

Copy and Paste for Hotel Mobile Websites? Or: The Power of Screen Sizes

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Abstract The evolution of user experience and the growing popularity of mobile devices have changed the behaviour of today's consumers. The hospitality industry faces several challenges adapting to these changes. By means of Responsive Website Design (RDW), the majority of website content has been tailored to different smart devices. Therefore, the aim of this exploratory study is to find out whether RWD is still considered a state-of-the art technology for hotel mobile websites in guaranteeing customer satisfaction. By means of a true experiment involving an eye-tracking study, think aloud protocols and semi-structured interviews, the findings of this research show that users navigating the same hotel website on different mobile devices exhibit great differences when it comes to usability and content perception. This implies that it is not sufficient to design only one website and adapt it through RWD but that there is a necessity to create variable website designs for variable devices.

Keywords Usability · Content · Responsive website design · Tablet · Smartphone · Eye-tracking

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1 Introduction

Over the last 20 years, mobile devices, namely smartphones and tablets, have affected the development of one of the fastest growing industries in the world (Buhalis & Law, 2008; Egger & Buhalis, 2008; Neuhofer, Buhalis, & Ladkin, 2012). The hospitality industry in turn, has been quick to embrace this and to incorporate various possibilities for mobile device usage (Wang, Park, & Fesenmaier, 2011). Morosan and De Franco (2014) attribute this phenomenon to the ubiquity of mobile devices, their personalisation and familiarity. Given the difference in the screen sizes of the two devices, smartphones having an average display size of 320 pixels by 480 pixels and tablets with an average size of 786 by 1,024 pixels, developing mobile websites for hotels has become more complex than before (Gibbs & Gretzel, 2015).

Nowadays, most websites are tailored to the mobile version through the application of RWD. RWD allows the very one and the same website to re-shape and adapt itself to various screen sizes (Baturay & Birtane, 2013). It serves the enhancement of usability, which is according to Lee and Kozar (2012) of major importance and vital significance for success in online business. According to ISO 9241-11 (1998) usability consists of three major components: effectiveness, efficiency and satisfaction. Effectiveness deals with adequacy of content, ease of use and accuracy and completeness in achieving goals. Efficiency indicates the relation between accuracy and completeness and the resources needed to achieve the latter (Yeung & Law, 2004; Frokjaer, Hertzum, & Hornbaek, 2000). According to Oliver (1999), customer satisfaction is a consumption state after usage of a product or service that indicates whether the purpose of the latter was fulfilled.

The presentation of content is a crucial aspect of all websites. According to Rahimnia and Hassanzadeh (2013), online content constitutes one of the most important tools for companies to expand their businesses and increase profits. In addition, it exhibits a close link to customer satisfaction, which is measured by means of rating scales and indicates how comfortable users feel when using a system and whether they have a positive or negative attitude towards it (Frokjaer et al., 2000). Schmidt et al. (2008) state that it became common in the hospitality industry to make use of the Internet and therefore, websites as a marketing tool. Most industry suppliers are not only visible on online travel agencies, but also operate their own websites (Benckendorff, Sheldon, & Fesenmaier, 2014). Understanding the importance of the website as a powerful tool in hospitality, it should also be taken into account that user experience is different when accessing the website on a different smart device.

However, researchers over the last couple of years have directed their attention more towards the development of mobile applications in the tourism and hospitality industry (Adukaite, Reimman, Marchiori, & Cantoni, 2014; Leung, Lee, Fong, & Law, 2014). Little attention has been given to the importance of hotel mobile websites, especially when it comes to usability and content importance in the context of devices with different screen sizes. Therefore, the aim of this research is

to examine the differences regarding usability and content of hotel mobile websites on mobile devices with different screen sizes.

2 Literature Review

2.1 Mobile Devices in the Search and Booking Process

Over the past decade, mobile technologies have become a popular instrument helping tourists at every stage of their trip (Wang et al., 2011; Neuhofer et al., 2012). In particular, smartphones play an important role in affecting the tourist's accommodation research and booking process (Leung et al., 2014; Linton & Kwortnik, 2015).

Adobe Systems Incorporated (2012) found in their analysis that more than one sixth of the 300 million visits to 31 hotel websites came from smartphones and tablets. Recent research in the area estimated that by 2016, 51.8% of all travel online bookings will be undertaken by means of mobile devices (eMarketer, 2015). Upon closer examination on the demographics of online purchasers and travel bookers, Dhanapal, Deeparechigi, and Thanam (2015) found that the majority of online purchasers comprises Generation Y, born between 1980 and 1994 (Weiler, 2004), followed by Generation X and the baby boomers. The typical profile of a Generation Y user expects that websites have to be easy to navigate (Djamasbia, Siegel, & Tullis, 2010). This overlaps with the findings of Nielsen and Loranger (2006), who have stated that web usability is of major importance nowadays, given how competition has become more intense and unforgiving, with every mistake or delay leading to customer dissatisfaction and lost business.

2.2 Usability and Website Content

As stated above, ISO 9241-11 (ISO, 1998) defines usability as “effectiveness and efficiency and the resulting satisfaction with which certain users reach specified goals in predefined environments”. According to Nielsen and Loranger (2006), the most crucial usability problems are associated with the search function, findability-related issues such as navigation, links, category names and information architecture. Other elements like website design, including layout, readability, scrolling and information, as product information, information about the organisation and price, are also of central importance when it comes to the usability of a website (Nielsen & Loranger, 2006).

Another determinant of importance is the content of a website, as it is closely related to customer satisfaction (Rahimnia & Hassanzahdeh, 2013). ISO 9241-151 (ISO, 2008) defines content as a “set of content objects” and content objects as

“interactive or non- interactive object containing information represented by text, image, video, sound or other types of media”. Thielsch and Jaron (2012) argued that content is the central element that differentiates websites from other interactive products and that motivates users to visit a website. In this context, Ranganathan and Ganapathy (2002) emphasised that content has a high degree of influence on the purchasing process.

2.3 Responsive Web Design

RWD offers an approach for enhanced website usability and content provision. This method marks a new design paradigm for website architecture that makes the very same website flexibly adaptive to different screen sizes. In contrast to websites without optimisation, which would just adapt themselves to the area that can be viewed, RWD changes the layout of a website based on its viewport. Therefore, its goal is to achieve a more satisfying user experience, regardless of the device used (Bohyun, 2013). However, despite the application of RWD it is of importance for hoteliers not to choose website design and content selection based on one single device but to adapt it across multiple devices. In other words, it needs to suit the respective screen sizes (Murphy et al., 2016). Mendoza (2014) explains one of the reasons for this, which is due to the mobile mantra, or a simple rule stating that the desktop experience is completely different from the mobile experience and vice versa. When the desktop version of a website is copied to a mobile device, it cannot be adapted so smoothly and thus the experience cannot be replicated.

In line with the arguments that have emerged in the existing literature, this paper will further deal with the following questions: (a) What are the differences in the perceived usability of a hotel mobile website in the context of different screen sizes? (b) How do perceptions of content importance vary in the context of different screen sizes? (c) What are the implications that can be derived from differences occurring on one and the same website in the context of different screen sizes?

3 Methodology

3.1 Research Design

A mixed method approach was adopted for testing usability and content perception on devices with different screen sizes using RWD. Data was collected through an eye-tracking study, which was combined with a think aloud protocol and a semi-structured interview. The website of one of Salzburg’s boutique hotels was the test website of this study. Hotel Blaue Gans (<http://www.hotel-blaue-gans-salzburg.at/de>) was chosen due to the fact that it applies RWD. More precisely, the website

design, navigation and features were identical on both tablet and mobile phone versions, in order to ensure the ability to relate results only to differing screen sizes.

3.2 *Sample*

In total, 14 persons were included in the study. These were divided into two groups, whereas seven participants tested the chosen website on the iPhone and seven on the iPad. Nielsen and Pernice (2010) argue that five participants are sufficient in a qualitative usability study to identify the major number of issues of a system. All test subjects belonged to Generation Y, which was the only criterion applied, no further demographic distinction was made at that point. The decision for using an iPad Pro and an iPhone 5C was made in order to avoid biases related to different operating systems (IOS and Android).

3.3 *Data Collection*

The research was conducted in an experimental setting. According to Bryman (2012), the independent variable in an experimental design has to be manipulated in order to find out if a change in the independent variable influences the dependent variable. In this study, the independent variable was the device itself, more precisely the screen size, whereas the dependent variables referred to usability and content perception of the users.

For this study, *SMI Eye Tracking Glasses* were used, a system that allows the researcher to follow eye movements of participants, to determine centres of attention and interest (Duchowski, 2007). At first, a 3-point-calibration was conducted to adjust the device to each individual participant. During that process, the eye-tracker maps the points, recognises the gazes and calibrates (Bojko, 2013). According to Goldberg and Wichansky (2003) the necessity of constant calibration of the hardware poses a big source of failure in the eye tracking methodology. They also critically address differences that may occur due to carrying eye colours and eye kinematics. Following the calibration, participants tested the website on the iPad or on the iPhone and had to fulfil a number of pre-defined tasks, which were identical for both groups.

The participants were asked to: (a) familiarise themselves with the website; (b) look for the best way to get to the hotel; (c) select three leisure activities they would like to do in Salzburg; (d) choose a hotel room that suits them and (e) book the hotel room and stop before registration. Parallel to the eye-tracking, the think aloud method was applied, which is referred to also as “concurrent verbalisation” and describes a method where participants are asked to perform a task and verbalise

whatever comes to their minds while doing that (Jääskeläinen, 2010). For that, the participants were asked to say out loud whatever came to their minds during their task performances. Lastly, in order to gain additional information, a short semi-structured interview was conducted. The interviews were carried out in order to gain supplementary information and were subsequently recorded. The questions of the interview were the following: (1) Where did you first look at? (2) How did you find the complexity of the tasks? (3) How did you find the website layout? Was it readable? (4) How satisfied were you with your task performance? (5) Would you reserve a room in the hotel with the device used? What triggered your answer?

3.4 Data Analysis

The collected data was analysed with the help of the software *SMI BeGaze* in which the recorded videos, eye-movements and the think aloud protocols were combined and displayed. Primarily, data cleansing was applied to identify incomplete or inaccurate data. During this process, data was corrected and one eye-tracking recording had to be excluded from the study due to a calibration error. However, the think aloud protocol and the semi-structured interview of the participant were analysed. According to Bojko (2013), it is not necessary to exclude other data such as the think aloud protocol from the study as it is not affected by calibration. After data cleansing, the areas of interest (AOI) which comprised of website content that was deemed important for the research were determined. These areas were: (1) Logo; (2) Picture block; (3) Language choice; (4) Best available room; (5) Existence reference; (6) English Video; and (7) English Text.

According to Bojko (2013) the analysis of eye-tracking data from dynamic content poses big challenges, since the content moves, changes size, appears or disappears. That is why the collected gaze data had to be manually mapped fixation by fixation on a static reference image. This procedure allowed the software to produce gaze plots and heat maps displaying where the gazes and fixations of the participants were at each point in time during the study. In order to gain a deeper understanding of usability issues, data collected by the means of the think aloud protocol and semi-structured interview was qualitatively analysed. Primarily the recorded data of the think aloud protocol and the interviews were transcribed and reviewed. In line with this process, codes and sub-codes were derived and statements of participants were labelled within those codes and sub-codes.

The qualitative coding was done in *Microsoft Excel* by mapping the codes and sub-codes. The chosen codes represent important elements of usability testing and were used for the development of the semi-structured interview guide (Table 1). The following coding manual was created and applied:

Table 1 Coding manual

Categories	Cognitive process	Usability	Content	Design	Performance
Sub-categories	Asking	Problems	Important content	Layout	Satisfaction
	Guessing	Positives	Less important content	Readability	Outcome
	Complaining	Task complexity	Content problems		
	Statements	Time factor	Unclear content		
			Positive outcome		

4 Findings

Given the fact that hotel website usability and content were the two main focus points, they also represent the main chapters. The content chapter analyses the three reference pictures with including AOIs, the chapter usability deals with usability problems, performance and booking behaviour as well as the layout of the hotel website. One of the measures used for evaluation was dwell time, which represents the sum of durations of fixations and saccades on an AOI (Jacob & Karn, 2003).

Table 2 summarises the outcomes of the eye-tracking study and will further guide the findings chapter on usability and content.

Table 2 Eye-tracking data analysis

AOI	Hits		Dwell time (ms)		Revisits	
	iPhone	iPad	iPhone	iPad	iPhone	iPad
Logo	5/7	5/6	1308.8	827.1	5/7	6/6
Picture block	7/7	6/6	5965.2	4718.5	7/7	6/6
Language choice	7/7	5/6	2812.6	5007.7	–	4/5
Best available room	4/7	0/6	936.5	–	3/4	–
Existence reference	7/7	5/6	818.3	720.9	5/7	5/6
English video	5/7	4/6	5843.5	11837.4	1/5	2/4
English text	7/7	4/6	14166	6637.6	5/7	0/5

4.1 Content

4.1.1 Eye Tracking Analysis

The *English Cover Page* constituted the entrance page of the website. Figures 1 and 2, exhibit the differences in gazing patterns of iPad and iPhone users. The gazes of participants tested on the iPad were more focused on specific areas than the gazes of those tested on the iPhone. The gazes of iPhone test subjects were more interspersed throughout the whole reference picture. Moreover, participants tested on the iPad

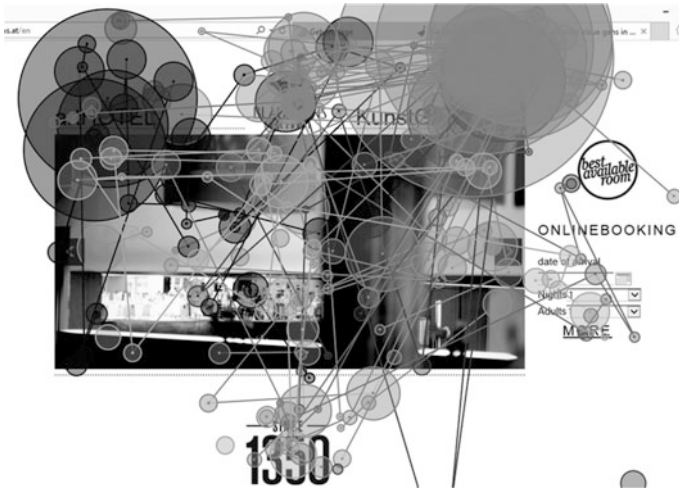


Fig. 1 Gazing pattern iPad users



Fig. 2 Gazing pattern iPhone users

seemed to concentrate on certain points more often when looking at the relative size of the fixation marks.

The *Logo* was considered relevant by both user groups and so was the central picture block of the website, as it can be viewed in Table 1. In both groups, the dwell time on the *Picture Block* was considerably high (iPhone 5965.2 ms; iPad 4718.5 ms). The AOI *Existence Reference* has also received large attention among both user groups. The AOI of *Language Choice* accumulated an especially high dwell time among the iPad test group (5007.7 ms).

The *Best Available Room* feature has not been recognised by iPad users at all, while more than half of iPhone users recognised and even re-visited it. The outcomes demonstrate that both groups hit the AOI *English Video*, but only the users on the iPad started watching the video, therefore, leading to a much higher dwell time (iPhone 5843.5 ms; iPad 11837.4 ms). The dwell time of the iPhone test group would have been even lower, if not for the one participant who watched the video extensively. When it comes to the AOI *English Text*, two participants in the iPad test group did not visit the text passage on the cover page as they proceeded to another page of content without scrolling. The findings also show, that iPhone users spent more time reading the text (14166 ms), than users on the iPad (6637.6 ms).

4.1.2 Interview Comments and Observations

In the course of the think aloud protocol, four iPhone participants explicitly indicated the video as less important than content: “*there is a video, I am not going to watch it*”, “*I will not look at the video because I don’t feel like it*”, “*there is a video, maybe I will look at it later*” and “*ok there is a video, but I do not want to watch it*”. Among iPad users, only one participant mentioned the video as “boring” after having started watching.

Concerning attention catchment according to the think aloud protocol, the majority of iPhone users were not able to recall which content they looked at first, which is why they mostly mentioned two or even more AOIs. It is also of great significance that two test users on the iPhone stated that they first looked at the overall page and could not define this more clearly. Despite of this, the collected data clearly demonstrate that most users on the phone and the tablet first looked at the picture block.

Related to importance, in the tablet test group, three test users mentioned the video as very important, while, as demonstrated above, the iPhone test users neglected the video. In general, the phone test group mentioned more often that content was considered unimportant. Four people mentioned the video in that context and three people mentioned the redundancy of “*just written information*”.

4.2 Usability

4.2.1 Identification of Problems

One of the common problems identified by both user groups was the size of the text passages of the hotel website, which appeared to be too small regardless of the screen size of the tested device: “*I am making the words bigger, the normal size is too small*” (phone) or “*the text is too small*” (tablet). The same applies to the *Language Choice*, which was also identified as a main usability problem in both groups. As it can be noticed in Table 1, a substantially high dwell time on this AOI was recorded. The evaluation of the think aloud protocol revealed major problems with this feature.

One user on the iPad experienced major problems in changing the language. This was demonstrated by a dwell time of 16336.7 ms and 27 fixations on the AOI. Another problem identified by users on both devices was the fact that they were redirected to another page during the booking process. Concerning navigation, three participants among the phone test users mentioned that it was very hard to find information on the website, and also stated that they did not find any headlines or pictures to click on.

Five iPhone test users mentioned confusion with “*things being not in their regular places*”, “*bad navigation*” and confusion over “*where to click on*”. These users made a total of 13 comments along these lines. Among tablet users, three participants mentioned that “*it was strange that the menu was partly on the top and partly at the bottom*” or that “*it was pretty tough to navigate around on the website*”. Tablet users made seven comments in total on the subject of navigation. The time factor was considered and mentioned by six users on the phone and four users on the tablet: “*It is going very slowly*” or “*ok let’s search—it is loading—pff—it is a little bit slow*”.

However, the most significant issue was discovered by the iPhone users when they had to search for leisure activities in Salzburg. The link to the hotel email was placed on top of the activities and the navigation bar could not be clicked. For this reason, iPhone test users were unable to complete the task. Concerning the overall complexity of tasks, all 14 test users said that the tasks were clear. However, six iPhone users mentioned that the tasks were difficult to accomplish with one user clarifying that this might be due to the small screen size of the device. In general, it was found that the total performance among the test users on the tablet took around 8–12 min while the accomplishment of the same tasks lasted for 18–20 min among phone test users.

When it came to complaints during task accomplishment (loading, waiting, not working slow, and having a hard time), tablet test users accounted for nine complaints while phone test users counted for 13 complaints. This was also partly due to the above-mentioned problem with non-responsive navigation. Two participants on the phone even stated that they would “*change to another page if something like that happened*”. When analysing the usability and comparing the results of tablet

users and phone users, iPhone users identified a much higher number of usability problems than iPad users.

Layout

The overall website layout was positively appraised by six tablet users while only one tablet user considered it not well arranged. Among the phone users, two people mentioned it as quite likeable and one person considered it at least clean, while all the others made remarks such as “*confusing due to too many headlines*”, “*messy*” and “*hard to navigate*”, “*not readable*” and “*awful fonts and headlines*”.

Performance and Booking Behaviour

All the tablet users mentioned that they were satisfied with their task performance and five said they would reserve a room on the tablet, while two participants clearly stated that they would just not make any reservation due to personal preferences. Among the users tested on the phone, five said that they were basically satisfied with their performance and two stated that they were not at all satisfied. According to that, four participants stated that they would not reserve on the phone at all, while one user revealed that she might consider booking if no computer was available. One test subject said she would reserve only if she was really convinced to book at this hotel, and another mentioned that he would probably make a phone reservation. Finally, one participant mentioned that a phone reservation was likely, but added that there was still some hesitation due to scarce navigability of the website.

5 Discussions and Implications

Researchers have dealt a lot with the development of mobile applications in the hospitality industry throughout the last years (Adukaite et al., 2014; Leung et al., 2014). However, they have largely neglected research on mobile hotel websites. By exploring mobile hotel websites in the context of different screen sizes, this study addresses a major gap in the existing literature. It provides insights on content creation and usability practices on mobile hotel websites by considering user experience. From a practical point of view, the study shows major industry implications in terms of hotel website creation for mobile devices with different screen sizes.

Murphy, Chen, and Cossutta (2016) state that online user behaviour differs depending on what devices are used in the information search and booking process. This study confirms these scientific findings in the context of mobile hotel websites. In the course of the study, many differences in the perception of different contents and usability were examined. The main differences occurred in the perception of

importance of video material, the feature of best available room, the perception of website layout and the amount of usability problems as well as in the intention to finally book via the device used. The study can also affirm the meaningfulness and importance of usability in the contemporary tourism landscape and identify the main usability disablers as navigation, category names, structure of information, product information and price, as proposed by Nielsen and Loranger (2006). This holds true for both devices, tablets and mobile phones, although usability problems occur more severely on mobile phones.

The study aimed at pointing out differences of content importance and usability of devices with different screen sizes. Although it has already been proven that a change in screen sizes impacts perceived usability (Raptis, Tselios, Kjeldskov, & Skov, 2013), this study adds to literature by addressing the perception of content importance and by focussing on hotel mobile websites. The conclusions from this study are that while the hotel website used RWD which ensures a uniform visual appearance on both the iPhone and iPad, some major differences still emerged in terms of content importance and usability. These differences as outlined in the above findings, lead to a number of practical implications for the industry.

The findings first imply that hotel operators, when creating a mobile phone optimised website, need to decide carefully on what should be delivered to the guest via text. They need to place this crucial information on the first page as after some time, the possibility of mobile phone users reading any of the text diminishes. When it comes to the iPad users, the probability of them complaining about having too much text to read, is much less.

Second, the implication following Nielsen and Loranger (2006), is that it is crucial to have a clearly navigable website. This was found to be true on the tablet but even more so on the mobile phone. Especially on website versions for smaller screen sizes, it is of importance to place the navigation bar on the top of the page instead of the bottom, as its location on the bottom potentially creates usability problems.

Third, phone user expectations and desire for quick interaction with the device is much higher than the expectations of the tablet users. It is therefore fundamental to tailor written information according to the different types of devices and the needs of their users. Another interesting point of discussion regards the redirection to external websites. In particular, tablet users felt confused and disliked being forwarded to another website. This was in contrast to the responses of phone users, possibly because of their tendency to rapid browsing between pages. Website developer should therefore present information in a compact and succinct way that ensures maximum usability for the potential customer.

The key implication for the hospitality industry, however, is that it is not sufficient to create one set of website content and overall website design and adapt it to multiple devices by means of RWD. For that, the differences in perception and importance of content, design and usability are too severe among various devices. The final suggestion for the industry would therefore be to separately design websites for different mobile devices in order to ensure customer satisfaction. Given the fact that RWD is referred to as an innovative way of tailoring websites to

different devices (Baturay & Birtane, 2013), the findings of this study constitute an important addition to the existing knowledge in the area.

6 Limitations and Further Research

Although this study has provided some novel insights into how mobile devices' screen sizes influence usability and the user experience, a number of constraints limited the extent and the generalisability of the results. First, data collected through the head-mounted mobile eye-tracking device did not allow for the quantitative evaluation of dynamic content. A table-mounted eye tracking solution would provide the stable and directly comparable set of data required for the analysis of such gaze data.

Second, due to the qualitative nature of the study, the sample size was explorative and only one website was tested. Therefore, it is not possible to generalise the findings to a larger population. A replication of the study could lead to varying and contrasting results, with interesting insights being derived. Another limitation was related to the experimental setting of the study. In the data collection stage both devices were mounted on a stand limiting participants' ability to move the devices naturally.

Future studies in this field should aim to expand the sample size and a larger number of websites should be tested in order to gain a richer body of information. Further studies could also aim at testing outcomes related to differences in usability and content on different mobile devices in a quantitative way to strengthen scientific literature. In that sense it would, for example, be of particular interest to assess if dwell time on areas of interest, varies significantly on different devices.

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