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Web 2.0 applications in tourism

A statistical analysis at hotels' websites

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ABSTRACT

Web 2.0 applications have been increasingly recognized as important information sources for consumers, including the domain of tourism. It is important therefore to investigate the issues associated to Tourism 2.0. The interactive character of Web 2.0 applications allows users make recommendations and ratings, but the danger of “false” postings renders them less trustworthy than the official governmental tourist websites when trying to find information about residence and accommodation. Using the data collected by eight of the most dominant search engines related to tourism and concern information about four hundred eighty six, chosen according to the list presented on Tripadvisor for each one of the twenty seven European capital cities, we made a statistical analysis. After proving that the variables that we examine are correlated we observed that almost one at four hotels is found in all the search engines. The part related to the cost analysis showed that there are differences among the search engines but we cannot conclude that one specific search engine should be preferable for always presenting the lower prices. The same are the results of the rating-satisfaction analysis, so travelers must evaluate all the sources during their travel planning decisions to conclude to the most profitable solution.

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1. INTRODUCTION

As the years pass and the technology of informatics is evolving, the use of the World Wide Web has become more widespread and this led to the new generation of it, called Web 2.0. Web 2.0 provides users with web applications that allow and facilitate interactive information sharing and collaboration between them. A lot of researches related to this phenomenon have taken place so it is critical to make a theoretical approach, based on the international bibliography, to Web 2.0 and to the new terms that are widely used and refer to it, by focusing mostly on the Web 2.0 applications that concern the sector of tourism. It is also important to make a statistical analysis concerning a specific form of Web 2.0 applications, those related to tourism, by the use of some of the most dominant search engines in the travel domain in order to compare them and to see if there are any important differences among them.

This study, by the use of the theoretical approach, passes in review the basic and most commonly used terms related to the Web 2.0, such as social networking, user-generated-content and world-of-mouth. We will also refer to the reasons for the participation to the Social Networks and to the problems of these websites that are valid not only in general but for the sector of tourism as well. In order to focus the research on this sector, we will present the profile of the users of these applications and of them who create the content online, so as to see if there are any gender or age differences. Then we will mention the role of the Web 2.0 applications related to tourism by the managers' and by the travelers' scope, by emphasizing to the latter and we will examine which stages of the travel planning process these applications intend to mainly affect. Furthermore we will make a reference to the factor of trust and to the false postings that may influence the credibility of the content of these applications in comparison to the official state tourism websites and to how we can partly insure a level of security. Consequently we will next make a short reference to the legal and social implications of the online content presented to the applications that we examine. Finally at the end of this theoretical part, there will make a small presentation for Tripadvisor which constitutes one of the most commonly used Web 2.0 tourism applications.

The theoretical part constitutes a bibliography review, the main aim of this study is to make a statistical approach to the data, collected by the eight most dominant search engines in the domain of tourism, that concern the prices of the rooms and the ratings of four hundred eighty six hotels (486) and to be more precise, eighteen hotels for each one

of the twenty seven European capital cities. An equal in amount sample of six hotels for each one of the categories of three, four and five stars is used and the prices are collected from their official websites as well, when they were available. The statistical analysis first of all aims to show some general statistical elements such as the presence of hotels in the search engines, namely to see how many of them appear in all the search engines or in each one of them separately. In addition to this, it is important to prove if there is any kind of correlation between the variables that participate in the research.

Another focal point of this statistical study is the cost analysis by the presentation of the descriptive measures of the prices, in order to see not only the general trend of the prices for each category but also for each search engine separately. We took into consideration the prices of the official websites when they were available. This fact will allow the comparison among the eight search engines and will help us conclude to which one of them appears to be the cheapest during the time period that we examine. Additionally it will permit the comparison among the prices given by the search engines and by the official websites, so as to see whether it is economically more beneficial to book directly from the website or to use a Web 2.0 tourism application of the ones mentioned. The final aim of the statistical analysis is to present a rating-satisfaction analysis. At this part it is important to show the descriptive measures of the satisfaction rating and the general trend that is observed proportional not only to the category of the hotels but also to the each search engine separately. Furthermore it is useful to notice which search engines usually give the highest or the lowest ratings.

Finally, at the conclusion the objective is to summarize all the findings of the theoretical and the statistical approach as it was mentioned above and to cite the limitations that in the future can turn into a fuse for a more thorough study.

2. BIBLIOGRAPHY REVIEW: A theoretical approach

By the early 1990s when the Internet diffusion started, there has been a great technological evolution and the World Wide Web is undergoing a further revolution. People with common interests can be gathered in online communities that provide the users with a collection of various interaction possibilities (Miguens, 2008). New terms such as Web 2.0, social networking, consumer generated content and word of mouth are widely used and therefore a lot of relevant articles have been published. By looking at the international bibliography we can see that most of the results of researches concern a theoretical approach to these terms. Some of them are statistical analysis and case studies that focus on a specific domain, such as the factor of trust or the reasons and the profile of the people who participate in online communities. It is important to make a reference to all these elements which will be analyzed at this unit, where we will also mention the reasons that motivate people to participate in online communities and the problems that may occur.

2.1 Web 2.0 Technologies

The term Web 2.0 emerged in late 2004 in the work of Tim O'Reilly of O'Reilly Media. This term is used in order to describe the new generation of the World Wide Web and is associated to web applications that allow and facilitate interactive information sharing and collaboration between the users. The website is no longer just a static page but it is turned into a dynamic platform which allows users, the autonomous generation of content and gives them the possibility of expressing their own experiences (Miguens, 2008).

2.1.1 General Terms

By the use of the technology, the Web is evolving from a business-to-consumer marketing media to one where peer-to-peer generation and sharing of data are the norm (O' Connor, 2008). This can be easily approved as new forms of sites are created, of which the basic characteristic is the ability of sharing information and content online, as the consumer-user of the website can present his opinion, reviews and ratings concerning a specific product or service. The content added by the consumer is called

“Consumer-generated content” (Gretzel, 2008) and the websites that give their users this opportunity are a form of social networking and constitute the epitome of Web 2.0.

According to Tredinnick (2006) the basic Web 2.0 Technologies and applications in the first place are the wikis, the blogs, the RSS and the peer-to-peer networks. The blogs appeared in the mid 1990s as a simplified way of publishing to the web and were first used as online diaries but later became utilized as a more general information tool where people can express their ideas on several topics. The wikis are like blogs but they additionally support the creation of full-scale websites with their combination of templates, authoring tools and audit trails. They also allow the collaborative software development and participation to the editing of information to the pages browsed. RSS is a suite of web-content syndication protocols and constitutes a way of syndicating web content through the use of content feeds. But on top of all the technological approaches come the business models such as social network sites, information aggregators of various kinds including price comparison services and the exploitation of user contributed content to add value to commercial services. The Web 2.0 business models, give users the opportunity to participate interactively and derive profitable returns by spreading information online and by reading other users’ generated content. This form of communication that refers to interpersonal communication among consumers concerning their personal experiences with a firm or a product is called “Word of mouth (WOM) communication”, a characterization given by Richins in 1983.

2.1.2 Reasons for participation to Social Networks- Online communities

It is mentioned above that the participation in social networks is spreading but it is needed to make a short reference to the reasons why people participate in these networks in every domain that they may refer to. According to Chung and Buhalis (2008), the variables are socio-psychological, such as keeping relationship with members, seeking a sense of belonging, and seeking identity. They might be hedonic such as having fun with contents, entertainment and to be amused by members and variables related to with information acquisition such as obtaining up to date information, sharing experiences and finding efficient information easily. At this study we will later analyze the importance of the last set of variables, more specifically for the domain of tourism.

2.1.3 Problems of social network sites

However according to O'Connor (2008) the social network sites are not without problems. As everyone has the right to deposit his point of view there might be an information overload problem which influences the credibility of the information presented (Bellman et al., 2006). Misleading information can affect the decision making process and can cause lack of trust. This is something unavoidable because the communication through the online environment does not allow the use of other contextual clues (such as for example a person's facial expression) to make the evaluation of the opinions (Dellarocas, 2003).

For the reason mentioned above and in order to make the information presented more credible, some websites often display demographic data or data such as the length of membership or the username. The anonymity and the authenticity are also two problems highlighted by the researchers of Web 2.0, as registration is not needed in every website in order to post something (Puri, 2007). In addition, someone can create multiple user accounts by using different e-mail addresses.

2.2 Web 2.0 and Tourism

The Web 2.0 applications are applied in many domains and in the tourism sector, that we are examining at this study, as well, while searching for travel related information is considered to be one of the most popular online activities. Online communities have been recognized as important information sources for consumers and as an effective marketing channel for marketers that are involved with the tourism industry. These applications have been named Travel 2.0 applications by Philip C. Wolf, president and CEO of PhoCusWright, a leading consultancy firm in the tourist arena (Miguens, 2008).

In Web 2.0 tourism applications the tourists post information that concerns their opinion and personal experiences, reviews and multimedia elements such as photos and videos concerning hotels, destinations and local tourist attractions (Miguens, 2008). They can also pose questions and look for the answers (Chung and Buhalis, 2008). One basic characteristic of the online social travel networking is that it is acting as a dissolver of boundaries and a catalyst to globalization (Puri, 2007) by allowing the interaction and the spreading of information among people who do not share the same social habits and cultural ideas. This makes the communication multicultural and therefore the collaboration multidimensional. In addition, information is created by

users and not by marketers and this makes it more credible (Gretzel, 2008) and exempted by economic profits.

2.2.1 Users' and Content Creators' profile

While trying to specify the profile of the people who use websites to make their travel-related decisions, we should mention that gender differences are found in online travel information search (eMarketer, 2010). According to Gretzel and Yoo (2008) women are more likely to engage in word-of-mouth (WOM) behavior and female users have been found more likely to be influenced by recommendations received from friends than marketer information. Differences also exist for different age groups. Young consumers are more likely to be influenced by WOM, with 85% of them indicating that they primarily learned about new products through WOM, but at the tourism literature it is reported that WOM is also important for older travelers too.

The basis of the new generation of tourism websites is the user who creates the content. At table 1 we can see the three types of content creators and their main features. Firstly there are the independent experts, such as the government tourism websites. The second type is the consumers who constitute the main creator of content at the third party tourism websites that we are examining and are in the center of the interest and finally the sellers-tourism operators.

Table 1 Summary of the different content creators of online tourism information
(derived from Burgess et al., 2009)

Content Creator	Description/ Features	Examples
Independent Expert	Information is created by what people perceive to be independent bodies or entities that allow the published information to embrace elements of objectivity and credibility. The information is impartial and devoid of advertising or unjustified recommendations. The evaluation and review of particular tourism product or service - with subsequent rating/recommendation might as well fall into this category. The use of online recommender systems based on user profiles to suggest unbiased products or services.	Government tourism websites Travel Agents
Consumer	Information that embodies User- Generated- Content that can be viewed as form of electronic word-of-mouth (eWOM). Product recommendations from other travel consumers appear to be more important to prospective purchasers when associated with an experiential product such as tourism. Purchasing intentions improve with the number of positive reviews posted on a travel product/ service.	Weblogs Social networking sites Third party tourism websites such as Tripadvisor
Seller (Tourism Operators)	Promotional marketing of an operator's products through a review in the traditional media or on a website recommending a particular product. The use of online recommender systems based on user profiles to suggest some of the operator's products or services.	Email promotion based on a commercial mailing list Tourist operators own website

2.2.2 The role of Web 2.0 tourism applications

The tourism domain is very complicated as the traveler may has never visited a destination before or he may not be familiar with the service provider and this makes the Word-of-mouth information even more widespread (Chatterjee, 2001). The consumers are more based to other users' online created content, so users have to provide with both quantitative and qualitative feedback (O'Connor, 2008). According to Chung and Buhalis (2008) when planning to travel, individuals tend to undertake extensive information search. This is because travel products are tangible and cannot be evaluated in advance. In addition, the cost of a trip is one of the biggest expenditures (Sirakaya & Woodside, 2005) so individuals are very careful and they try to collect information that would maximize their knowledge by credible sources. Generally it is considered that if any compensation is needed to acquire information, then information is believed to have commercial traits (Money & Crofts, 2003). On the other hand if information is provided by a third party like the travel network communities it is

considered to be more reliable and trustworthy, subsequently the online communities are regarded as one of the most influential information source as they provide up-to-date destination information.

According to O'Connor (2008) the role of the online travel communities has to be examined by two scopes, by the managers' and by the travelers'. We will shortly refer to the first one by mentioning that the content presented on travel websites help managers to better understand how they can manage their image and positioning on the site by improving and promoting their services. By the scope of the travelers, which has to be more emphasized, the content generated online concerning tourism serve two distinct roles, first they provide information about products and services (Gretzel, 2008) and they also the serve as recommendations (Park & Lee, 2008). One of the key effects of the travel communities is the support they provide during the consumer decision making process. According to Cox et al. (2009) travelers generally collect and review various forms of travel information early in order to minimize the risk of making a poor decision.

In order to understand better the role of the user-generated content (UGC) and the Web 2.0 platforms related to travel planning, we will present the five key stages that constitute the general travel planning process (Figure 1). Travelers are based on this model when they seek for tourist information, so according to Cox et al. (2009) UGC sites have the potential to influence viewers' decisions at any of these stages.

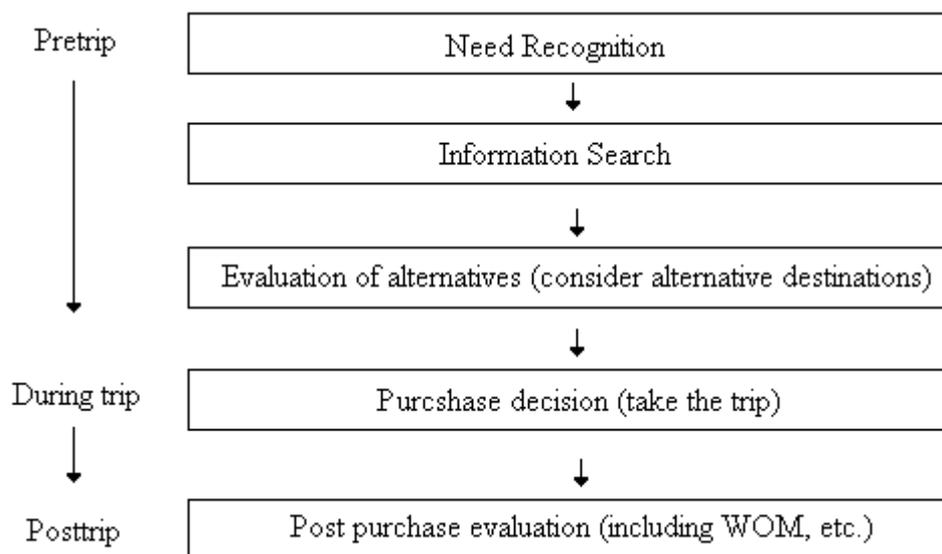


Figure 1 The travel planning process (Cox et al., 2009, adapted from Engel, Blackwell and Miniard, 1990)

Theoretically the roles mentioned above, are the roles which the third party (non commercial) travel sites are made for, so a lot of researches have taken place in order to confirm this hypothesis. Cox et al. (2009) showed that the majority of the people who participated pointed that they use the UGC travel sites in the stage of the information search and after they have already chosen the destination and during seeking information on accommodation options (28%). So their results confirm that UGC sites relevant to the tourism really provide information about products and services and serve as recommendations.

According the research made by Gretzel and Yoo (2008), where the sample of the participants was consisted by users of Web 2.0 applications related to tourism and review readers, the travel planning procedure involves a multitude of facets for which decisions need to be made through all the planning stages and the use of reviews presented on online communities is extensive. The majority (77,9%) claimed that find the travel reviews extremely important in order to choose where to stay, the 33.6% about where to eat, the 32.5% about what to do during their staying, the 27% about where to go and the 26.6% about when to visit the destination that they have chosen.

2.2.3 The factor of Trust

As in every information presented on the Internet, the level of trustworthiness of online travel information has to be taken under consideration. By trying to define “trust” that concerns the user generated content, according to Chen (2006), we should adopt the idea that regards trust as a belief or expectation about another party’s trustworthiness.

According to Burgess et al. (2009) the sources of information that we are examining which are the websites related to travel, can be characterized as impersonal and personal. The first category includes the product/service sellers and the travel agents and the second includes sources that can be attributed to the word-of-mouth. At this kind of websites consumers can post content online in a number of formats, such as text reviews and images. A number of legal and social issues associated to this type of online content are discussed as they can affect the level of trust placed in this content. Goods with experience qualities, such as travel products, cannot be easily determined before purchase because of their nature and for this type of goods. At these cases consumers rely more on product recommendations from others but there is always a doubt by the part of the consumer because the “tie” among him and the recommenders is weak, which means that they do not have a personal relationship (Duhan et al., 1997).

It is proved that information derived from logical, well-reasoned and persuasive reviews can positively influence the likelihood of product purchases (Park & Lee, 2008) and that by buying a mostly recommended product the consumer's likelihood will be maximized. According to Litvin et al. (2008) it is more likely that consumers who have had extreme experiences, either very favorable or very unfavorable ones, are more likely to provide online comments or reviews, so these sites could be regarded as being more neutral.

One of the challenges faced by social network sites is false postings. Many people suspect that at least some information and reviews are fake and posted either by competitors to drag down the scores of the others or to ameliorate their position (Dellarocas, 2003). So there is criticism and skepticism, regarding the power of UGC to persuade travelers about travel related decisions, based on the potential of "fake" content to be posted by travel operators posing as independent reviewers. This automatically defeats the purpose of UGC to influence travelers in their decision making process as the content added is no longer independent, objective or credible (Bray and Schetzina, 2006).

There is a perception that consumers are considered to be more reliable and honest as an information source because they are not affected by economical benefits as they do not promote any fiscal interests (Senecal and Nantel, 2004). Consumer created content tends to reflect threads of consumer experiences, views and beliefs associated with travel and tourism events and reviews that are often considered to have a relatively high trust value. On the other hand, as it is already mentioned, sometimes fake content is posted as a form of deception to either improve the profile of a company or damage its reputation (Burgess et al., 2009).

A main question is how consumers can be assured that the reviews that they are viewing are independent and trustworthy. According to Dellarocas (2003), it is pointed out that one of the most important factors in understanding the credibility of a reviewer is the overall number of reviews posted (irrespective of whether they are positive or negative). Even though single reviews may not be false it is considered that such reviews are more extreme and this makes them less trustworthy. Another factor that might indicate a false review is its great deviation from the average or the fact that a reviewer may have visited only one site the day he registered and posted only one review (Keates, 2007). A means of protection is the registration needed in order to leave comments, but this does not insure that someone has not made multiple accounts with

different usernames. But in general little evidence is found of characteristics that typify false reviews.

In order to understand the level of travelers' trust and whether they trust more the UGC sites compared to the more traditional sources of information such as travel agents and State tourism websites a lot of researches have taken place. According to a research made by Cox et al. (2009) the majority of travelers (91%) believe that the state tourism websites are the most trusted source of information. The same result is presented at the research of Burgess et al. (2009) where travel consumers place more trust in travel information provided on State tourism websites and by travel agents (mean 5.65 and 4.82 to 10) than they do in travel comments provided by travelers on weblogs and social networking sites (mean 4.39 and 4.19 to 10). We conclude that UGC sites relevant to the tourism really provide information about products and services and serve as recommendations but they act as an additional source of information as the official state websites are considered to be more reliable. Travelers use the advice provided by these websites but they do not constitute the unique and the trust worthiest source of information.

2.2.4 Legal and social implications of online content

As the use of the websites that publish UGC is becoming more extended, it is necessary to make a small reference to the fact that new legal and ethical issues have to be seriously taken into consideration. Like all the types of social networking sites, the ones related to travel facilitate new types of fraud as they enable new types of communities where not all the participants can understand the obligations that publishers have when dealing with the online environment. In addition, more countries are involved and there is a different set of regulations, laws and policies in each one of them, including issues related to copyright and distribution of content (Burgess et al., 2009). Especially for the domain of tourism there are some serious discussions related to the fact that the providers of content must be aware of potential intellectual property infringements as well as defamation when posting comments because there might be a possibility to damage the reputation of individuals or businesses (Fayle, 2007).

2.2.5 Case Study of Tripadvisor

Online social travel networking is a new method that affects the way tourists plan their trips. These websites allow users to interact and provide reviews on hotels or on local tourist attractions. Some examples of these websites are Booking.com, Expedia.com, Hotelclub.com, Hotels.com, Orbitz.com, Priceline.com, Travelocity.com, Tripadvisor.com and Venere.com. The latter, according to its official website where it mentions the results of comScore Media Matrix (August 2010), is the most dominant one and we will make a small reference to it, as the statistic analysis that follows to the next chapter is based on the hotels that are listed at this website.

As it is mentioned at its official website, Tripadvisor attracts more than 50 million unique monthly visitors across 18 popular travel brands. It has 20 million members, and over 40 million reviews and opinions. The site, which was founded in 2000 and is a part of Expedia Inc, operates in 26 countries worldwide. This website is based on the idea that travelers rely on other travelers' reviews to plan their trips and be helped in their decisions. Most of the information presented on Tripadvisor is autonomously generated by its users and apart from the reviews, multimedia elements can also be posted. The main difference among Tripadvisor and the other websites mentioned above, is that by Tripadvisor the user cannot make bookings at the hotels, he can only see reviews, suggestions, the popularity index and the rating of them, or acquire information about restaurants, accommodation facilities, sightseeing locations and planning tips. There is also the possibility to create a topic and pose questions that can be answered by travelers who have already visited a destination and can express their own experience, so users can get quantitative feedback (O' Connor, 2008).

As it is mentioned above, the factor of trust plays a very important role and it is highly important to ensure the security and confidentiality of the personal information which is posted. For this reason, although it is very difficult to control the information diffused by Internet, only registered members can post reviews and comments. Tripadvisor asks for some personal information that can identify the user including his first and last name, telephone number, postal and e-mail addresses, user name and password. Tripadvisor can also automatically collect some information about the user's computer when he visits the website, such as session data, including the IP address, Web browser software, and referring Web site.

3. METHODOLOGY

The statistical analysis that follows to the next part, for which we have used the SPSS statistical package, focuses on some of the most dominant search engines concerning hotels and the official websites of the hotels as well. The data that is used comes from the websites Booking.com, Expedia.com, Hotelclub.com, Hotels.com, Orbitz.com, Priceline.com, Travelocity.com, Venere.com and Tripadvisor.com, during the time period September to November 2010.

For each one of the twenty seven European capital cities we have gathered information for eighteen hotels, six for each category of the 3 stars, 4 stars and 5 stars, randomly selected from the list of the hotels that Tripadvisor gave for each city sorted by rating, so most of them were at the first positions. For each one of the four hundred eighty six hotels we listed the city where it is located, its name, its official website and the price of the room that is mentioned in it when it was available, the number of the stars that it has and consequently the category where it belongs and the number of its rooms. By Tripadvisor we also noted its popularity index, the number of reviews and the percentage of recommend and by each one of the rest of the search engines we recorded the price and the rating when this information was available. The price refers to one bed room and the monetary unit that is used is the euro, so when some of the websites used another unit, the price was converted.

During the collection of the data the main problem was the lack of information. Many hotels were not presented on all the search engines. Especially for the 1 star and the 2 stars hotels this phenomenon was very intense and for this reason we did not use these two categories as the analysis could not lead us to safe conclusions. In addition to this, not all the hotels had an official website with prices presented on it. To be more precise by the 486 hotels that participate to the project, the 464 presented prices at their official websites, 144 of the 3-stars, 159 of the 4-stars and 161 of the 5-stars.

The statistical analysis is the best means of processing data like those that we collected and especially for a multi-dimensional subject like the one that we are examining, while in the future new elements can be added for further analysis and for deeper conclusions. It focuses on finding the descriptive measures of trend and dispersion for some variables that we would like to examine in each case, such as the price and the ratings. In addition to this, we present the frequencies where the hotels fulfill the conditions of the key questions that we investigate. The statistical analysis

that we do and consequently the results, is very important in order to compare the search engines and to see if we can conclude to which one of them appears to be the cheapest way to book a hotel through the internet. It is also very useful in order to understand which search engine is the most complete, which means that it might be more credible than some others.

To conclude, the statistical analysis that will follow has many advantages as it helps to distinguish the differences that might present among the eight search engines that we want to examine and it gives us the possibility to export some important conclusions about the prices and the ratings given by them, which constitutes and the focal point of this study.

4. DATA ANALYSIS: Web 2.0 applications in hotels' websites - Statistical approach

At this part of the study we will present the data analysis that concerns the information related to the hotels of the European capital cities that has been gathered in order to be statistically analyzed, as mentioned at the methodology. Furthermore we will interpret the findings which will appear on tables. First we will cite the table and its explanation will follow. At the beginning we will present some general statistical elements, then the cost analysis which includes the comparison of the search engines and finally the rating-satisfaction analysis.

4.1 General Statistical Elements

4.1.1 Presence of hotels at the search engines

First of all it is important to check the presence of the hotels, so at table 2 that follows we can see the number of the hotels found for all the categories in total and for each category separately and at table 3 the same number but for each category separately.

Table 2 Percentage of the hotels found in search engines

Hotels found:	All Categories		3 stars hotels		4 stars hotels		5 stars hotels	
	Frequency	Percentage	Frequency	Percentage	Frequency	Percentage	Frequency	Percentage
In all the search engines	112	23%	30	18.5%	35	21.6%	47	29%
At least at the half of the search engines	322	66.3%	91	56.2%	106	65.4%	125	77.2%

At the table above we can see that 23% of the total sample of the hotels (486 hotels) are found in all the search engines. For the 3 stars hotels this percentage is 18,5% and for the 4 stars and the 5 stars hotels the equivalent percentages are 21,6% and 29%. At the last row of table 2 we can see the frequencies and the percentages of the hotels found at least at the half of the search engines, in total and for each category separately. We observe that 66,3% of the total sample of the hotels are found in at least at the half of the search engines that we examine. For both occasions we can realize that the

percentage is increased as the category of the hotel gets higher. This shows that the search engines are more complete for the 5 stars hotels rather than for the 4 stars or the 3 stars hotels.

Table 3 Percentage of the hotels found in each search engine

	All Categories		3 stars hotels		4 stars hotels		5 stars hotels	
	Frequency	Percentage	Frequency	Percentage	Frequency	Percentage	Frequency	Percentage
Booking	443	91,15%	149	91,98%	143	88,27%	151	93,21%
Expedia	440	90,53%	145	89,51%	145	89,51%	150	92,59%
Hotelclub	308	63,37%	92	56,79%	99	61,11%	117	72,22%
Hotels	445	91,56%	144	88,89%	145	89,51%	156	96,30%
Orbitz	353	72,63%	97	59,88%	123	75,93%	133	82,10%
Priceline	353	72,63%	102	62,96%	123	75,93%	128	79,01%
Travelocity	393	80,86%	107	66,05%	139	85,80%	147	90,74%
Venere	310	63,78%	111	68,52%	104	64,20%	95	58,64%

Table 3 presents the frequencies and the percentage of the hotels which are found in each search engine. As we can see at the second and the third column, in general and for all the categories of the hotels, Hotels.com (91,56%) and Booking.com (91,15%) are the most complete. On the other hand Venere (63,78%) and Hotelclub (63,37%) have the less listed hotels. At the next two columns we can conclude that the majority of the 3 star hotels is found at the search engine Booking (91,98%) while the least options are found at Hotelclub (56,79%). Concerning the category of 4 star hotels, the search engine where most of them are presented is Hotels and Expedia (89.51%) while the most incomplete is Hotelclub (61,11%). Finally for the 5 star hotels the most complete is Hotels (96,3%) and the search engine with the least hotels is Venere (58,64%).

4.1.2 Correlation Checks

In order to make the statistical analysis more accurate and integrated it is necessary to verify that the variables that we are examining are correlated either positively or negatively, apart from the value of the correlation coefficient we will take into

consideration the Pearson's correlation check as well, which is a measure of the strength of the association between the two variables.

This test is based on two hypothesis, the first one (null hypothesis H_0) refers to the fact that the two variables are not associated and the second one (alternative hypothesis H_1) refers to the fact that one random variable is associated to another one either positively or negatively according to the sign of the correlation coefficient. In order to determine which one of the two hypothesis is real the test is based on the P-value (Significant Value) of the correlation table. If the P-value is more than 0,05 then the null hypothesis is accepted. Otherwise if the P- value is less than 0,05 then the null hypothesis is rejected and the alternative is valid.

Firstly in order to check that the correlation test of Pearson is feasible, we must check if the variables that we are examining follow the normal distribution, otherwise we have to make the non parametrical test of Spearman (Foster, 2001). The test is based on two hypothesis. The first refers to the fact that the data follow the normal distribution and the second that the data does not follow it. If the P- value of the check is more than 0,05 then the zero hypothesis is accepted. If the P-value is less than 0,05 then the zero hypothesis is rejected. At the following table (table 4) we can see that all the P-values are more than 0,05 so all the variables of the prices of the hotels at the search engines follow the normal distribution. In addition to this, at the same table we can check the normality of the variables of the rating of the customers as presented on the search engines. According to the $P\text{-value} > 0,05$ we can see that all the variables follow the normal distribution.

Table 4 Normal Distribution Test

One-Sample Kolmogorov-Smirnov Test

		Price Booking	Price Expedia	Price Hotelclub	Price Hotels	Price Orbitz	Price Priceline	Price Travelocity	Price Venere
N		16	16	18	16	15	14	17	10
Normal Parameters ^{a..b}	Mean	100,08	108,38	109,44	107,55	96,87	101,16	121,43	116,23
	Std. Deviation	39,614	59,557	57,952	53,874	39,888	28,912	55,029	44,006
Most Extreme Differences	Absolute	,194	,181	,146	,183	,179	,129	,167	,125
	Positive	,194	,181	,146	,183	,179	,129	,167	,086
	Negative	-,094	-,160	-,122	-,127	-,118	-,100	-,126	-,125
Kolmogorov-Smirnov Z		,777	,724	,618	,730	,694	,481	,690	,396
Asymp. Sig. (2-tailed)		,582	,671	,840	,661	,721	,975	,728	,998

		Rating at Booking	Rating at Expedia	Rating at Hotelclub	Rating at Hotels	Rating at Orbitz	Rating at Priceline	Rating at Travelocity	Rating at Venere
N		16	15	18	16	8	14	9	10
Normal Parameters ^{a..b}	Mean	8,3875	8,3933	6,7611	9,0375	9,0750	8,4571	8,6000	8,9300
	Std. Deviation	,67614	1,56043	2,04339	,61196	,93770	,70462	1,29228	,65498
Most Extreme Differences	Absolute	,199	,251	,233	,230	,249	,144	,210	,202
	Positive	,115	,152	,177	,117	,249	,144	,139	,093
	Negative	-,199	-,251	-,233	-,230	-,213	-,135	-,210	-,202
Kolmogorov-Smirnov Z		,794	,973	,989	,919	,705	,540	,630	,640
Asymp. Sig. (2-tailed)		,554	,300	,282	,367	,703	,932	,822	,807

a. Test distribution is Normal.

We will continue by checking the correlation between the category of the hotels and the satisfaction of the consumers and the number of rooms. The results of the SPSS program show that the category of the hotels is positively associated with the level of satisfaction of the customers ($r=0.436$, $p=0.0 < 0.05$) and with the number of the rooms as well ($r=0.385$, $p=0.0 < 0.05$). According to this fact, the higher the category of a hotel is, the more satisfied the customer is. In addition to this the stars of a hotel are proportioned to the number of rooms. This shows that usually the more stars a hotel has, the more rooms it disposes.

Next at table 5 we will examine for each search engine the correlation of its ratings with each other search engine and with the rating of Tripadvisor for all the categories of the hotels.

Table 5 Correlations of the ratings between the search engines

		Rating Booking	Rating Expedia	Rating Hotelclub	Rating Hotels	Rating Orbitz	Rating Priceline	Rating Travelocity	Rating Tripadvisor	Rating Venere
Rating Booking	Pearson Correlation	1	,350**	,432**	,570**	,374**	,813**	,340**	,588**	,544**
	Sig. (2-tailed)		,000	,000	,000	,000	,000	,000	,000	,000
Rating Expedia	Pearson Correlation	,350**	1	,291**	,276**	0,135	,400**	,216**	,339**	,261**
	Sig. (2-tailed)	,000		,000	,000	0,078	,000	0,001	,000	,000

Rating Hotelclub	Pearson Correlation	,432**	,291**	1	,342**	0,062	,338**	,182*	,417**	,244**
	Sig. (2-tailed)	,000	,000		,000	0,52	,000	0,037	,000	0,009
Rating Hotels	Pearson Correlation	,570**	,276**	,342**	1	,316**	,569**	,247**	,468**	,413**
	Sig. (2-tailed)	,000	,000	,000		,000	,000	,000	,000	,000
Rating Orbitz	Pearson Correlation	,374**	0,135	0,062	,316**	1	,301**	,416**	,206**	0,177
	Sig. (2-tailed)	,000	0,078	0,52	,000		,000	,000	0,004	0,066
Rating Price-line	Pearson Correlation	,813**	,400**	,338**	,569**	,301**	1	,371**	,537**	,481**
	Sig. (2-tailed)	,000	,000	,000	,000	,000		,000	,000	,000
Rating Travelocity	Pearson Correlation	,340**	,216**	,182*	,247**	,416**	,371**	1	,172**	,313**
	Sig. (2-tailed)	,000	0,001	0,037	,000	,000	,000		0,003	,000
Rating TripAdvisor	Pearson Correlation	,588**	,339**	,417**	,468**	,206**	,537**	,172**	1	,480**
	Sig. (2-tailed)	,000	,0000	,000	,000	0,004	,000	0,003		,000
Rating Venere	Pearson Correlation	,544**	,261**	,244**	,413**	0,177	,481**	,313**	,480**	1
	Sig. (2-tailed)	,000	,000	0,009	,000	0,066	,000	,000	,000	

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

* . Correlation is significant at the 0.05 level (2-tailed).

At table 5 we can see for each search engine the correlations of its ratings with each other engine's rating for all the hotels. In most of the cases the P-value is less than 0,05 which means that there is a correlation between the variables-ratings. This always happens concerning the rating of Tripadvisor. This shows that the satisfaction of the customers based on the rating of the search engines is positively correlated to the rating of Tripadvisor, so the greater the level of satisfaction of the customers at the search engines is, the greater the evaluation of Tripadvisor is. The same is valid for most of the search engines as well. This renders them more trustworthy as the positive correlation between them shows that their ratings have the same tendency which means that there are not any contradictions. There are some exceptions mostly for Orbitz where the zero hypothesis is not always rejected as the P-value is not always less than 0,05, as for example between Orbitz and Hotelclub where the P-value is 0,52. This means that the ratings of Orbitz are not always correlated to the ratings of the other search engines but this is formulated according to the personal point of view of the users-clients who visited this specific tourism application.

We will next check at table 6 the correlations of the prices between the search engines for all the categories of the hotels.

Table 6 Correlations of the prices between the search engines

		Price-Booking	Price-Expedia	Price-Hotelclub	Price-Hotels	Price-Orbitz	Price-Priceline	Price-Travelocity	Price-Venere
Price-Booking	Pearson Correlation Sig. (2-tailed)	1	,943 ,000	,931 ,000	,945 ,000	,919 ,000	,812 ,000	,868 ,000	,945 ,000
Price-Expedia	Pearson Correlation Sig. (2-tailed)	,943 ,000	1	,940 ,000	,980 ,000	,932 ,000	,803 ,000	,877 ,000	,937 ,000
Price-Hotelclub	Pearson Correlation Sig. (2-tailed)	,931 ,000	,940 ,000	1	,926 ,000	,966 ,000	,769 ,000	,887 ,000	,942 ,000
Price-Hotels	Pearson Correlation Sig. (2-tailed)	,945 ,000	,980 ,000	,926 ,000	1	,913 ,000	,802 ,000	,878 ,000	,937 ,000
Price-Orbitz	Pearson Correlation Sig. (2-tailed)	,919 ,000	,932 ,000	,966 ,000	,913 ,000	1	,759 ,000	,885 ,000	,913 ,000
Price-Priceline	Pearson Correlation Sig. (2-tailed)	,812 ,000	,803 ,000	,769 ,000	,802 ,000	,759 ,000	1	,899 ,000	,757 ,000
Price-Travelocity	Pearson Correlation Sig. (2-tailed)	,868 ,000	,877 ,000	,887 ,000	,878 ,000	,885 ,000	,899 ,000	1	,858 ,000
Price-Venere	Pearson Correlation Sig. (2-tailed)	,945 ,000	,937 ,000	,942 ,000	,937 ,000	,913 ,000	,757 ,000	,858 ,000	1

At table 6 we can see that for all the associations the P-value is less than 0,05 and the sign of the correlation coefficient is positive. This means that there is a positive correlation of the price of every search engine that we want to examine with the price of every other one. This shows that the higher the price of a search engine is, the higher the price of another search engine is, so they follow the same tendency. This fact points that probably the administrators of each search engine during the procedure of the formulation of the prices take into consideration the prices given by the hotels themselves, either on their official websites or by directly contacting them and the

prices mentioned by the other search engines. The price formulation by the search engines is a demanding procedure which needs market research by their administrators in order to provide their electronic clients with prices that maximize their economical benefit.

At table 7 that follows we will check the correlations between the rating and the cost for each search engine.

Table 7 Correlations between rating and cost

Rating	Price	All stars	3 stars	4 stars	5 stars
Booking	Pearson Correlation	,329	,205	,260	,057
	Sig. (2-tailed)	,000	,012	,002	,493
Expedia	Pearson Correlation	,209	,231	,124	,126
	Sig. (2-tailed)	,000	,016	,170	,159
Hotelclub	Pearson Correlation	,247	,126	,297	,213
	Sig. (2-tailed)	,001	,322	,019	,126
Rating Hotels	Pearson Correlation	,287	,118	,269	,076
	Sig. (2-tailed)	,000	,209	,002	,384
Rating Orbitz	Pearson Correlation	,273	,268	,117	,066
	Sig. (2-tailed)	,000	,082	,301	,603
Rating Priceline	Pearson Correlation	,207	-,083	,160	,094
	Sig. (2-tailed)	,000	,410	,047	,308
Rating Travelocity	Pearson Correlation	,423	,161	,327	,078
	Sig. (2-tailed)	,000	,189	,001	,397
Rating Venere	Pearson Correlation	,250	,079	,300	,086
	Sig. (2-tailed)	,000	,438	,005	,494

At table 7 we can see the correlations between the ratings and the prices for each search engine for all the hotels and for each category separately. By the first column we realize that in general for all the categories there is correlation between the ratings and the cost of the rooms at the search engines as every P-value is less than 0,05. Consequently we can confirm a paradox related to the consumers' behavior, the fact that the prices of the hotels are positively correlated to the level of satisfaction of the consumers. In other words, the higher the price is, the more satisfied the customer is. This phenomenon can be explained because most of the times higher prices are

combined with better quality which counterbalances the difference. Usually the price is proportionate to the service so higher prices premise higher quality of supplied services and the opposite.

On the other side, if we look at the rest of the columns we can see that for the 3 stars hotels only for Booking and Expedia there is a correlation between the rating and the cost. For the 4 stars hotels there is a positive correlation for all the search engines except from Expedia and Orbitz and for the 5 stars hotels according to the results of the program there is no correlation between these two variables for any of the search engines that we examine. In order to explain this phenomenon we can say that it seems like the price constitutes a criteria to the rating mostly for the 4 stars category and the program considers this correlation very high in comparison to the other categories so it affects the most the total result. This can be explained as for the 5 stars category the clients take for granted the high price and they use other criteria such as the quality of service in order to form a rating for the hotel. The same is the conclusion for the 3 stars hotels, where the clients are aware of the fact that the cost will be relatively lower than that of the higher categories so they usually evaluate the services provided. On the other hand for the 4 stars category there are more possibilities for the clients to use the price as a criterion, as they pay more for their residence to a hotel of this category than for a hotel in a lower one and apart from the other measures they take into consideration the price as well.

At table 8 we will see the correlations between the prices of the rooms at the search engines and the rating at Tripadvisor, the number of the rooms, the stars of hotels and the rating of the search engines.

Table 8 Correlations related to the prices of the rooms

		Rating at Tripadvisor	Number of rooms	Stars of Hotels
Price- Booking	Pearson Correlation Sig. (2-tailed)	,147** ,002	,161** ,001	,569** ,000
Price- Expedia	Pearson Correlation Sig. (2-tailed)	,147** ,002	,131** ,006	,559** ,000
Price- Hotelclub	Pearson Correlation Sig. (2-tailed)	,137* ,016	,114* ,045	,564** ,000
Price- Hotels	Pearson Correlation Sig. (2-tailed)	,137** ,004	,142** ,003	,565** ,000
Price- Orbitz	Pearson Correlation Sig. (2-tailed)	,139** ,009	,126* ,018	,546** ,000
Price- Priceline	Pearson Correlation Sig. (2-tailed)	,048 ,368	,135* ,011	,428** ,000
Price- Travelocity	Pearson Correlation Sig. (2-tailed)	,070 ,167	,107* ,035	,507** ,000
Price- Venere	Pearson Correlation Sig. (2-tailed)	,088 ,121	,163** ,004	,541** ,000

At table 8 we can see the correlations between some interesting variables. Firstly, at the second column, we can see the correlation between the rating of Tripadvisor and the prices of the rooms at the search engines. The rating of Tripadvisor is positively correlated with the prices given by the search engines Hotels ($r=0.137, p<0.05$), Booking ($r=0.147, p<0.05$), Expedia ($r=0.147, p<0.05$), Orbitz ($r=0.139, p<0.05$) and Hotelclub ($r=0.137, p<0.05$). For the rest of the search engines we conclude that they are not correlated with the rating of Tripadvisor. Consequently, according to the positive correlation we understand that the higher the prices of the search engines are, the higher the evaluation of Tripadvisor is.

At the third column we can see the correlation between the number of the rooms and the prices of the rooms at the search engines. We can realize that the number of the rooms that each hotel has, is positively correlated with the prices mentioned at the search engines. For example the positive correlation is observed for the following search engines Booking ($r=0.161, p<0.05$), Expedia ($r=0.131, p<0.05$), Orbitz ($r=0.126, p<0.05$), Priceline ($r=0.135, p<0.05$), Venere ($r=0.163, p<0.05$), Hotelclub ($r=0.114, p<0.05$), Hotels ($r=0.142, p<0.05$) και Travelocity ($r=0.107, p<0.05$). This means that for these search engines the more rooms a hotel has the higher the prices are. This can also be explained because famous hotels usually have a lot of rooms but high prices as the consumer also pays for the well-known brand name and the quality of

service. On the other hand if a hotel has a few rooms then the prices are lower so as to attract more consumers and therefore ensure an income.

By looking at the fourth column of table 8 we can realize that the prices of the rooms given by the search engines are positively correlated with the category in which the hotels belong. This is logical as the better the category of the hotel is, the higher the prices are, due to differences in the comforts and the amenities provided. so 3-stars hotels have lower prices than the others at higher categories.

4.2 Cost Analysis

Now we are going to present the descriptive measures of the trend and dispersion for the price of the rooms found at the search engines and the website, where it was available, of all the hotels and for each category separately. So the minimum, the maximum and the mean price as well as the standard deviation of them will be examined.

Table 9 Descriptive measures of trend and dispersion for the price of the rooms

Price of the search engines	Total sample	Minimum value	Maximum value	Mean value	Standard deviation
All hotels	464	18,82	514,22	115,736	63,4614
3 stars hotels	144	18,82	168,57	74,589	28,65707
4 stars hotels	159	30,12	252,2	108,225	41,79004
5 stars hotels	161	58,05	514,22	164,394	73,6327

By the table above we can see that from the total sample of the 464 hotels, now we take into consideration only those that had prices at their official websites, the minimum price found at the search machines and the website is 18,82€ and the maximum value is 514,22€. The mean value is 115,73 and the standard deviation is 63,46. This happens because these descriptive measures concern all the categories of the hotels found in all the cities that participate to the research and a big difference to the prices was observed among the cities.

At the third row of table 9 we can see that for the 3 stars hotels the minimum price presented on the search machines and the websites is 18,82€ and the maximum one is 168,57€. The mean value is 74,58€ and the standard deviation is 28,65. The equivalent values for the 4 stars and the 5 stars hotels are shown at the last two rows of the table above where we can see that at the sample of 161 5-stars hotels, the minimum price is

58,05€, the maximum price is 514,22€, the mean value is 164,39€ and the standard deviation is 73,63.

Summarizing we observe that there are some big differences between the minimum and the maximum prices that are found at the search engines and the websites which are caused by the fact that all the capital cities of the European Union participate in the research and there is difference at the quality of life and the living standards. In some cities the price level is higher in every aspect of life. Also the differences at the prices among the search engines can be explained because of some hidden costs or additional charges for the service of the web booking by the use of the search machine.

We continue the analysis by calculating the descriptive measures of the prices of the hotels.

Table 10 Descriptive measures of the prices of the hotels for each search engine

Prices at Engine:	All Categories					3 stars hotels				
	Total sample	Minimum value	Maximum value	Mean value	Standard deviation	Total sample	Minimum value	Maximum value	Mean value	Standard deviation
Booking	443	18	550	115,23	66,799	149	18	189	71,78	29,978
Expedia	440	21	526	111,68	64,128	145	21	204	71,34	30,045
Hotelclub	308	26	528	123,85	74,203	92	26	180	74	29,383
Hotels	445	17	529	111,87	64,595	144	17	198	70,78	29,905
Orbitz	353	21	522	118,08	66,864	97	21	178	70,89	28,626
Priceline	353	18	779	120,59	74,906	102	18	779	81,79	76,218
Travelocity	393	26	390	124,21	63,48	107	26	257	84,23	40,966
Venere	310	21	550	117,8	73,801	111	21	199	76,55	33,022
Prices at Engine	4 stars					5 stars hotels				
	Total sample	Minimum value	Maximum value	Mean value	Standard deviation	Total sample	Minimum value	Maximum value	Mean value	Standard deviation
Booking	143	29	261	109	45,299	151	59	550	164	77,54
Expedia	145	28	244	103,34	42,19	150	57	526	158,72	75,129
Hotelclub	99	36	247	109,88	45,899	117	50	528	174,88	85,738
Hotels	145	20	250	101,75	43,241	156	56	529	159,22	73,956
Orbitz	123	38	240	108,68	45,162	133	59	522	161,2	76,481
Priceline	123	28	267	111,16	47,157	128	39	516	160,57	76,742
Travelocity	139	41	273	113,22	43,605	147	50	390	163,7	70,337
Venere	104	36	260	109,16	48,119	95	59	550	175,46	92,944

At table 10 we can see the minimum, the maximum and the average prices of each search engine and the standard deviation as well for all the categories and for each one of the three categories that we are examining separately. In general and according to the mean value, Travelocity appears to be the most expensive search engine and Expedia the cheapest one and the difference of their mean values is 12,34€. For the 3 stars hotels Orbitz and Hotels give the lowest prices and Travelocity the highest ones. For the 4 stars hotels the search engine Hotels appears to be the cheapest and Travelocity the most expensive one. Expedia seems to be the cheapest search engine for the 5 stars hotels and Venere the most expensive one, while the range between their mean values is 16,74€.

At this point it would be useful to present at table 11 that follows the frequencies and the percentages where each search engine was the cheapest of all, the cheapest for more than 10% of all and the cheapest of the average value of all.

Table 11 Percentage of the hotels where the search engine is the cheapest of all, for more than 10% of all and of the average value of all.

Cheapest of all (other search engines and website)								
	All Categories		3 stars hotels		4 stars hotels		5 stars hotels	
	Frequency	Percentage	Frequency	Percentage	Frequency	Percentage	Frequency	Percentage
Booking	31	6,68%	15	10,42%	10	6,29%	6	3,73%
Expedia	55	11,85%	19	13,19%	21	13,21%	15	9,32%
Hotelclub	24	5,17%	7	4,86%	11	6,92%	6	3,73%
Hotels	71	15,30%	22	15,28%	25	15,72%	24	14,91%
Orbitz	58	12,50%	17	11,81%	21	13,21%	20	12,42%
Priceline	44	9,48%	5	3,47%	11	6,92%	28	17,39%
Travelocity	33	7,11%	6	4,17%	11	6,92%	16	9,94%
Venere	11	2,37%	6	4,17%	5	3,14%	0	0,00%
Cheapest for more than 10% of all (other search engines and website)								
Booking	14	3,02%	6	4,17%	4	2,52%	4	2,48%
Expedia	9	1,94%	4	2,78%	3	1,89%	2	1,24%
Hotelclub	4	0,86%	0	0,00%	3	1,89%	1	0,62%
Hotels	15	3,23%	5	3,47%	4	2,52%	6	3,73%
Orbitz	13	2,80%	4	2,78%	4	2,52%	5	3,11%
Priceline	9	1,94%	1	0,69%	1	0,63%	7	4,35%
Travelocity	12	2,59%	2	1,39%	3	1,89%	7	4,35%
Venere	6	1,29%	4	2,78%	2	1,26%	0	0,00%

Cheapest of the average value of all (for the specific hotel, the prices at all the search engines and at the website)								
Booking	228	49,14%	94	65,28%	72	45,28%	62	38,51%
Expedia	285	61,42%	90	62,50%	100	62,89%	95	59,01%
Hotelclub	140	30,17%	45	31,25%	52	32,70%	43	26,71%
Hotels	301	64,87%	93	64,58%	100	62,89%	108	67,08%
Orbitz	208	44,83%	63	43,75%	76	47,80%	69	42,86%
Priceline	145	31,25%	30	20,83%	44	27,67%	71	44,10%
Travelocity	160	34,48%	38	26,39%	52	32,70%	70	43,48%
Venere	138	29,74%	59	40,97%	49	30,82%	30	18,63%

Table 11 firstly presents the frequencies and the percentages of the hotels where each search engine is the cheapest of all for all the categories of the hotels and then for each category separately. So Hotels.com appears to be the cheapest of all for 15,30% of the total sample, where at this time as total sample we consider not all the 486 hotels but only the 464 of them that had prices at their official website and that is because we take into account the prices at the website too. On the other hand Venere appears to be the cheapest search engine only for 2,37% of the hotels. For the 3 stars hotels where the sample was 144 hotels, Hotels appears to be the cheapest of all for 15,28% of the hotels, as well as for the 15,72% of the 159 hotels at the 4 stars category that we examined. At the 5 stars hotels Priceline appears to be the cheapest of all for the 17,39% of the 161 hotels of this category, followed by Hotels.com with 14,91%. While for Venere we can see that it was never the cheapest search engine at this category.

At table 11 we can also see the frequencies and the percentages where each search engine was the cheapest for more than 10% both for the rest of the engines and the official website. At all the categories Hotels seems to be the most dominant, as it is the cheapest for more than 10% for 3,23% of the hotels while Booking and Travelocity follow with small differences. The equivalent amounts for each category separately are also present at the same table.

Finally at table 11 we can check the frequencies and the percentages where each search engine is the cheapest of the average value of all. The totals help us see that in general Hotels appears to be the cheapest for the 64,87% of the hotels and Expedia follows (61,42%). At the 3 stars hotels Booking has the greater percentage 65,28% and

Hotels follows with 64,58%. Priceline has the lower percentage 20,83%, which means that this search engine is less times cheaper than the average value. The equivalent percentages for the 4 stars hotels are for Hotels and Expedia 62,89% and for Priceline 27,67% and for the 5 stars hotels is the higher for Hotels (67,08%) and the lower percentage for Venere (18,63%).

We will continue the analysis by presenting at table 12 the frequencies and the percentages where each search engine was cheaper than the website or for more than 10% cheaper than the website and where it was the most expensive of all including the other search engines and the websites too.

Table 12 Percentage of the hotels where the search engine is cheaper than the website, for more than 10% cheaper than the website and the most expensive of all.

Cheaper than the website								
	All Categories		3 stars hotels		4 stars hotels		5 stars hotels	
	Frequency	Percentage	Frequency	Percentage	Frequency	Percentage	Frequency	Percentage
Booking	137	29,53%	47	32,64%	46	28,93%	44	27,33%
Expedia	228	49,14%	60	41,67%	86	54,09%	82	50,93%
Hotelclub	106	22,84%	27	18,75%	41	25,79%	38	23,60%
Hotels	208	44,83%	58	40,28%	73	45,91%	77	47,83%
Orbitz	175	37,72%	46	31,94%	67	42,14%	62	38,51%
Priceline	134	28,88%	28	19,44%	47	29,56%	59	36,65%
Travelocity	138	29,74%	28	19,44%	56	35,22%	54	33,54%
Venere	90	19,40%	29	20,14%	35	22,01%	26	16,15%
Cheaper for more than 10% than the website								
Booking	79	17,03%	30	20,83%	22	13,84%	27	16,77%
Expedia	112	24,14%	40	27,78%	41	25,79%	31	19,25%
Hotelclub	47	10,13%	12	8,33%	21	13,21%	14	8,70%
Hotels	123	26,51%	40	27,78%	42	26,42%	41	25,47%
Orbitz	90	19,40%	27	18,75%	36	22,64%	27	16,77%
Priceline	55	11,85%	11	7,64%	14	8,81%	30	18,63%
Travelocity	65	14,01%	16	11,11%	23	14,47%	26	16,15%
Venere	60	12,93%	20	13,89%	24	15,09%	16	9,94%

Most expensive of all (other search engines and website)								
Booking	31	6,68%	8	5,56%	8	5,03%	15	9,32%
Expedia	24	5,17%	11	7,64%	5	3,14%	8	4,97%
Hotelclub	41	8,84%	11	7,64%	16	10,06%	14	8,70%
Hotels	25	5,39%	9	6,25%	10	6,29%	6	3,73%
Orbitz	39	8,41%	13	9,03%	13	8,18%	13	8,07%
Priceline	70	15,09%	33	22,92%	25	15,72%	12	7,45%
Travelocity	81	17,46%	25	17,36%	35	22,01%	21	13,04%
Venere	25	5,39%	6	4,17%	6	3,77%	13	8,07%

Firstly at table 12 we can see the percentages where the search engine was cheaper than the website for all the categories and for each category separately. Expedia has the highest percentage 49,14% and Hotels follows (44,83%). This means that for the 49,14% of the 464 hotels that had prices at their official websites Expedia gave lower prices than the price of the website. At all the other occasions the price of the website was lower. The rest of the percentages can be interpreted the same way and we can also notice that for each one of the categories separately Expedia has the highest percentages too. So for the 41,67% of the 3 stars hotels that have prices at their websites, Expedia gives lower prices and Hotels comes next with 40,28%. The equivalent percentages for Expedia, that has the higher percentages for the 4 stars and the 5 stars hotels are 54,09% and 50,93%.

The phenomenon that some search engines are cheaper than the official websites of the hotels might be owed to the fact that they take directly the whole amount of money from the credit card without giving the chance of cancellation as it is usually feasible by the official website. In addition to this sometimes it is not clear by the search engines if the breakfast and the taxes are included. So the electronic customer pays less while doing the reservation through the search engine but he is called to pay the difference at the hotel. Furthermore most of the times behind the search engines the hotels themselves are hidden. So they give low prices to the most famous search engines and they have profit because of the high consumption. Finally there is a new tendency in the travel industry which is called allotment. According to Wikipedia (December, 2010) this term is used to explain the phenomenon where pre-negotiated hotel rooms are bought out and held by travel organizers who have prepaid the hotels and agree with them to dispose the rooms to any price, even if it is lower than the official price of the hotel. The hotel have profit as they assure that a block of their rooms is already paid.

Next at table 12 we can see the percentages where each search engine was cheaper for more than 10% than the price at the website. This check is important because 10% less in price is a significant difference. In general and for all the categories of the hotels, Hotels seems to be cheaper at 26,5% of the hotels and Expedia follows (24,14%). Hotels and Expedia appear to have the highest percentage for the 3 stars and the 4 stars hotels, while for the 5 stars Hotels has the highest percentage equal to 25,47%. On the other hand Priceline has the lowest one for the 3 stars (7,64%) and the 4 stars category (8,81%), while for the 5 stars category Hotelsclub has the lowest percentage (8,70%).

Finally, table 12 shows the percentages of the hotels where each one of the eight search engines had the most expensive price compared to the other search engines and to the official websites of the hotels. In general for all the categories of the hotels Travelocity was the most expensive of all at the 17,46% of the hotels where it had a valid price. On the other hand Expedia has the lowest percentage 5,39%. If we take into consideration the categories of the hotels we can see that for the 3 stars hotels Priceline has the greater percentage 22,92% and Venere the lowest one 4,17%. At the 4 stars category Travelocity appears to be the search engine that was the most expensive of all for 22,01% of the hotels that were encountered and on the other side there is Expedia with 3,14%. As for the 5 stars category, Travelocity seems to be the most expensive of all for 13,04% of the hotels and on the other side there is Hotels with 3,73%.

Table 13 that follows shows cases where the search engines were cheaper than the website.

Table 13 Percentage of hotels where the search engines were cheaper than the website

Hotels where:	All Categories		3 stars hotels		4 stars hotels		5 stars hotels	
	Frequency	Percentage	Frequency	Percentage	Frequency	Percentage	Frequency	Percentage
at least one search engine was cheaper than the website	368	79,31%	103	63,58%	137	84,57%	128	79,01%
at least one search engine was for more than 10% cheaper than the website	123	26,5%	40	25,15%	42	26,41%	41	25,46%
at least two search engines were cheaper than the website	295	63,58%	101	62,35%	101	62,35%	93	57,41%

at least three search engines were cheaper than the website	216	46,55%	74	45,68%	75	46,30%	67	41,36%
at least four search engines were cheaper than the website	96	20,69%	30	18,52%	37	22,84%	29	17,90%
at least five search engines were cheaper than the website	93	20,04%	27	16,67%	38	23,46%	28	17,28%
at least six search engines were cheaper than the website	54	11,64%	20	12,35%	17	10,49%	17	10,49%
at least seven search engines were cheaper than the website	22	4,74%	10	6,17%	4	2,47%	8	4,94%
all the search engines were cheaper than the website	8	1,72%	1	0,62%	4	2,47%	3	1,85%

At table 13 we can see the frequencies and the percentages of the hotels where the search engines were cheaper than the website and we can notice that in total only for eight hotels all the search engines were giving lower prices for the rooms than the website. On the other hand at least one search engine was cheaper than the website for 368 occasions. And at least four, the half, of the search engines gave lower prices for the rooms than the official website of the hotel at 96 of them. In order to calculate the percentages we used the total of the hotels of each category that had an official website with prices mentioned in it for the time period that we were examining (464 hotels in total, 144 of the 3-stars hotels, 159 4-stars and 161 of the 5-stars hotels).

4.3 Rating (Satisfaction) Analysis

We will continue the statistical analysis by citing the rating- satisfaction analysis at the tables that follow.

Table 14 presents the descriptive measures that concern the level of satisfaction and the rating of the hotels given by the clients who posted their feedback. The rating is the result of the offsetting of all the recorded values at.

Table 14 Descriptive measures of satisfaction rating

Ratings of the search engines	Total sample	Minimum value	Maximum value	Mean value	Standard deviation
All hotels	486	2	10	8,39	0,75329
3 stars hotels	162	2	10	7,9798	0,79349
4 stars hotels	162	4	10	8,4146	0,63684
5 stars hotels	162	2	10	8,783	0,59065

As we can see in the second row that concerns the rating of all the categories of the hotels at the sample of the 486 hotels the estimated average value of rating given by the clients is 8,39 and the standard deviation is 0,753. The value of the standard deviation is low and this shows that the clients that give their ratings have a common consensus. The lowest rating is 2 which shows a low level of satisfaction and the highest is 10 which shows the ultimate level of satisfaction by the services of the hotels. In general we conclude that the clients have given relatively good ratings. This fact can be explained because usually either the satisfied or the unsatisfied customers express their opinion and as for this research we have taken into consideration the hotels that were listed at the first positions of Tripadvisor so it is expected that most of the ratings would be good. At the histogram that follows (Diagram 1) we can see the graphical presentation of these elements.

By examining each category of the hotels separately we can see that for the total of the 3 stars hotels (162 hotels) the minimum value of the rating is 2 and the maximum is 10, while the mean value is 7,97 and the standard deviation is 0,79. For the 162 hotels of the 4 stars category whose elements we have listed, the minimum value is 4, which is a mediocre rating, the maximum value is 10 and the mean value is 8,4 which shows an

enough high level of satisfaction for the customers who have visited the hotels and then the websites to express their personal experience. Finally concerning the 5 stars hotels the minimum value is 2 which is low for this category as a higher level of satisfaction is expected when someone stays at a 5 stars hotel, but the maximum value is 10 which shows the ultimate satisfaction. The mean value is 8,783. In general we can realize that as the category of the hotels gets better the mean value gets higher, this fact could be expected as the 5 stars hotels are supposed to have a very high quality of service.

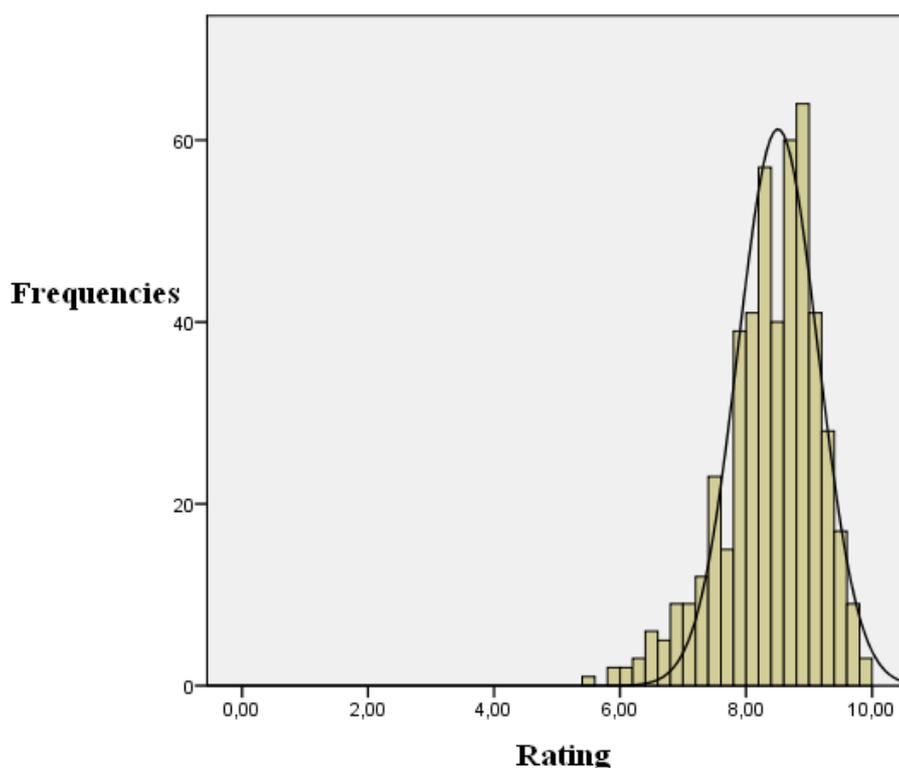


Diagram 1. Histogram of satisfaction rating for all the hotels.

The statistical analysis continues at table 15 by calculating the frequencies and the percentages of the hotels where each search engine had the highest and the lowest rating.

Table 15 Descriptive measures of the ratings of the hotels for each search engine

	All Categories					3 stars hotels				
Ratings at Engine	Total sample	Minimum value	Maximum value	Mean value	Standard deviation	Total sample	Minimum value	Maximum value	Mean value	Standard deviation
Booking	450	6	9,8	8,29	0,59533	153	6	9,2	7,96	0,5901
Expedia	362	3,4	10	8,52	1,3784	110	3,4	10	8,26	1,3617
Hotelclub	184	6	10	8,31	1,00629	68	3,9	9,6	8,09	0,81615
Hotels	385	2	10	8,68	0,98645	119	3,5	10	8,22	1,02306
Orbitz	193	2	10	8,2	1,4126	44	2	10	7,29	1,7133
Priceline	336	6	9,7	8,28	0,63431	101	6	9,2	7,94	0,64071
Travelocity	292	2	10	7,58	1,87565	71	2	10	5,87	1,43392
Venere	260	4	10	8,42	0,76548	103	4,6	9,5	8,14	0,76553
	4 stars hotels					5 stars hotels				
Prices at Engine	Total sample	Minimum value	Maximum value	Mean value	Standard deviation	Total sample	Minimum value	Maximum value	Mean value	Standard deviation
Booking	148	6,2	9,8	8,36	0,51177	149	7,1	9,6	8,56	0,51759
Expedia	124	4	10	8,44	1,4929	128	4,3	10	8,8325	1,2215
Hotelclub	62	4,1	9,8	8,41	0,84728	54	3,8	8,6	8,46	1,31551
Hotels	133	3,7	10	8,713	0,8685	133	2	10	9,06	0,89865
Orbitz	83	3,5	10	8,3	1,2262	66	4	10	8,69	1,11444
Priceline	116	6	9,3	8,27	0,5015	119	6	9,7	8,59	0,59289
Travelocity	101	4	10	7,28	1,4472	120	2	10	8,83	1,49687
Venere	90	6,2	9,9	8,53	0,59568	67	5,1	10	8,7	0,83454

At table 15 we can see the minimum, the maximum and the average rating of each search engine and the standard deviation as well, for all the categories and for each one of the three categories that we are examining separately. In general and according to its mean value 8,68, Hotels appears to be the search engine that gives the highest ratings and Travelocity the one that gives the lowest (mean=7,58). For the 3 stars hotels, Hotels and Orbitz give the lowest ratings and Expedia the highest ones. For the 4 stars hotels the search engine Travelocity appears to give the lowest ratings (mean value= 7,28) and Hotels the highest one (mean value= 8,7). The same is observed for the 5-stars where the mean value of Hotels is 9,06 and the lower rating is for Hotelclub (8,46).

Table 16 that follows shows the frequencies and the percentages of the hotels where each search engine evaluated the hotels with the highest rating and the equivalent percentages concerning the lowest rating as given by the visitors of the search engines.

Table 16 Percentage of the hotels where each search engine has the highest and the lowest rating

Highest Rating								
	All Categories		3 stars hotels		4 stars hotels		5 stars hotels	
	Frequency	Percentage	Frequency	Percentage	Frequency	Percentage	Frequency	Percentage
Booking	22	4,53%	10	6,17%	9	5,56%	3	1,85%
Expedia	103	21,19%	40	24,69%	44	27,16%	19	11,73%
Hotelclub	26	5,34%	15	9,26%	6	3,70%	5	3,09%
Hotels	91	18,72%	31	19,14%	33	20,37%	27	16,67%
Orbitz	24	4,94%	5	3,09%	14	8,64%	5	3,09%
Priceline	5	1,03%	2	1,23%	0	0,00%	3	1,85%
Travelocity	53	10,91%	3	1,85%	6	3,70%	44	27,16%
Venere	38	7,82%	20	12,35%	9	5,56%	9	5,56%
Lowest Rating								
	All Categories		3 stars hotels		4 stars hotels		5 stars hotels	
	Frequency	Percentage	Frequency	Percentage	Frequency	Percentage	Frequency	Percentage
Booking	44	9,05%	12	7,41%	10	6,17%	20	12,35%
Expedia	49	10,08%	15	9,26%	20	12,35%	14	8,64%
Hotelclub	18	3,70%	4	2,47%	5	3,09%	9	5,56%
Hotels	28	5,76%	14	8,64%	5	3,09%	9	5,56%
Orbitz	38	7,82%	13	8,02%	16	9,88%	9	5,56%
Priceline	26	5,35%	4	2,47%	7	4,32%	15	9,26%
Travelocity	133	27,37%	51	31,48%	55	33,95%	32	19,75%
Venere	30	6,17%	11	6,79%	10	6,17%	9	5,56%

By observing the above table, in general and for all the categories, Expedia gave the highest rating at 21,19% of the hotels that we examined, while Priceline had the best rating in comparison to the others given by the other search engines, for 1,03% of the hotels. If we examine each category separately we can realize that for the 3 stars and the 4 stars hotels Expedia has the highest percentage 24,69% and 27,16% and Priceline has the lowest percentage in both occasions 1,23% and 0% respectively. For the 5 stars category Travelocity has the highest percentage 27,16%. This means that at 27,16% of the hotels Travelocity had the best rating from any other search engine.

By table 16 we can also see that Travelocity has the highest percentage concerning the check that we make to see the percentages of the hotels where each search engine had the lowest rating for all the categories in general, as well as for each category separately. On the other hand for the 3 stars hotels Hotelclub and Priceline are the search engines that have the lowest percentages (2,47%), which points that at the 2,47% of the hotels of this category they gave the worst rating. For the 4 stars hotels Hotels and Hotelclub for 3,09% of the hotels give the worst rating and for the 5 stars hotels this percentage is 5,56% for Hotels, Orbitz, Venere and Hotelclub. For the rest of the search engines we might conclude that they usually give medium ratings in proximity to the mean value of all the ratings of all the search engines.

By evaluating the results of the rating analysis we can say that the mean values of all the search engines are higher as the category of the hotels gets higher. This is logical as the 5 stars hotels are supposed to have better facilities and quality of services. The ratings are formed by the electronic users of the search engines according to their satisfaction related to the hotel's amenities and facilities, to the rendering of services and the behavior of the personnel. Sometimes the price is related to the rating as well. It is also mentioned that some false postings might be included. Usually the ratings are good which means that the relatively satisfied customers visit the tourist applications that we examine and express their personal experiences but there are some extreme ratings too. The tendency of the ratings is a factor that cannot be easily explained because of its nature, as it involves socio-psychological variables related to the consumer's behavior.

The statistical analysis that preceded indented to answer to some interesting key questions that were posed according to the nature of the subject of this study such as the presence of the hotels on the search engines and queries related to the cost and the rating comparison among them.

5. CONCLUSION AND SUGGESTIONS

The evolution of the technology in the domain of informatics led to Web 2.0, the new generation of the World Wide Web where the website is no longer static but has turned into a dynamic application which allows users the generation of content online. The Web 2.0 business models, give users the opportunity to participate interactively and derive profitable returns by reading other users' generated content and by expressing their personal experiences with a firm or a product, as well as by making recommendations.

At this study, in succession of the theoretical approach to the Web 2.0 applications, by emphasizing to those related to tourism, we presented a statistical analysis that concerns information derived from some of the most famous of them. More specifically by nine big search engines related to tourism we collected data about eighteen hotels for each European capital city. The search engines used are Booking.com, Expedia.com, Hotelclub.com, Hotels.com, Orbitz.com, Priceline.com, Travelocity.com, Tripadvisor.com and Venere.com. The data is about the number of the rooms, the rating and the price that each search engine presented as well as the price that was given by the official websites of the 3 stars, 4 stars and 5 stars hotels that we have chosen from Tripadvisor.com, according to the list of the hotels that it gave for each city sorted by rating.

By using the SPSS statistical program we concluded that 23% of the total sample of the hotels (486 hotels) are found in all the search engines and Hotels appears to be the most complete as 91,56% of the hotels are found at this search engine, Booking comes next (91,15%) while Hotelclub (63,37%) is at the final position. Before continuing with the statistical analysis we proved that as it was expected there is a correlation between the category of the hotels and the satisfaction of the consumers and the number of rooms as well. We also showed that there is correlation between the rating at the search engines and Tripadvisor and between the prices of the rooms and some important variables such as the stars of the hotels and the rating of the other search engines.

The cost analysis that followed showed, as it was expected, that the higher the category is the more expensive the mean values of the prices are. We will now mention some of the most important statistical results that refer to all the categories but at the study each one of the three categories has been separately analyzed as well. Concerning the comparison among the search engines, Travelocity appears to have the highest mean

value 124,21€ and Expedia the lowest which is 12,37Euros less (111,68€). These prices can give us a general idea but they are not absolutely representative of the general trend of the prices. The latter can be presented by some percentages that have been calculated and show that Hotels, that has the highest percentage, is the cheapest of all the other search engines and of the price at the website at 15,30% of the hotels, Orbitz comes next (12,50%) and finally Venere is the cheapest for 2,37% of the hotels, while these percentages get lower when the query changes and we look for how many hotels each search engine is for more than 10% cheaper than all the others, including the official website. Then Hotels has the higher percentage again but it is only for 3,23% of the sample. When we compared the price of each search engine to the price of the website we concluded that Expedia gives cheaper prices for 49,14% of the hotels, but Hotels (26,51%) gives the cheapest prices for more than 10% of the price of all the others. On the other hand Travelocity appears to be the most expensive of all at 17,46% of the occasions while at this query Expedia has the minimum percentage (5,17%). The cost analysis ended by calculating the percentages of the hotels where the prices at some search engines were cheaper than the price of the website. At least one search engine was cheaper than the website for 79,31% of the hotels and all the search engines were cheaper than the website for 1,72% of the hotels which is a quit low percentage.

Generally, in some cases we observe big differences between the minimum and the maximum values or high standard deviations, this is caused by the fact that all the capital cities of the European Union participate in the research and there is difference among them at the general level of the prices, the quality of life and the living standards. In addition to that the differences at the prices among the search engines can be explained by some hidden costs, additional charges for the service of the web booking or by the price policy that it follows and the target group of consumers where it addresses to.

The rating-satisfaction statistical analysis has shown that the general mean value of all the categories is 8,39 which is enough high and shows that probably the most satisfied users express their opinion about the hotel where they stayed at. In addition to that, the mean values get higher as the category of the hotel gets higher. Although some bad ratings have been noticed, that make us being critical about whether they constitute false postings or they express the feelings of really unsatisfied customers, on purpose these hotels were not removed by the initial data and replaced by hotels that had more normal ratings to show that the factor of trust must be seriously taken into consideration. Generally the minimum value observed is 2 and the maximum is 10

which shows the ultimate satisfaction. Travelocity appears to give the lowest ratings with a mean value of 7,58 and Hotels the best one (mean value =8,68). In order to see the general trend of the ratings for each search engine, we calculated the percentages of the hotel where each one of them was giving the higher and the lower ratings. So Expedia appears to give the highest rating of all at 21,19% of the hotels and Hotels and Orbitz only at 4,94% of them. Concerning the lowest rating Travelocity has the lowest one for 28,40% of the sample of the hotels that participated in the study.

The main practical weakness of the study is related to the prices. Each search engine has its particular price policy formed by the hidden costs for the breakfast or for the charge of the service of online booking or for the brokerage, by the taxes, by special agreements that may exist between them and the hotels, mostly for the big chains, by the advertisements presented on its website and by the prices of the competitors. Furthermore, in order to attract more electronic customers some search engines and consequently the hotels themselves hidden behind the search engines might make special offers and if we consider that the current time period is economically unstable, the prices may vary if we repeat the research for another time period so the results will be differentiated.

Another practical weakness concerns the ratings and is related to the factor of trust. At the eight search engines it is mentioned that the ratings are formed by the marking of the visitors of the website that express their personal point of view, but the danger of the false or extreme postings always remains. At Tripadvisor it is not clear how the ratings are formed. As it is mentioned by Miguens (2008) they are the result of the users' marking by interacting with the system and giving their ratings and by other factors that are not clarified neither at the official website.

Another limitation is during the collection of the data. At the study we did not take into consideration the 1 star and 2 stars categories as the information about those hotels was inadequate at the search engines and there were enough deficiencies. Furthermore in order to make a more detailed research it would be nice to select the number of the hotels that participate to the study proportionally and according to the population of each European capital city or according to the total number of the hotels that each city has, while now we chose an equal number of eighteen hotels for each one of the capital cities. These limitations can turn into a fuse and a suggestion for future research. In addition to this, by adding economical elements, such as the GDP of each country and by trying to define their association to the variables that we have, we can give new dimensions to the study.

The results of this study can be useful for the search engine managers in order to see the general tendency of the prices and the rating and to compare their search engine to the others. By this comparison they can decide which price policy that they will apply to attract more visitors and electronic clients. The hotel managers can easily see the prices of other hotels of the same category and form theirs. Furthermore, by taking into consideration the ratings presented on the search engines they can ameliorate their services to improve their ratings and positioning among the others. They can also see which search engines are the most complete and make the required actions to appear on them if they do not, because this could constitute a good way of advertisement. The tourist organizations and agents can be benefited as well. The results of the study can facilitate them to keep their customers more satisfied by proposing the most beneficial solutions after having looked at the search engines that appear to be the most complete or that usually give the lower prices. Finally the comparison of the search engines presented at this study can help each client/guest to check which search engine usually is the most economical way to book a hotel or they should prefer the online booking directly from the official website.

To conclude, we could say that the Web 2.0 applications provide us with plenty of information and possibilities. The evolution of the technology will create new innovative challenges and by using our critical thinking we must evaluate all the sources and choose the solutions that seem to be the most beneficial.

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