

Service gap in hotel website load performance

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Abstract

Purpose – The purpose of this paper is to investigate how well hotel website load time performance compared against customer expectation benchmarks. In a competitive market, service interactions are important. As customers move to mobile devices, the time to load a website is a critical part of the service delivery. Long load times can lead to poor service experiences, customer frustration and lost business. Hotel website load times on both mobile and desktop devices were examined and compared to service expectations.

Design/methodology/approach – The study used an online service to assess and compare website load performance using both desktop and mobile devices for 259 international hotel company and sub-brand websites.

Findings – The time to load hotel websites was significantly slower on mobile devices compared to desktops. Load times on both platforms exceeded 3 s, which is considered best practice. Long load times represent a service gap and can cause dissatisfaction resulting in a potential customer abandoning the website for a competitor's site, thus affecting sales.

Research limitations/implications – While the population for the study was robust in size and contained most of the major hotel companies worldwide, it was not exhaustive. Data also represent a snapshot and will change over time. Load times vary based on test location, access device and network traffic. Additionally, web page load times and customer expectations will change as technology evolves.

Originality/value – Increased use of mobile devices for hotel reservations increases the importance of mobile service delivery. This is the first known study to measure hotel website load times for mobile devices, and to examine both mobile and desktop performance against best practice. The results of this study highlight a service gap, which can lead to loss of business. Given the consistency of the results, the authors suspect that this is an issue that has not been recognized within the industry. This study is valuable because it exposes an issue of website design not generally addressed in the hospitality industry, even though tools are available to monitor site performance.

Keywords Service, Mobile, Website, Internet, Hotel, Expectations, Gap, Load time, Speed index, GTmetrix

Paper type Research paper

Introduction

Service has long been defined as the interaction between a customer and a company or firm (Reisinger, 2001). In the hotel industry, evaluating service quality is a common process and critical undertaking for both management and hotel guests. Most of the research on service quality evaluation in hotels has emphasized the onsite experience. However, as we move to deliver more service encounters online, it is important to examine how hotel guests are redefining service quality. Additionally, the delivery or first impression of service for hotels now often begins online in advance of the guest stay, when guests seek to make reservations (Mok *et al.*, 2013). This study seeks to evaluate the online service experience that precedes the guest arrival, namely the interaction with the hotel's website.



Service quality theory identifies that when service delivery meets or exceeds expectation, consumers are satisfied. However, when the reverse is true and consumer expectation exceeds the service delivery, dissatisfaction results. This is defined as a service gap (Parasuraman *et al.*, 1985; Qu and Tsang, 1998).

The first point of contact a potential guest has with a hotel is often when they access the hotel website on their computer or mobile device. The website presentation, including both its appearance as well as the time it takes the website to load is the hotel's first opportunity to serve the customer. As the first impression, a page's load time has the potential to influence consumers' opinion of the hotel for better or worse, particularly for first-time visitors.

Internet marketing research has identified that when a web page fails to load in the time expected, consumers are dissatisfied and generally abandon the website in favor of competing websites that load more quickly (Benes, 2018; Rose *et al.*, 2001; Selligent, 2017). This represents a service gap in the website's performance. When consumers are seeking to make a hotel reservation, if the hotel website does not load in the expected timeframe, consumers may seek to make reservations elsewhere, resulting in lost revenue for the hotel. This is particularly true for Millennials and Generation Z, who are more tech-savvy and less brand loyal (Henry, 2018).

In the last several years, consumer behavior has shifted so that mobile devices are now the predominant distribution channel for booking hotel rooms (Linton and Kwortnik, 2015; Ozturk *et al.*, 2016). Given the growing importance of mobile, it is imperative for hotels to examine this first element of guest service, the load time, particularly on mobile devices.

When using a mobile device to search for hotel information, consumers have the option of using an app or accessing information through a mobile website. Several studies have shown that consumers prefer mobile websites over apps (Linton and Kwortnik, 2015; Ozturk *et al.*, 2016; Hwong, 2017). While most mobile users have downloaded at least one travel app, research has revealed that about half of those apps are subsequently deleted from the mobile devices (Linton and Kwortnik, 2015). Consumer reluctance to use apps comes from several factors. Consumers prefer to limit the number of apps due to storage limitations, and to keep single purpose apps from cluttering the screen. Consumers are also concerned about security and requirements for disclosing personal information to use apps (Harris *et al.*, 2014; Harris *et al.*, 2016). Because of these factors, this study focuses on hotel website performance rather than that of apps.

This study examines the state of hotel website load times across the industry, comparing website load time against best practice for both desktop and mobile devices. The contributions of the study are five-fold:

- it brings attention to web page load time as a factor impacting customer satisfaction, and identifies 3 s as the target based on prior research and industry best practice;
- it highlights website design best practices that impact web page load times drawing upon recent behavioral research;
- it provides a broad-based survey of hotel web page load time performance establishing a benchmark upon which future performance can be compared;
- it compares hotel website load times for both desktop and mobile devices against consumer service expectations, highlighting service gaps which may impact hotel reservation processes and hotel revenues; and
- it introduces a methodology using readily available tools that not only enables the hotel companies to monitor their own (and competitor) website performance, but that also provides specific, actionable recommendations to improve their site's performance.

Previous studies have identified load time as an important factor in both hotel website quality and user satisfaction (Hahn *et al.*, 2017; Law and Hsu, 2005, 2006; Li *et al.*, 2017;

Panagopoulos *et al.*, 2011; Qi *et al.*, 2009). However, the authors are not aware of any systematic study that measured hotel web page load performance, or have analyzed the performance on desktop and mobile devices. This study seeks to fill that gap by studying the load time for hotel websites.

Literature review

“Service quality can be defined as the extent to which the service fulfills the needs or expectations of the customers” (Al-Ababneh, 2017, p. 1). One measure of service quality is the gap between the expected service and the actual perceived service. Parasuraman *et al.* (1985) brought forward the concept of a service gap that exists when expectations exceed service delivery. Hospitality researchers have examined service gaps for hotels in areas, such as the appearance of the guest room, hotel staff performance and the value of the room rate (Juwaheer and Ross, 2003; Lee *et al.*, 2000; Prince and Khaleq, 2013; Qu and Tsang, 1998).

Service quality and websites

As the internet becomes an embedded part of our lives, consumers often make decisions about the quality of a business or product based on their experience online through a website. When consumers’ first interactions with a website align with their expectations, consumers have a higher perception of the business and its subsequent products. In travel planning specifically, research has shown that when the consumer experience with the service provided by a travel website is favorable, an increased likelihood to stay on the website and use it for trip planning results (Kim and Fesenmaier, 2008).

Researchers have applied the concepts of service quality to websites (Parasuraman *et al.*, 2005; Zeithaml *et al.*, 2000, 2002). Hospitality researchers have adapted some of the early website quality tools for use in tourism and hospitality (Sigala, 2011). In the hospitality industry, there has been extensive research examining website service quality as a function of website performance (see Ip *et al.*, 2011 and Law *et al.*, 2010 for hotel website quality in the early years). Research has continued with the development of scales and models to measure service quality for hotel websites (Chen *et al.*, 2016; Hahn *et al.*, 2017; Li *et al.*, 2017). Given the role of websites in hotel room distribution, research in this area continues with researchers studying many factors and markets.

Several researchers have utilized web performance tools to study hotel website performance. Lee and Morrison (2010) used two web performance tools (NetMechanic.com and Linkpopularity.com) to compare technical critical success factors for websites of both Korean and US hotels. Nurlansa (2016) used web pagetest.org to measure website performance on Airbnb. Yahoo’s YSlow tool was used to investigate performance of tourism websites (Zhu, 2011). These studies, while important, only addressed website performance on desktop computers and did not compare load performance against best practice or customer expectations. With the growing importance of mobile web access as a part of service delivery, the lack of performance information on mobile devices is an important gap in the literature. The website’s design, the mobile device’s processing power and slower network speeds all affect the mobile website performance and site load time, increasing the need to study load time on mobile devices.

Load time as a measure of website quality

Factors related to load time, such as the ability of a consumer to access or get onto a website have been included in models for examining website quality. Parasuraman *et al.* (2005) included how fast a web page loads as one of the factors in E-S-Qual. Baraković and Skorin-Kapov (2017)

considered website load time as a factor of influence in their model to examine quality of experience in mobile web browsing.

Hospitality and tourism researchers have similarly included factors related to load time in models and scales for website quality. Law and Hsu (2005) asked travelers to rate the importance of website dimensions and attributes when making hotel reservations online. Respondents in their study considered website download time to be important. Law and Hsu (2006) further segmented the data of this study to examine differences in the importance of website dimensions and attributes between online browsers and online purchasers. Website load time was found to be important to both groups. Qi *et al.* (2009) found website load time to be one of the most important criteria in perceived website usability for both Chinese and international travelers. Li *et al.* (2017) found how quickly the website loaded influenced user's e-trust and online booking intentions in China. Hahn *et al.* (2017) interviewed Korean and Australian residents to develop an E-S-Qual survey related to customers' needs for hotel website quality. Respondents in their study indicated that the ability to get on the website quickly was an important measure of website quality. While important, the majority of these studies surveyed consumers about the role of website load time in website quality rather than measuring website load performance and subsequent user response.

There has been recent research into the relationship between how quickly a website loads and users' attitudes, and response. Consumers were more likely to abandon a website due to slow load time rather than for other problems, such as weblinks not working (Benes, 2018). In a controlled experiment, Baraković and Skorin-Kapov (2017) manipulated website load time and found that it impacted consumer opinions of website quality and influence. Guse *et al.* (2015) concluded, "web page loading delays impact the quality perception, may cause frustration as well as annoyance, and can impact the users' behavior." Industry leaders Google and Doubleclick, have reported that their data shows that individuals will abandon sites if the load time is too long (An, 2018, DoubleClick (2016), Google, 2017).

Consumers consider website quality in making purchase decisions (Bilgihan and Bujisic, 2015; Dedek, 2016; Herrero and San Martín, 2012; Kuan *et al.*, 2008; Wen, 2012). Despite the importance of website load time and its inclusion in many models, there is limited research that measured web page load times for hotel websites.

Mobile technology

Consumers access hotel websites in a variety of ways and through a variety of devices (Gartner, 2013; Murphy *et al.*, 2016; Smith, 2017; Ukpabi and Karjaluoto, 2017). Desktop and laptop computers were once the standard for making hotel internet reservations; however, mobile devices are increasingly being used for hotel search and selection (Lamsfus *et al.*, 2015; Murphy *et al.*, 2016; Ozturk *et al.*, 2016). Mobile bookings currently account for over half of digital hotel reservations, as well as three-fourths of all hotel and travel research (Abramovich, 2017; Carter, 2017; EMarketer, 2017).

Research on the use of mobile technology for hotels has focused mainly on adoption and acceptance of mobile technology. Consumers use multiple devices and platforms across search and booking stages of hotel travel (Murphy *et al.*, 2016; Okazaki *et al.*, 2015; Wang *et al.*, 2016). Research has shown that when the booking process for hotel rooms on a mobile device is perceived to be convenient and easy to use, its likelihood of use increases (Kim, 2016; Ozturk *et al.*, 2016; Park and Huang, 2017).

In summary, previous research has identified the importance of web page load time. However, little research actually evaluates mobile web page load time, or compares the load time to consumer service expectations. Hotel web page load time has been examined in a few studies, involving relatively few sites, namely 14 hotels in South Korea and USA

(Lee and Morrison, 2010); 30 chain hotels in Greece (Panagopoulos *et al.*, 2011); and 50 US state tourism sites vs 45 online travel agencies (Zhu, 2011). While the methodology in these previous studies measured page load times, they do not address mobile devices. Given the move in hotel reservations to mobile devices, there exists a need to study load time on mobile devices. Additionally, previous studies looked at web page load speeds of hotels or hotels companies within limited geographic regions. The current study is one of the first to evaluate the load speed of an international set of hotel websites on both desktop computers and mobile devices.

Adding to the study's importance is that Google now considers page load time in its mobile page ranking (Google, 2017), which impact site placement on search listings. This means that slow load performance will impact the website's visibility on search results.

Methodology

This study investigated the current state of the hotel industry's website load performance. Prior research shows that "47% of consumers expect a web page to load in two seconds or less, and 40% of people abandon a website that takes more than three-seconds to load" (Akamai, 2009; Chartbeat, 2017). This 3 s expectation was verified by An (2018), Google's Global Product Lead for Mobile Web. He stated that based on a sample of 3,700 sites "53% of mobile site visits leave a page that takes longer than three-seconds to load." An (2018) further indicated that best practice is for mobile pages to display content in under 3 s. Note that individual load time expectations will vary depending on the consumer, device, connection, as well as other factors. To provide a point of reference for acceptable load performance, this study used the established metric of 3 s as the benchmark for load time expectations.

The study included a set of 259 websites of international hotel companies and sub-brands. Website URLs used in the study were compiled from industry and financial reports, academic literature, and supplemented through search engine searches (Weinstein, 2017; Smith Travel Research, 2017; Stringam and Partlow, 2016). The data set was limited to hotel companies with six or more hotels. The study sought to be geographically comprehensive, including hotel companies on six continents (see Table I).

The sample included not only hotel company websites, but also the websites for sub-brands of those companies. For example, 27 hotel sub-brand websites linked to Marriott were included. There was a concern that including sub-brand sites would violate the data independence assumption in the analysis and skew the results. Some hotel companies had only one website for multiple sub-brands, while many had multiple, sub-brand specific websites. Consolidation in the hotel industry has resulted in a dichotomy, with several large organizations, and many small players. The data independence concern was addressed by doing a separate analysis using the corporate main landing page as a surrogate for the separate sub-brand pages. This "parent" or consolidated brand website allowed consumers to make reservations across the hotel brands of that company. To examine the effects of brand size and geographic location, additional analysis was conducted (see Tables IV and V).

Continent	Count (<i>n</i>)
Africa	5
Asia	20
Australia	3
Europe	13
North America	21
South America	6

Table I.
Geographic
distribution of hotel
companies for sites
studied

During the data collection phase, the load time and speed index performance metrics were collected for each web page. Data were collected for both desktop and mobile devices to determine if there were any differences in load performance. This study utilized GTmetrix (<https://gtmetrix.com/>) which runs multiple performance tests on the specified web page, and provides actionable recommendations on how to improve its performance. GTmetrix was selected because it provided results from both Google’s PageSpeed and Yahoo’s YSlow performance testing of the website. It also provided a testing environment which could test both desktop and mobile platforms. It is important to note that the testing was done on real physical machines and devices, not simulated or virtual devices. Because a study objective was to compare desktop vs mobile performance, the test was run on GTmetrix’s Vancouver Canada facility, because it was the only location that offered testing on both platforms (GTmetrix Blog, 2013). To ensure a consistent testing environment, all desktop and mobile performance tests used an unthrottled internet connection using the Chrome browser from the Vancouver location.

While GTmetrix provides a broad set of performance metrics, for this study we focused on the full load time, and the RUM speed index. These metrics are defined as (GTmetrix FAQ, 2018).

Full load time is the point after the on load event fires and there has been no network activity for 2 s. GTmetrix is waiting until the page stops transferring data before completing a test, resulting in more consistent page load times.

Speed index is a page load performance metric that shows how quickly the page was visibly populated. Essentially, the concept is to analyze the viewport of a browser (i.e. above the fold) and assess how fast the content becomes visible for the user. An algorithm for “visual completeness” over time is used to generate a final speed index score, using video analysis to calculate the value.

RUM speed index is based on the same concept as speed index, but uses JavaScript to estimate paint/render times of elements, looking at when images were loaded.

Once the user specifies the test parameters, GTmetrix visits the specified site, downloads the web page on the specified platform and analyzes the load performance. The tool generates meta-performance metrics, along with page-wide performance scores and actionable recommendations on how to improve the web page load performance. The performance data were subsequently examined using IBM SPSS version 24.

Data collection was done between June 6, 2017, and July 17, 2017. The distribution of the web page load times and speed index was compiled for both the full sample of 259 sites (Table II), and the 68 consolidated sample (see Table III). While the population for the study was not exhaustive, the study included websites for more than 52,000 hotels, and 68 companies headquartered on six continents.

Page load times	Load times distribution		RUM speed index distribution	
	Desktop computer	Mobile device	Desktop computer	Mobile device
0–3 seconds	25 (9.7%)	2 (0.8%)	139 (53.7%)	57 (22.0%)
3–5 seconds	32 (12.4%)	14 (5.4%)	67 (25.9%)	87 (33.6%)
5–10 seconds	78 (30.1%)	63 (24.3%)	34 (13.1%)	80 (30.9%)
10–15 seconds	51 (19.7%)	63 (24.3%)	14 (5.4%)	26 (10.0%)
More than 15 seconds	73 (28.2%)	117 (45.2%)	5 (1.9%)	9 (3.5%)
Mean times (seconds)	11.82	15.40	3.82	6.25
SD	8.14	9.78	3.28	7.27
<i>t</i> -statistic	5.430		5.248	
<i>p</i>	1.30 E-07		3.21E-07	

Table II.
Distribution of load
time and RUM
speed index
performance
for 259 hotel
sub-brand websites

Results

The results of the study indicate a service gap exists for hotel web page load times. This was true whether the site was accessed from a desktop or mobile device (see Tables II and III). Table II details the load performance of the complete 259 site sample. The benchmark used for consumer expectation of load time was 3 s (An, 2018). When downloaded to a desktop device, 25 sites (9.7 percent) met the 3-s load time metric, while only two sites (0.8 percent) met the metric on a mobile device. A similar service gap existed for speed index. Since the speed index focuses only on the content above the fold, its speed is always faster than the full load time, and thus more sites will meet the metric. The results indicate 139 sites (53.7 percent) met the benchmark for consumer expected load time on a desktop device, but only 57 sites (22.0 percent) met the metric on a mobile device. Note, GTmetrix reports the web page’s speed index in milliseconds which we converted to seconds to allow easier comparison with the load times.

Table III focuses on the performance of the 68 aggregated hotel company websites. On a desktop device, four sites (5.9 percent) met the 3-s load time metric, while none of the sites met the metric on a mobile device. Results indicate 37 sites (54.4 percent) met the 3-s RUM speed index metric on a desktop device, while only 14 sites (20.6 percent) met this metric on a mobile device.

We found significant differences between desktop and mobile performance, with mobile load time lagging behind desktop performance (see Tables II and III). Using paired samples *t*-tests, mobile was significantly slower than desktop performance in terms of both load time and speed index at a 95% confidence level.

As expected, the speed index performance was better than the full load time, but many web pages still did not meet the 3-s expectation metric (see Table II). Desktop performance did not meet the service expectation metric 46 percent of the time, and that service gap increased to 79 percent for mobile devices.

With consumers increasingly moving to mobile devices, this service gap is a concern. It is worth noting that the average mobile load time was 15 s, which is faster than the average 19 s for all internet websites (An, 2018). This indicates that while there is room for improvement, the industry as a whole is performing better than other industries.

Geographic location and company size

We segmented aggregated data by geographic location to determine if the location of the corporate sites affected page performance. Local influences would naturally influence website development, but do these factors impact load time? Table IV shows the mean load times and speed index for hotel companies segmented by continent of the hotel company office or headquarters location. Load time and speed index means were calculated for each group, and a one-way analysis of variance was conducted to compare the effect of hotel

Table III.
Distribution of load time and RUM speed index performance for 68 hotel company websites

Page load times	Load times distribution		RUM speed index distribution	
	Desktop computer	Mobile device	Desktop computer	Mobile device
0–3 seconds	4 (5.9%)	0 (0.0%)	37 (54.4%)	14 (20.6%)
3–5 seconds	11 (16.2%)	4 (5.9%)	21 (30.9%)	25 (36.8%)
5–10 seconds	26 (38.2%)	20 (29.4%)	6 (8.8%)	19 (27.9%)
10–15 seconds	14 (20.6%)	11 (16.2%)	4 (5.9%)	8 (11.8%)
More than 15 seconds	13 (19.1%)	33 (48.5%)	0 (0.0%)	2 (2.9%)
Mean time (seconds)	10.27	15.16	3.55	5.81
SD	7.42	8.40	2.69	4.00
<i>t</i> -statistic		5.613		4.831
<i>p</i>		4.11 E-07		8.26E-06

company headquarter geographic location on load time and speed index. While the mean load time for hotel websites with North America company headquarters was faster than other continental means, the Kruskal–Wallis test found no significant difference at the 95% confidence level related to continental location for either desktop (load time: $\chi^2(3, n = 68) = 6.29, p = 0.279$; speed index: $\chi^2(3, n = 68) = 1.98, p = 0.852$) or mobile performance (load time: $\chi^2(3, n = 68) = 6.18, p = 0.289$; speed index: $\chi^2(3, n = 68) = 1.08, p = 0.956$).

Company size

To investigate the relationship between the load time and company size, the 68 hotel company sites were segmented into four groups, according to the number of hotel properties owned (see Table V). Load time and speed index means and standard deviations were calculated for each group, and the Kruskal–Wallis test was used to compare the effects of company size on load time and speed index. We anticipated that larger hotel companies would have more resources invested in technology and would therefore have websites that better reflected current industry performance standards. However, the mean load time was slower as the number of hotels increased; however, the difference was not significant at 95% confidence level for either desktop (load time: $\chi^2(3, n = 68) = 2.86, p = 0.413$; speed index: $\chi^2(3, n = 68) = 2.04, p = 0.563$) or mobile performance (load time: $\chi^2(3, n = 68) = 1.32, p = 0.725$; speed index: $\chi^2(3, n = 68) = 2.33, p = 0.506$).

Implications

As consumers are increasingly moving to mobile devices for travel planning and booking reservations, the need to provide a positive mobile experience becomes an imperative part of guest service. While hotel websites were once used peripherally by consumers, they are now the key distribution mode for hotel reservations (Abramovich, 2017). Online impressions are particularly important in tourism and hospitality where a guest may have no other tangible interaction with the hotel or location (Kane, 2017). They are also critical

Continent	Count (n)	Desktop				Mobile			
		Load time (in seconds)		Speed index (in seconds)		Load time (in seconds)		Speed index (in seconds)	
		Mean	SD	Mean	SD	Mean	SD	Mean	SD
Africa	5	8.68	5.23	3.82	1.85	11.24	7.25	5.81	3.60
Asia	20	9.16	5.61	3.15	2.97	13.56	5.76	6.10	4.14
Australia	3	6.87	1.01	3.05	1.77	25.37	8.05	6.59	3.16
Europe	13	11.63	9.85	3.54	2.08	16.08	10.02	5.50	2.85
North America	21	12.69	8.45	4.12	3.40	15.91	8.48	5.28	3.53
South America	6	5.58	2.64	2.89	1.18	13.93	11.27	7.29	7.61

Table IV. Hotel Company websites' load time and speed index segmented by hotel company office location

Hotel Size	Count	Desktop				Mobile			
		Load time (in seconds)		Speed index (in seconds)		Load time (in seconds)		Speed index (in seconds)	
		Mean	SD	Mean	SD	Mean	SD	Mean	SD
Group 1 (25 or less properties)	18	9.31	6.46	3.97	2.97	14.97	10.33	7.43	5.62
Group 2 (26–100 properties)	21	9.02	5.62	2.76	1.48	13.89	6.72	5.57	2.89
Group 3 (101–750 properties)	17	12.79	9.81	3.77	2.69	15.75	7.05	4.83	2.62
Group 4 (more than 750 hotels)	12	10.34	7.42	3.96	3.77	16.82	10.14	5.32	4.0

Table V. Load time and speed index, segmented by hotel company size

for new potential customers who do not have any prior impressions of the hotel. Customers' performance expectations directly influence behavioral intentions to continue to use a technology, in this case, a particular hotel's website. Prior research has found that consumers expect websites to respond quickly, and load within 3 s. The results of this study show that hotel companies were failing to meet the expectation metric in the first point of service with a guest. This service gap in load time has the potential to result in decreased hotel reservations resulting in lower hotel revenues. Previous research has shown that slow load times often result in the devaluation of the brand in the eyes of the consumer (Benes, 2018; Rose *et al.*, 2001; Selligent, 2017).

As guests move to mobile devices for making hotel reservations, it is important for the hotel industry to also meet their mobile website performance expectations. The results of this study indicate that there is a larger service gap for mobile devices than for desktop devices. The study showed 57 (22 percent) sites in the larger sample and none in the aggregated sample met the 3-s metric for mobile load time. Slow sites increase user dissatisfaction with the site and have negative long-term lasting effects (Schurman and Brutlag, 2009). DoubleClick (2016) found that 53 percent of mobile site visits were abandoned if pages take more than 3 s to load. Unfortunately, the results of this study showed the average load time on mobile devices was 15 s (see Tables II and III). This study shows a need for hotel companies to prioritize improvement in the mobile load time to close the service gap between current website performance and consumer expectations, or risk losing hotel reservations to competitors.

Web page design decisions can affect a page's load time and speed index. There are a wide array of factors that must be considered when developing a website. These factors impact not only how the site appears, but also how fast it loads. GTmetrix provides specific suggestions as to how to improve the load performance of sites tested with their tool.

Given that Millennials and Generation Z are more likely to use mobile devices, are more brand agnostic and have less tolerance for slow loading web pages and apps, the importance of evaluating load times is imperative for capturing these consumers (Henry, 2018; Tao *et al.*, 2018). Lastly, this study introduces a methodology that allows management to assess their own sites against their competitors. These tools provide a scorecard that is easy for management to interpret, yet provide guidance to the technical staff as to how to improve site performance. These tools provide immediate results, and are therefore useful for assessing the impact of website design decisions.

Given the growth and significance of the mobile market, hotels need to consider site load time as part of their design process for mobile devices. As best expressed in the words of a travel writer: "why, I wondered impolitely, has it taken so long for the hotel industry to realize this is the age of the phone?" (Calder, 2017).

Limitations and further research

Web page load time is only one element of website quality, and must be considered with the goals and objectives of the site. A hotel may offer visually stunning panoramic imagery and engaging animated content on their site, but these features increase load time, particularly on mobile devices. These factors do play a role in how fast a site will load, but were not specifically considered in this study. Further research is needed to investigate what design factors impact hotel website download times.

Testing environments used were constrained by the platforms available on GTMetrix. At their Vancouver, Canada location, GTMetrix has Chrome and Firefox browsers for the desktop environment, and a Galaxy Nexus Android device running a Chrome browser for the mobile environment. Testing using iOS devices was unfortunately not available. While results may vary for iOS devices, different connect speeds, and browser environments, the reported data does provide relative performance of each website tested under similar conditions.

The data collected was a snapshot of web performance. Load time will vary based on where the site is accessed and network traffic at the time. The study used a single, standardized test site to assess the various hotel sites. While this provided a consistent testing environment and allowed ready comparison of the results, it did not capture site performance from diverse international locations. It would be interesting to investigate how website performance varies when accessed from different testing locations.

While the population for the study was robust in size and contained most of the major hotel companies worldwide, it was not exhaustive. In particular, the study did not include independent hotels, nor those not affiliated with larger hotel companies. Further research is recommended to determine how the independent hotel sector of the industry compares in web page load time and speed index.

Research into the factors driving the observed longer load time on hotel sites is needed. Which design decisions lead to extended load times? Are there certain design elements that customers want even if they result in longer download time? The 3-s metric used in this study is an e-commerce best practice. Future research should examine if this the appropriate metric for hotel sites, or are there factors which make customers willing to wait a longer (or shorter) amount of time before abandoning a site? These factors warrant additional study.

The availability of website performance tools like GTmetrix open up a new branch of potential research related to hotel websites. These tools provide an automated, independent and objective assessment of website performance. It enables testing from multiple worldwide locations using different devices and network connections. This opens up avenues of research that previously were unavailable.

This study used previous research as the benchmark for load time expectations. Actual consumers may vary in their personal load time expectations. Additionally, expectations may differ between first-time and repeat visitors to a website, and there may be demographic differences. It is recommended that future research further examine the service expectations of consumers toward hotel website load times.

Hotels and hotel companies are constantly changing their web presence. Emerging web technologies make it possible to present information in new and exciting ways. Likewise, consumer devices and network performances are continually evolving. As such, page load times will change as web design evolves. Consumer expectations may also change as technology changes, therein altering the service gap defined in this study. It is recommended that the service gap and web page load time be regularly reexamined in light of these predicted changes to technology and consumer behavior.

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