

# Analyzing a Hotel Website's Access Paths

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## Abstract

Irrespective of content richness and user friendliness of a website, customers may not access the website if they cannot easily find their desired information. At present, the existing tourism and hospitality literature has a limited number of, if any, prior studies that examined users' accessed paths when browsing websites. This study analyzed the web server log of a Hong Kong five-star international chain hotel in the period May 2006 to Apr 2007. The log contained 597,269 visitors and 2,655,661 pages of view data. The main focus of this study was to analyze the information retrieved by visitors and their access paths. Empirical results showed that the majority of the visitors were local residents, and dining information was their primary interest. This implies that the visibility of a website in search engine was relatively low so that only local residents that know the hotel name can find the website. Moreover, this hotel information structure was not very well-organized as visitors took an average of 3.94 clicks to reach the page that contained their desired information.

**Keywords:** hotel websites; customer behaviour; log file analysis; access path

## 1 Introduction

The importance of website evaluations, in general and in particular on functions and design has been widely discussed in the existing academic literature (Au Yeung & Law, 2003; Liu & Arnett, 2000; Nielson, 2000). In a recent study, Chan & Law (2006) developed an automated website evaluation system that evaluates the layout and colour scheme performance of websites for hotels in Hong Kong. These prior studies, albeit were able to achieve certain degree of success, primarily incorporated users' perception into the evaluation process. It remains largely unknown to what extent the users have actually behaved in the real environment. Additionally, it is still unknown whether users can get what they want even though suggested criteria were strictly followed when hotel and tourism practitioners develop their websites. In order to understand web surfers' actual information search behaviour, an analysis of web server logs thus plays an important role. In general, web server logs capture all visitor information search activities, allowing visitors' behaviour to be analyzed. The number of previous attempts to understand web server logs, unfortunately, is very limited, if any, in the existing hospitality and tourism literature. To bridge such a gap, this study adopted a manual way to analyze the log file data of a hotel website to understand customers' web surfing behaviour and identify hidden weaknesses of the website layout.

## 2 Literature Review

One of the primary objectives of having a website is to have visitors to view as many pages as possible, and for a long period of time (Burton & Walther, 2001). To retain the visitors, Catledge and Pitkow (1995) offered some advice on design. For instance, important information should be located within two to three clicks from the home page and information should be grouped together so that users can interact within a small area on the website. Learning about precise user behaviour on websites is thus of significant interest to both academic researchers (Spiliopoulou, 2000; Joshi *et al.*, 1999; Schegg *et al.*, 2005) and practitioners (Davenport, 1999; Kimball, 2000). The way users behave has long been of interest to tourism researchers. Since individual web visitors cannot be physically observed, studying their web surfing behaviours could be an alternative way to understand what they actually do. As such, web server logs, which record activities without disruption or intervention, should surely serve as a repository for users' action.

An entry in a web server log is created when a person interacts with a website and web server (Buchner & Mulvanna, 1998). Access paths, which reflect what users have done on a website, usually include data such as "the average length of a user's sessions, specific location duration (e.g., average time on a page), average download times, and how the user navigated through the site (e.g., entrance and exit points)" (Bertot *et al.*, 1997, p.376). Understanding visitors' navigation behaviour can assist the design of more efficient and user-friendly websites, discover misleading, duplicate or overlapping content, and help to understand the links' effectiveness (Berkhin *et al.* 2001). Since path analysis provides a comprehensive visitors' web navigation pattern, Greenstain and Vasarhelyi (2002) advocate that understanding the access path well can make a company move towards success. This is due to the critical use of customer information to meet the challenges of increasing competition and to compete in the market place which is dictated by customer needs and preferences. Schegg *et al.* (2005) suggest that combining path analysis with user observation and user surveys would shed more light on how to convert these visitors from lookers to bookers.

## 3 Methodology

### 3.1 Company Background

Hotel Y is a five-star international chain hotel located in the city center of Hong Kong, a popular tourist destination in Asia. The hotel has more than 400 guest rooms with seven restaurant outlets. To meet the growth of Internet applications, Hotel Y has established its own website since mid-1990 and the newly refurbished version was launched in March 2006. The website is outsourced to a third-party design house that is responsible for hosting services and for updating all static information. Hotel staff update dynamic information update such as seasonal F&B and room promotion information. The hotel website offers four different language versions, including English, Japanese, Traditional Chinese, and Simplified Chinese, and is hosted on a

dedicated Microsoft Window Web Server. All visitors' activities are logged into web server log files.

### 3.2 Web Server Logs

This research utilized 12 months' (May 2006 to April 2007) web log files of Hotel Y for data analysis. All web logs were analyzed by a web log analysis software system that provided visitors' geographical data, page visit ranking details, click analyses, and visitor access path details. Furthermore, the system can generate detailed web statistics and exported to CSV files for further data analysis.

This study analyzed the log files in three areas: web page, files, and access paths. Web pages included all HTML and ASP browser related files. A file includes all non-web related documents such as PDF, DOC, and XLS. An access path shows the web visitor's surfing behaviour commencing from the entry page till the exit page.

In total, 365 web server log files with a total of 5.09GB data were analyzed. The web log is a Microsoft Internet Information Services Server log file (<http://www.microsoft.com/technet/prodtechnol/WindowsServer2003/Library/IIS/676400bc-8969-4aa7-851a-9319490a9bbb.mspx?mfr=true> [Accessed on May 10, 2007]). The total number of visitors and page view were 597,269 and 2,655,661 respectively, and the average number of page views per visitor is 4.45.

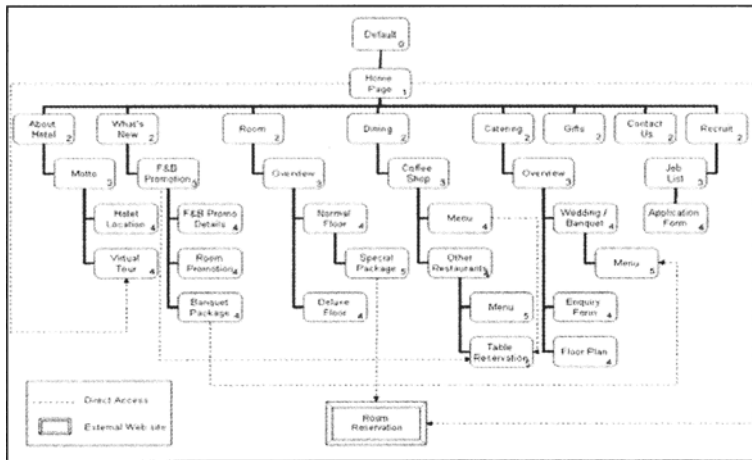


Fig. 1. A Simplified Hotel Y Site Map

### 3.3 Hotel Website Structure

The layout structure of Hotel Y's website is similar to other hotel websites. There are totally four language versions with each language version contains 51 web pages. The English version has additional 42 pages for staff recruitment. This provides a total of 246 available web pages on the website. If a visitor simply types in the domain name on web browser, the default page (default.aspx) will be redirected to the hotel home

page (Fig. 1). The upper part of the web page has a series of selection and the lower part of the web page is the content area. The content area of the home page was created by Flash where users can enjoy animation when selecting their information.

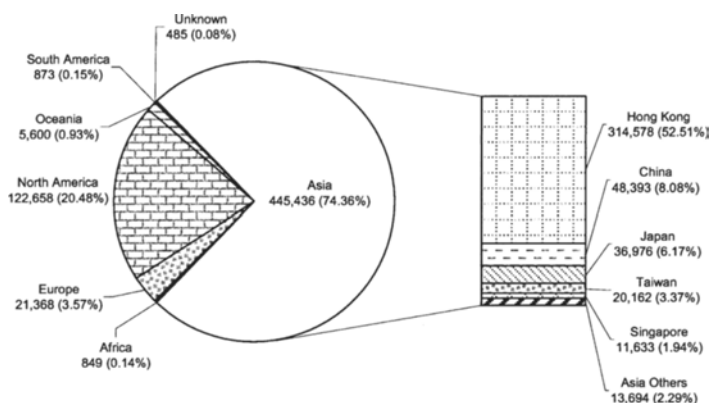
## 4 Findings and Discussions

### 4.1 Visitor Geographic Analysis

Table 1 outlines the ranking of web visitors' countries of residence. Apparently, the majority of visitors was from Hong Kong and the United States with 314,578 visitors (52.51%) and 118,077 visitors (19.71%) respectively. Mainland China (hereafter known as China) and Japan web visitors rank number three and four with 48,393 and 36,976 visitors (8.08% and 6.17%). In addition, hotel guest rooms' in-room broadband service and hotel internal network personal computers' default home page were on the hotel website. Extracting data from these IP addresses showed there were 8,004 visitors (2.13%) from these two servers.

**Table 1.** Ranking of Web Visitors' Country of Residence

Rank	Country	Visitors	%
1	Hong Kong SAR	314,578	52.51%
2	United States	118,077	19.71%
3	China	48,393	8.08%
4	Japan	36,976	6.17%
5	Taiwan	20,162	3.37%
6	Singapore	11,633	1.94%
7	United Kingdom	7,053	1.18%
8	Australia	5,148	0.86%
9	Canada	3,793	0.63%
10	Others	4,456	5.55%
	Grand Total	597,269	100.00%



**Fig. 2.** Geographic Distribution of Hotel Website Visitors

It is interesting to note that Hotel Y is an international chain hotel, three-quarter of web visitors (445,436 visitors or 74.58%) were from Asia and one-fifth of visitors (122,658 visitors, 20.54%) were from North America; whereas only 29,175 visitors (4.88%) were from other continents (please refer to Fig. 2).

Using only Asian visitors as the calculation base, more than 70% of them were from Hong Kong, about 10% of visitors were from China, and more than 8% were from Japan.

#### 4.2 Access Path Analysis

In total, there were more than 40,000 access path combinations. As revealed in Table 2, the most popular visiting path was purely from the default page to the home page with 34,580 hits (11.07%). One of the reasons for attaining such a result could be attributed to the fact the default home page for all in-room broadband service and hotel staff internal computers were defaulted to the hotel website. Once the web browser was started and the hotel web page appeared users simply left and visited their desired websites. Moreover, some web visitors may found that they could have reached the wrong hotel website, rendering their immediate departure.

**Table 2.** Top 20 Web Visitor Access Path Statistics

Ran	Hits	%	Path
1	34,580	11.07	/Default-->Home
2	6,748	2.16%	/Default-->Home-->Coffee Shop
3	3,634	1.16%	/Default-->Home-->Accommodation Overview
4	3,031	0.97%	/Default-->Home-->Contact Us
5	2,213	0.71%	/Default-->Home-->Recruitment Job List
6	2,060	0.66%	/Default-->Home-->Motto-->Location
7	1,899	0.61%	/Default-->Home-->/Default-->Home Page
8	1,869	0.60%	/Default-->Home-->Home (Traditional Chinese)--> Coffee
9	1,205	0.39%	/Default-->Home-->F&B Promotion Main
10	1,152	0.37%	/Default-->Home-->Motto
11	1,097	0.35%	/Default-->Home-->Virtual Tour-->Virtual Tour
12	1,083	0.35%	Home-->Home
13	863	0.28%	/Default-->Home-->Accommodation Overview-->Room
14	852	0.27%	F&B Promotion Detail-->F&B Promotion Detail
15	791	0.25%	/Default-->Home-->Recruitment Job List-->Application
16	757	0.24%	/Default-->Home?lang=en-us
17	757	0.24%	/Default-->Home-->Home
18	638	0.20%	/Default-->Home-->Accommodation Overview--> Normal
19	544	0.17%	/Default-->Home-->Home Page (Traditional Chinese)
20	455	0.15%	/Default-->Home-->Home (Traditional Chinese)--> Motto--
	66,228	21.20	

Total No. of Hits: 312,361

The second most favourable (or popular) access path was the access from home page and subsequently to coffee shop's information page. There were 6,748 hits following this path (2.16%) on the English version and 1,869 hits (0.60%) on Chinese version. This generated a combined total of 8,617 hits (2.76%). Since the majority of web visitors were from Hong Kong, the main service that these local residents were interested would be dining. In Hotel Y, the coffee shop provides Hong Kong residents with a buffet, their most preferred dining style. As such, many web visitors would like to browse for coffee shop information before they made actual reservations. The third and fourth favourable access paths were from home page to accommodation overview and hotel contact information with 3,634 and 3,031 hits respectively (1.16% and 0.97%). The hotel recruitment opportunity and application form pages ranked fifth and fifteen, which generated total 3,004 hits (0.96%). The English and Chinese versions of hotel location information ranked the sixth and twentieth with a total of 2,515 hits (0.81%).

Among the top 20 accessed paths, 19 of the entry paths originated from the home page and only the F&B promotion detail page was directly accessed as an entry page. Hotel Y regularly sent out monthly F&B promotion e-newsletters with URL link embedded so that recipients could directly access these pages. Apparently, most of the web information was searched directly from the hotel website but not referred by a search engine.

As far as the entry page record was concerned, more than 73% of the entries (185,889 hits) were from the "default" page which was then redirected to the home page. As well, a total of 81.5% entries were from all four languages' home pages (207,259 hits) and 6.25% of the entry hits was from the promotional page which included F&B promotions and room promotions (Table 3). Ranked the eighth was the robot exclusion file that was used when a search engine spider visited the website. However, only 860 hits per year indexing were recorded, which is quite low.

**Table 3.** Rankings of the Top 50 Entry Pages by Categories

Rank	Categories	Visits	%
1	Home Page (all four language)	207,259	81.50%
2	Promotional Page	15,895	6.25%
3	Virtual Tour	5,984	2.35%
4	F&B Dining	5,533	2.18%
5	Hotel Information	3,710	1.46%
6	Guest Room	2,745	1.08%
7	Recruitment	1,524	0.60%
8	/robots.txt (Robot exclusion file)	860	0.34%
9	Others	1,590	4.24%
		254,290	100.00%

### 4.3 Most Popular Web Pages and Files

As indicated in Table 4, the most popular two pages were the home page which generated 518,678 hits (32.04%). The F&B promotion page came next with 71,793 hits (4.43%). Following the website structure, if visitors would like to visit this page, they needed to click at least three times starting from the home page. However, from the monthly promotion e-newsletters that were sent to all the dining card members and office email footers, users can simply access this page directly by entering the special URL as indicated in the newsletter and emails. As a result, the recipients of these messages could directly reach these pages without searching around from the hotel website. Hence, the hit rate of the promotion page was the highest except the home page. The coffee shop page ranked fourth with 64,170 hits (3.96%). There could be two reasons for the coffee shop to get a high hit rate among restaurants. First, it was the most favourable restaurant in the hotel. Second, once visitors clicked “Dining” from the menu bar, they could immediately see the coffee shop information. Visitors could only visit other restaurants’ information via the coffee shop page.

**Table 4.** Top 20 Popular Visited Web Pages

Rank	Page Hits	Hits %	Web Page Description	Clicks from home page
1	271,922	16.80%	Home Page	1
2	246,756	15.24%	Default.aspx*	1
3	71,793	4.43%	F&B Promotion Main page	3
4	64,170	3.96%	Coffee Shop	2
5	62,468	3.86%	Accommodation Overview page	2
6	55,245	3.41%	F&B Promotion Detail page	4
7	41,653	2.57%	Hotel Motto	2
8	35,777	2.21%	Room Promotion Main	3
9	33,382	2.06%	Home Page (Traditional Chinese)	2
10	26,405	1.63%	Coffee Shop (Traditional Chinese)	3
11	25,368	1.57%	Catering Main Page	2
12	22,768	1.41%	Hotel Virtual Tour	2
13	22,668	1.40%	Hotel Contact Detail	2
14	19,403	1.20%	Recruitment Application Form	3
15	18,786	1.16%	Cake Gift Voucher	2
16	17,547	1.08%	Hotel Room – Normal Floor	3
17	16,910	1.04%	Hotel Location	3
18	16,338	1.01%	Room Promotion Detail	4
19	16,072	0.99%	Recruitment - Job List	2
20	15,882	0.98%	Restaurant Reservation	3
	1,131,313	57.02%		

Total Page Hits: 1,618,907

\* For Home page redirection

According to Table 4, the cake gift voucher page seems to be a popular choice that ranked 15<sup>th</sup> with more than 18,000 hits. However, after the new website had been launched for a year, this page was still shown as “under construction”. On the basis of

this result, it was likely that cake gift voucher was a highly expected item which the hotel could have lost many online business opportunities without the page ready.

In this study, the hotel motto page ranked seventh with 41,653 hits (2.57%). Seemingly, this page acts as a bridge for visitors to visit other hotel information pages like hotel fact sheets, location map, virtual tour, and access methodology (see Fig. 1). Among these different pages, hotel location map should be an important piece of information before visitors making any actual reservations. Therefore, it ranked the 17<sup>th</sup> with 16,910 hits (1.04%). However, once the visitors have reached the location page, they needed one more click to open the location map file which was created using PDF format. From the top 20 downloaded files (Table 5), the numbers of visitors who downloaded the English and Chinese versions of the hotel location map file ranked number one and 11<sup>th</sup> with 9,368 and 2,497 visitors respectively. Based on hit counts, location map ranked third and 18<sup>th</sup> with 20,793 and 3,931 hits respectively. Many new visitors needed the location information. As such, counting number of visitors for the hotel location page naturally ranked number one among the popular downloading activities.

**Table 5.** Top 20 Downloaded files Ranked by Number of Hits and Visitors

Downloaded File (PDF)	Hits Rank	No. of Hits	Visitors Rank	No. of Visitors	Clicks from home
Coffee Shop Menu	1	30,028	2	6,917	3
Chinese Restaurant Menu	2	22,811	6	3,273	5
Hotel Location Map	3	20,793	1	9,368	4
Chinese Wedding Package Flyer	4	17,088	3	5,457	4
Christmas Promotion Brochure	5	10,445	16	2,142	3
Coffee Shop Breakfast Menu	6	9,873	7	2,881	4
Restaurant Drink List	7	9,340	20	1,730	4
Fact Sheet	8	7,625	4	4,611	3
French Restaurant Menu	9	7,300	8	2,826	5
Japanese Restaurant Menu	10	6,868	10	2,707	5
Western Wedding Package	11	5,905	17	2,099	4
Ballroom Floor Plan	12	5,637	5	3,525	3
Fact Sheet (Japanese)	13	5,214	12	2,483	5
Fact Sheet (Traditional Chinese)	14	4,799	15	2,198	4
Japanese Restaurant Set Menu	15	4,320	19	1,802	4
Function Room Floor Plan	16	4,277	9	2,717	4
Snack Menu	17	4,138	14	2,262	4
Hotel Location Map (Traditional Chinese)	18	3,931	11	2,497	5
Ballroom Floor Plan (Chinese Style)	19	3,902	13	2,392	3
Function Room Floor Plan (Chinese Style)	20	3,253	18	1,909	4

*Total number of hits: 1,144,744.*



#### 4.4 Using PDF files

According to Table 5, the ranking of coffee shop and Chinese restaurant menu ranked the top two by hits but rank second and sixth when calculated by number of visitors. Interestingly, restaurant information such as restaurant menu and seasonal promotion changes frequently such that many repeat web visitors returned and checked for the latest information. It, however, lacked the flexibility for Hotel Y to use different PDF files for showing web visitors the banquet room layout in different function styles. Instead, customers could only get a general idea of the function room size and layout. Customers might further request the sales person to draw the actual floor plan for their functions which might take several days before the sales person was able to get back to the customers. At present, various web applications are available that can display dynamic contents based on different variable values. Web visitors can input the number of guests and banquet style, and the system can then generate the exact floor plan layout to the customers.

Hotel Y's website contained plenty of dynamic information, which made it uneasy to update the website frequently using web design software. Such a situation was attributed to two factors. First, not many staff knew how to use web design software. Second, the high staff turnover rate created difficulties for software training. For these reasons, the hotel preferred to update the web contents using Word or Excel first, which were subsequently converted to PDF files for visitors to download. The main disadvantage of using PDF as the media was Acrobat Reader. Although Acrobat Reader is free, additional fonts pack is required for Asian fonts that some novice web surfers may not know how to download and install the fonts. Hence, they are unable to view the PDF files properly.

#### 4.5 Number of Clicks to Retrieve the Desired Information

It is natural that the number of clicks to the desired pages can affect the website effectiveness and popularity. According to Table 4, the average number of clicks to the top 20 popular web pages was 1.84. This number showed the performance of Hotel Y's website was generally effective. However, more than 30% of the clicks were from the home page that would reduce the average clicks. As revealed in Table 5, the average number of clicks from the home page to download the desired files was 3.94, indicating a fairly lengthy process. Using hotel location map as an example, visitors needed four clicks to reach the location map page before a PDF file can be downloaded. For novice or impatient visitors, they might not be able to reach the map which was located four levels down from the home page. Moreover, for the users who needed non-English contents, they had to make one more click on language selection from the menu bar. In particular, when the F&B and room promotion pages were referred, which were the most attractive contents, visitors needed three to four clicks from the home page before they could get the information. This would certainly affect the website attractiveness, and ultimately the hotel business performance. Moreover, since the hotel had promotional e-newsletter with direct links to these promotional pages, the hit rate of these pages could remain high. In contrast, web visitors might

not be able to find the hotel information due to their lack of patience to go down to levels three and four.

#### 4.6 Web Visitors' Behavior

By grouping the top 100 popular access paths by contents, ten different categories can be identified. Table 6 shows that more than 13% of the visitors accessed purely the home page and then quit. These users might find the website was not the one they were looking for. For instance, a visitor was looking for Hotel Y in Tokyo's website but reached Hotel Y in Hong Kong. Also, F&B related information ranked second with 16,909 hits (5.41%) and hotel information pages ranked third with 7,793 hits (2.49%). In contrast, only 347 and 61 hits looked for guest rooms with hotel location information or coffee shop information in one visit. Among the top 25% access paths, out of the 78,951 hits, 78,500 hits searched for single topic information, which outperformed those looked for multiple topics.

**Table 6.** Ranking by Categories for the 100 Most Popular Access paths

Rank	Category	Hits	%
1	Home Page Only	42,434	13.58%
2	Restaurant and Catering Pages	16,909	5.41%
3	Hotel Information Related Pages	7,793	2.49%
4	Guest Room Related Pages	6,846	2.19%
5	Hotel Recruitment Pages	3,315	1.06%
6	Virtual Tour	1,155	0.37%
7	Guest Room Page then Hotel Location	347	0.11%
8	Guest Room Page then Coffee Shop	61	0.02%
9	Gift Voucher	48	0.02%
10	Hotel Motto then F&B Promotion Page	43	0.01%
		78,951	25.26%

*Total No. of Hits: 312,361*

Among the top 50 popular types of downloaded files, more than 70% was F&B related (160,628 hits). However, when the number of visitors was concerned, only 57.24% of the visitors had downloaded the F&B information; whereas over 28% of the visitors had downloaded hotel information. This showed there were many repeat visitors who retrieved F&B information regularly because such information changes frequently. In contrast, for the visitors who had downloaded the hotel information, most of them were new visitors who were not familiar with Hotel Y.

**Table 7.** Ranking of the Top 50 Most Downloaded Files by Category

Rank	Category	Hits	%	Visitor	%
1	F&B	160,628	70.89%	51,032	57.24%
2	Hotel Information	50,543	22.31%	25,248	28.32%
3	Virtual Tour	13,332	5.88%	11,280	12.65%
4	Guest Room	2,094	0.92%	1,595	1.79%
		226,597	100.00%	89,155	100.00%

## 5 Limitations and Implications

Hotel Y has outsourced its online reservation service to a GDS. As such, it was not possible to analyze the performance of Internet bookings from the log file. Additionally, due to the limitation of the software, only the first 30 access paths were computed in this study, which makes it not possible to examine the complete information seeking paths. Moreover, there were more than 40,000 combinations of access paths, rendering its impossibility to manually categorize all the paths. Another limitation of this study is the dearth of further analysis for visitors' behaviour in a specific country.

In spite of the mentioned limitations, this research is expected to make a meaningful contribution to raise the awareness of the importance of hotel web log evaluations in order to understand online visitors' behaviour. To further elaborate this point, the arrangement of an information hierarchy could affect the information search efficiency of visitors. From the access path analysis, management can group the related information together in order to shorten the information search time. Also, by looking at the top visiting pages, hotel managers are able to understand which the most attractive (or popular) part is. Using Hotel Y as an example, if the hotel can launch the gift voucher sooner, they can increase the e-business opportunities. Thirdly, the entry page analysis can enable management to be aware of search engine visibility. Apparently, Hotel Y's website visibility in search engine is relatively low so that the top entry pages were mainly start from home page. Moreover, while there are many files in PDF format for visitors to download, the hotel management should consider the fonts used inside the document as well as the file size to avoid a long download time.

For software development professionals, they should consider further development on the software that can perform geographical analysis of web logs. With this additional feature, hotel management would be able to identify the behaviour of visitors from different regions.

## 6 Future Research

Findings of this research offer a general overview of web visitor behaviour on the basis of access paths and page hit. The empirical findings on path analysis, however, cannot identify visitors from individual countries. Therefore, this study is unable to distinguish the behavioural difference between local residents and overseas visitors. At present, most of the existing commercially available web log analysis software cannot perform such a kind of analysis. In view of this challenge, new software should be developed to analyze the relationship between access paths and origin for more comprehensive web log analysis. In addition, empirical findings in this study showed that the majority of visitors were local residents, indicating that the search engine indexing did not perform well. The ranking in search engines on general keywords such as "Hong Kong hotel" or "hotel in Hong Kong" does not seem to be high enough for visitors to locate the hotel website, and only those who know the

name of Hotel Y can find the website easily. As a result, a keyword analysis and search engine performance analysis would be valuable for future studies.

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