these questionnaires:

Table 1

Evaluation Criteria (Expert 1)	Visibility and Findability	Visual Design and Content	Functionality and Accessibility	Technology	Online Bookability	Customer Engagement
Visibility and Findability	1	3	5	7	3	6
Visual Design and Content	0.3333	1	3	6	3	5
Functionality and Accessibility	0.2	0.3333	1	7	5	6
Technology	0.1429	0.1667	0.1429	1	0.1429	0.2
Online Bookability	0.3333	0.3333	0.2000	7	1	7
Customer Engagement	0.1667	0.2	0.1667	5	0.1429	1

Then all these completed questionnaires were turned into one using geometric mean and you can see the result in Table 2:

Table 2.

Evaluation Criteria (Geometric Mean)	Visibility and Findability	Visual Design and Content	Functionality and Accessibility	Technology	Online Bookability	Customer Engagement
Visibility and Findability	1	3.2453	4.4777	6.0933	3.3659	5.8845
Visual Design and Content	0.3081	1	0.5642	5.7527	2.4915	5.0080
Functionality and Accessibility	0.2233	1.7725	1	6.2330	4.0428	5.8845
Technology	0.1641	0.1738	0.1604	1	0.1655	0.3466
Online Bookability	0.2971	0.4014	0.2474	6.0438	1	4.8914
Customer Engagement	0.1699	0.1997	0.1699	2.8854	0.2044	1
Sum	2	6.7927	6.6196	28.0082	11.2701	23.015

Table 3. Weight of Criteria

Criterion	Weight
Visibility and Findability	0.3981
Visual design and Content	0.1698
Functionality and Accessibility	0.2254
Technology	0.0319
Online Bookability	0.1251
Customer Engagement	0.0497

And you can see the calculated weight of all criteria in Table 3.

Then the second questionnaire was distributed among the experts to evaluate these two websites based on these 6 criteria. Table 4 shows one of the completed questionnaires.

Then all these filled questionnaires were turned into one using geometric mean and you can see it in Table 5.

Table 4.

Evaluation of Online Travel Agencies (Expert 1)	Visibility and Findability	Visual Design and Content	Functionality and Accessibility	Technology	Online Bookability	Customer Engagement
Expedia	100	60	90	100	100	80
Priceline	90	80	50	100	100	70

Table 5.

Evaluation of Online Travel Agencies (Geometric Mean)	Visibility and Findability	Visual Design and Content	Functionality and Accessibility	Technology	Online Bookability	Customer Engagement
Expedia	100	66.8762	91.8598	95.8732	100	75.9067
Priceline	90.7527	84.8822	62.3859	95.8732	100	66.8762
Weight	0.3981	0.1698	0.2254	0.0319	0.1251	0.0497

Then as you can see in Table 6, these numbers were normalized:

Table 6

Normalized Evaluation of Online Travel Agencies	Visibility and Findability	Visual Design and Content	Functionality and Accessibility	Technology	Online Bookability	Customer Engagement
Expedia	0.7405	0.6189	0.8273	0.7071	0.7071	0.7503
Priceline	0.6720	0.7855	0.5618	0.7071	0.7071	0.6611

Then they were weighted (Table 7):

Table 7

Weighted Normalized Evaluation of Online Travel Agencies	Visibility and Findability	Visual Design and Content	Functionality and Accessibility	Technology	Online Bookability	Customer Engagement
Expedia	0.2948	0.1051	0.1864	0.0225	0.0885	0.0373
Priceline	0.2675	0.1334	0.1266	0.0225	0.0885	0.0329

Then positive and negative ideal solutions were determined. Positive ideal solutions are the maximum of each row and the negative ideal solutions are the minimum of each row. You can see them in Table 8:

Table 8

Weighted Normalized Evaluation of Online Travel Agencies	Visibility and Findability	Visual Design and Content	Functionality and Accessibility	Technology	Online Bookability	Customer Engagement
Expedia	0.2948	0.1051	0.1864	0.0225	0.0885	0.0373
Priceline	0.2675	0.1334	0.1266	0.0225	0.0885	0.0329
I+	0.2948	0.1334	0.1864	0.0225	0.0885	0.0373
I-	0.2675	0.1051	0.1266	0.0225	0.0885	0.0329

Table 9.

D+	D-	CC	Rank	Online Travel Agencies
0.0008	0.0043	0.8443	1	Expedia
0.0043	0.0008	0.1557	2	Priceline

And finally, the distance between each alternative and positive and negative ideals and closeness coefficient (CC) was measured. The one with the higher CC is the better website (Table 9).

As you can see, evaluations show that Expedia's website gets a better score on these criteria and so has a better quality than Priceline's website.

Also you can see these websites' score on each category the below chart:

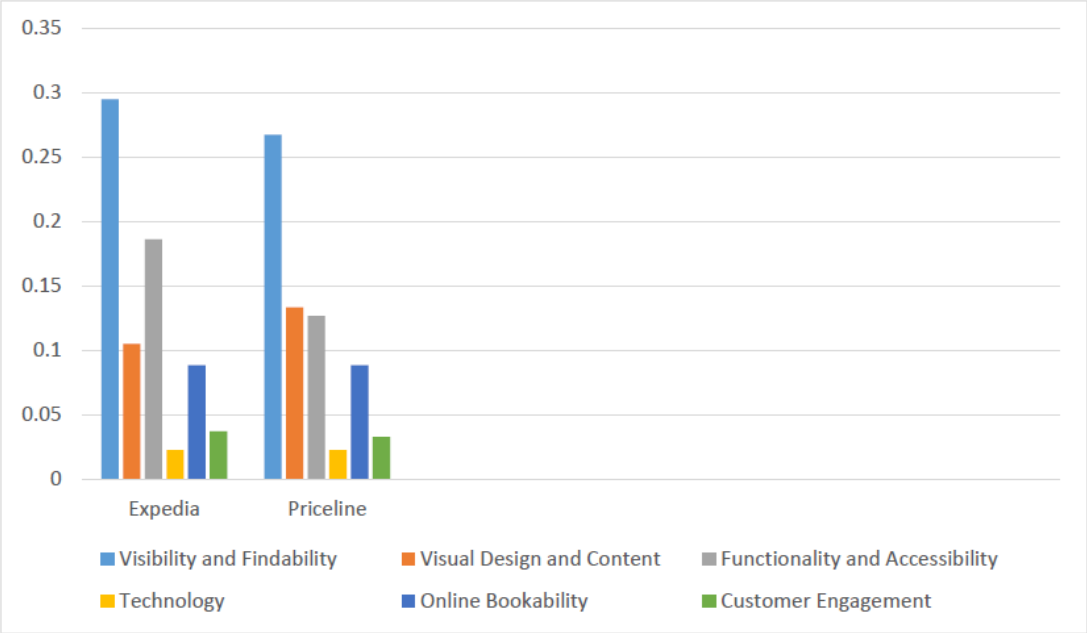

Chart 1.

As you can see in this chart, the most difference is in the first three criteria that also has the most weight. In online bookability and technology, they both receive the same score and there no need for much improvement in this part. In visual design and content, Priceline has the upper hand and Expedia has to improve its website's design to make it more attractive for visitors.

In other sections, Expedia is better. In visibility and findability, Expedia usually is among the top 3 search results which very impressive. Priceline is also on the first page of search results, but it usually is 7 or higher which is good, but not as good as Expedia. So they should work more on SEO (search engine optimization) and other related methods to improve their ranking [42].

The difference in customer engagement is little and Expedia usually has more followers and fans than Priceline on every social network.

But the main difference is related functionality and accessibility. Expedia is well designed for mobile devices and different browsers and is fully responsive. But Priceline is not responsive at all which make it impossible for mobile device users to use this website on their device. And considering the fact that number of mobile users have exceeded number of desktop users, this is a major weakness for Priceline that should be solved immediately or they will keep losing their customers.

5. Conclusions

The aim of this paper was to establish a criteria for evaluating online travel agencies and evaluate two of them as the case study. Results showed that the most important criteria are visibility and findability and functionality and accessibility. The first one is very important because the number of online travel agencies and other similar websites is rapidly growing and if users can't find your website among these huge number of competitors, then you don't have any chance for becoming successful. And the other one has become very important in recent years. Mobile devices are becoming very popular and the number of mobile devices in every house is higher than the number of desktop computers and so nowadays mobile devices have more users. But website designers should note that these devices are different than traditional ones and have special needs and websites should be responsive and optimized for them in order to function properly. Otherwise users will easily ignore their websites and will go to other similar websites that are mobile friendly. Also the nature of tourism industry involves travelling and so mobile devices are even more important in this industry. And the fact that Priceline has ignored this issue is the main reason that they are falling behind and they should solve it quickly.

The importance of these two criteria doesn't mean that we should ignore other factors. As we can see both these websites got good score on these other criteria which means they are aware of their role in success. All of these criteria are important in their own way and ignoring any of them can harm your business and give an edge to your competitors.

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