Time-varying browsing behavior of hotel website users

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Abstract

Hospitality and tourism practitioners and researchers need to understand e-consumer behaviors to develop successful digital marketing strategies and improve website performance. In particular, "when" a behavioral pattern occurs must be investigated. The present study aims to identify users' time-varying browsing behavior on hotel website by use of weblog data collected from a hotel (a major tourist destination) in Hong Kong. The daily and hourly visitor numbers, number of pages viewed, and average visit duration are compared using one-way ANOVA and Kruskal–Wallis tests. Findings reveal time-varying visitor numbers and various time-varying browsing behaviors. The study extends existing knowledge on e-consumer behavior in hospitality and tourism and provides a new direction for hotel managers in analyzing web users' behaviors.

1   Introduction

Scholars have mentioned that many marketers ignore the relationship between time and consumer behaviors while developing marketing research (Jacoby, Szybillo, & Berning, 1976). However, the present tourism literature has a very limited number of prior studies on users' time-varying behaviors on hospitality and tourism websites. Capturing users' actual behavior through traditional data collection methods, such as questionnaire and content analysis, is difficult (Kellar, Hawkey, Inkpen, & Watters, 2008). Several prior studies have thus utilized an alternative approach, which is the use of web data, to analyze consumers' online behaviors (Su & Chen, 2015). In hospitality and tourism, web data are occasionally used, and most studies have focused on identifying users' access path on websites (Leung & Law, 2008; Schegg, Steiner, Gherissi-Labben, & Murphy, 2005) and users' characteristics (Park & Chung, 2009). Leung, Law, Masiero, and Hatter (2016) examined users' behavior considering time-varying differences, but their study only focused on weekday–weekend differences, thereby barely obtaining the temporal dynamics. In other words, differences on daily and hourly basis remain unknown. The present study aims to extend current knowledge on consumers' time-varying behavior in the online platform by use of weblog data from a hotel website.

2 Literature review

Schegg et al. (2005) published the first study using weblog data collected from 15 Swiss hotel web servers. Similarly, Leung and Law (2008) used weblog data from a 5-star hotel in Hong Kong and identified users' information and access path preference, thereby determining the weakness of the hotel website. Both studies have identified "how" travelers navigate through hotel websites and provided useful insights for hotel managers and website designers in improving website performance.

In accordance with the conception that users' purchase behavior is a consequence of their search motivation and on-site involvement, Park and Chung (2009) used weblog data to identify users' motivation and involvement on the basis of their access paths and length of stay, respectively, which were then used to predict their actual purchase behaviors. They found that direct entrance to the website without referrals and long duration induce frequent purchases. Courture et al. (2015) integrated the use of weblog data and questionnaire to study the relationship between tourism innovativeness on the information searching, purchasing, and communication behavior on tourism website. Leung et al. (2016) showed that users have different browsing patterns during weekends and weekdays based on web log data.

Weblog data contain rich technical and behavioral data with a time stamp; thus, researchers and managers can examine website users' behavior more accurately than when using traditional methods (Schegg et al., 2005). However, most existing studies have focused on identifying users' profiles and examining users' navigation behaviors on hotel and tourism websites. Time-varying behaviors have also not been fully examined to date. Peterson (2004) stated that a good website analysis tool must provide all the "who," "where," "what," "how," and "when" information of the website user; otherwise, managers cannot acquire all necessary information to develop complete e-marketing plans. To fill this research gap, the present study aims to identify users' time-varying behaviors on hotel websites, particularly focusing on number of visitors, number of pages viewed, and average length of visit on a hotel website on a daily and hourly basis.

3 Method

This study collects weblog data files from an independent luxury hotel (Hotel A, a major tourist destination) in Hong Kong. A total of 365 weblog files from September 1, 2015 to August 31, 2016 are collected from Hotel A's website server. The research team analyzes all weblog files, generating different types of reports that cover statistics related to general information, activities, access, visitors, referral, browsers, and error reports. The weblog files are collected daily and are then transferred into another software system developed by the research team for further analysis. Not every weblog data item is used in the analysis as the figures can be inflated or deflated due to web crawlers, spiders, and server error; accordingly, accurate measurement can be achieved and actual browsing behaviors can be reflected (Ferrini & Mohr, 2009). All unusual activities, such as zero and large visitor numbers, page viewed, and average visiting length are eliminated. All data are then imported into SPSS to detect the outliers. Finally, 87 weblog files are omitted, and the remaining data are analyzed. Daily browsing behaviors are examined using one-way

ANOVA test. The hourly browsing behavior data are not normally distributed, which violates the assumption of ANOVA (Field, 2009). The comparison is conducted using a non-parametric test (i.e., Kruskal–Wallis and Mann–Whitney tests).

4   Findings and Discussion

A total of 278 daily and 1,668 hourly data are investigated. From September 1, 2015 to August 31, 2016, Hotel A's website has 1,309,109 visitors (4,709 visitors on average per day), with 4,043,290 pages viewed (3.09 pages viewed per visitor on average). Most visitors are from Hong Kong (41.89%), followed by the United States (12.51%), Mainland China (7. 54%).Over 58% of the visits to the website are from desktop device and 41% are from portable devices (mobile: 36.02%; tablet: 5.16%).

Day-varying browsing behaviors: The one-way ANOVA results presented in Table 1 indicate a significant difference in daily visitor numbers ($F_{(6, 271)}=13.61$, $P<0.001$). However, no significant differences are found for average number of pages viewed per visitor ($F_{(6, 271)}=2.38$; $P>0.05$) and average visit length ($F_{(6, 271)}=0.84$, $P>0.05$). Higher visitor number is found during weekdays than in weekends. Specifically, Tuesday records the highest visitor number (M=5107), followed by Wednesday (M=4984), and Thursday (M=4980). Conversely, Saturday (M=4130) and Sunday (M=4233) record the lowest visitor volume in a week.

The post hoc comparison using the Games–Howell test reveals no differences among weekdays and between Saturdays and Sundays. However, the visitor numbers on Saturdays and Sundays are smaller than that on each weekday. This finding aligns with the results of Leung et al. (2016) that users access a hotel website during work or school day. Workers usually participate in out-of-home activities on Saturdays and rest at home on Sundays (Baht & Srinivasan, 2005). Thus, low number of visitors using Hotel A's website on Saturdays (M=4130), with a slightly larger number on Sundays (M=4233), is reasonable. On the one hand, users are not willing to use their holidays to search for hotel-related information or the target customers of Hotel A may be businessmen or event organizers. Thus, most of them visit the website during weekdays, particularly during working hours.

Hour-varying browsing behaviors: this study groups the hours into four main sections, namely, (1) midnight to 5:59 am, (2) 6 a.m. to 11:59 a.m., (3) 12 p.m. to 5:59 p.m., and (4) 6 p.m. to 11:59 pm, in comparing the browsing behaviors among all sections using Kruskal–Wallis tests. As shown in Table 2, a significant difference is observed in the number of visitors among the sections (H(2)=3101.56, $P<0.001$), with mean rank values of 1,524, 2,673, 4,807, and 4,342 for sections 1, 2, 3, and 4, respectively. Similarly, the average number of pages viewed per visitor expresses significant differences among the four sections (H(2)=150.99, $P<0.001$). Mann–Whitney U tests are conducted to validate these findings.

Table 1. Users' browsing behavior by day (Sep 2015 to Aug 2016)

Daily	Visitor no.			Avg. no. of page/visitor		Length of visit	
	Mean *(SD)*	F	Games-Howell	Mean *(SD)*	F	Mean *(SD)*	F
Mon	4915 *(730)*		>Sun	3.13 *(0.32)*		05:04 *(01:55)*	
Tue	5107 (705)		>Sun	3.13 *(0.31)*		04:41 *(01:53)*	
Wed	4984 (706)		>Sun	3.18 *(0.40)*		04:52 *(01:53)*	
Thurs	4980(635)	13.61***	>Sun	3.15 *(0.33)*	2.38	04:50 *(01:52)*	0.84
Fri	4739(727)		>Sun	3.14 *(0.35)*		05:12 *(02:12)*	
Sat	4130(570)		/	3.03 *(0.36)*		05:32 *(02:15)*	
Sun	4233(688)		/	2.94 *(0.37)*		05:19 *(02:21)*	

***p<0.001

Table 2 shows that the visitor number in section 1 is less than that in the other hourly sections, and hourly section 3 has the highest visitor number among the other hourly sections. Moreover, the period from 12:00 pm to 5:59 pm is the most popular visiting time on Hotel A's website whereas that from 00:00 am to 5:59 am is the least popular time section. These findings confirm the analysis mentioned above.

Table 2. Users' browsing behavior by hour section (Sep 2015 to Aug 2016)

	1	2	3	4	x^2	Mann–Whitney U test
Number of visitors	1524	2673	4807	4342	3102***	1<2, 1<3, 1<4, 2<3, 2<4, 3>4
Avg. no. of pages viewed	3300	3111	3820	3113	151***	1>2, 1<3, 1>4, 2<3, 3>4

*****p<0.001 *(Remark: 1= 00:00–05:59; 2=06:00–11:59; 3=12:00–17:59; 4=18:00–23:59)

For the average number of pages viewed per visitor, the Manny–Whitney U tests show that users view more pages in the hourly section 3 than in the other sections and view a few number of pages in the hourly sections 2 and 4. Leung et al. (2016) found that desktop and mobile device users exhibit different access paths on the hotel website. In the current study, the difference in number of pages viewed found in each hourly section is related to the type of devices used to access the website. The visitor number and average page view per visitor on Hotel A's website in each hourly section between the desktop and portable devices are compared to confirm the above-mentioned assumption. The results show that users viewing the website via portable devices view 50% fewer pages than desktop device users and over 50% of portable device users are accessing Hotel A's website at hourly sections 2 (20.92%) and 4 (34.7%). This result explains why the overall pages viewed on sections 2 and 4 are less than those on the other sections. Hotel managers should thus be aware of the different website viewing behaviors of desktop and portable device users, and a mobile website version should be developed to satisfy mobile device users.

5   Conclusions and future research

This study aims to identify time-varying behaviors of website users by comparing the number of visitors, average number of pages viewed per visitor, and average length of visit on a daily and hourly basis. The findings show that the number of visitors during weekdays is more than that during weekends. Thus, more promotion can be implemented during weekdays while maintenance services may be conducted during weekends to reduce disturbances to users. Moreover, users access the website on weekdays during working hours via desktop devices. After work, users tend to use portable devices to access the hotel website and view 50% fewer pages than using desktop device. Users' behaviors toward desktop and mobile websites can be different. Thus, hotel managers should ensure that the mobile version of their website is fully functional and should examine what additional information or service users need on a mobile website to improve their service.

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