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Weight of criteria in hotel selection: An empirical illustration based on TripAdvisor criteria

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Abstract
The aim of this paper is to show how to calculate the weight of criteria that influences the decision making process of potential hotel guests. By taking into consideration the growing importance of electronic word-of-mouth and the popularity of hotel reviews websites, this research note exposes the framework to calculate the weight of the 6 TripAdvisor criteria by using the Multi-Criteria Decision Analysis (MCDA) – Analytic Hierarchy Process (AHP) method. 250 tourists in Paris (France) have been interrogated in order to apply the AHP method and to illustrate how to determine the weight of 6 criteria: location, bed quality, comfort & equipment, service, value for money and, cleanliness. By doing so, this research note facilitates the understanding of AHP method and its application to the hotel sector. The empirical study proposes weight for each criterion by taking into consideration tourists' point of view.

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***Keywords*:** AHP Method, Weight of Criteria, Hotel Attributes, Electronic Word-of-Mouth (eWOM), TripAdvisor.

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Introduction

Due to the competitive business environment, it is indispensable for hotel managers to understand how potential customers choose their hotel and which criteria have been privileged in their decision-making processes; moreover by considering that Internet has dramatically changed the customer purchasing behaviour (Buhalis & Law, 2008). According to Nielsen (2013) report, 70% of customers trust online reviews. So the reviews, widely known as word-of-mouth (WOM), are considered as one of the most influential factors in customer decision-making process.

WOM is defined as a post-purchase oral communication between people where communicator gives non-commercial information on a brand, a service, a product or a company based on his personal experience (Dickinger & Basu, 1994; Harrison-Walker, 2001). With the development of information

technology, electronic word-of-mouth (eWOM) (i.e. online reviews, recommendations, rating, etc.) has gained significant importance in decision-making process (Serra-Cantallops & Salvi, 2014) especially as it is easily accessible to global community via Internet (Litvin et al., 2008). Moreover, users feel free to express themselves in front of a computer rather than being observed (Sun et al., 2006). Therefore, previous studies show that the eWOM influences the decision-making process of potential hotel customers (Mauri & Minazzi, 2013; Liu & Zhang, 2014) and according to Gretzel (2007), 77.9% of TripAdvisor users consulted eWOM for choosing their hotel. In this regard, our research note exposes the framework to calculate the weight of the 6 criteria proposed on TripAdvisor and fills the existing research gap from previous study of Serra-Cantallops & Salvi (2014).

Weight of criteria in hotel selection

Criteria play a vital role in different stages of decision-making process (Yavas & Babakus, 2005). Multiple researches have been done on multi-criteria decision-making process in hotel selection (Chou et al., 2008). Most of them are focused on "*Customer's Quality Perception*" (Oh, 1999; Albayrak & Caber, 2015) from a post-experience point of view. Accordingly, they try to understand the contribution of hotel attributes on overall customer satisfaction (Tsaur & Tzeng, 1996; Chu & Choi, 2000; Albayrak & Caber, 2015). Studies show that some attributes are highly important to satisfy the customers while others play insignificant roles. On the contrary, very few researches have been focused on the weight of attributes that play a vital role in customer decision-making process. TripAdvisor proposes 6 attributes which are subject to customers' evaluation during their stay in the respective hotel: location, bed quality, comfort & equipment, service, value for money and, cleanliness. While a potential customer searches for a hotel on TripAdvisor, he or she goes through the eWOM based on his or her own criteria, which are subjective (Figure 1). According to Crouch (2011), the decision making process is based on an array of information connecting multiple criteria. Serra-Cantallops and Salvi (2014) mentioned the necessity of calculating the weight of these criteria. Therefore, the research gap on the

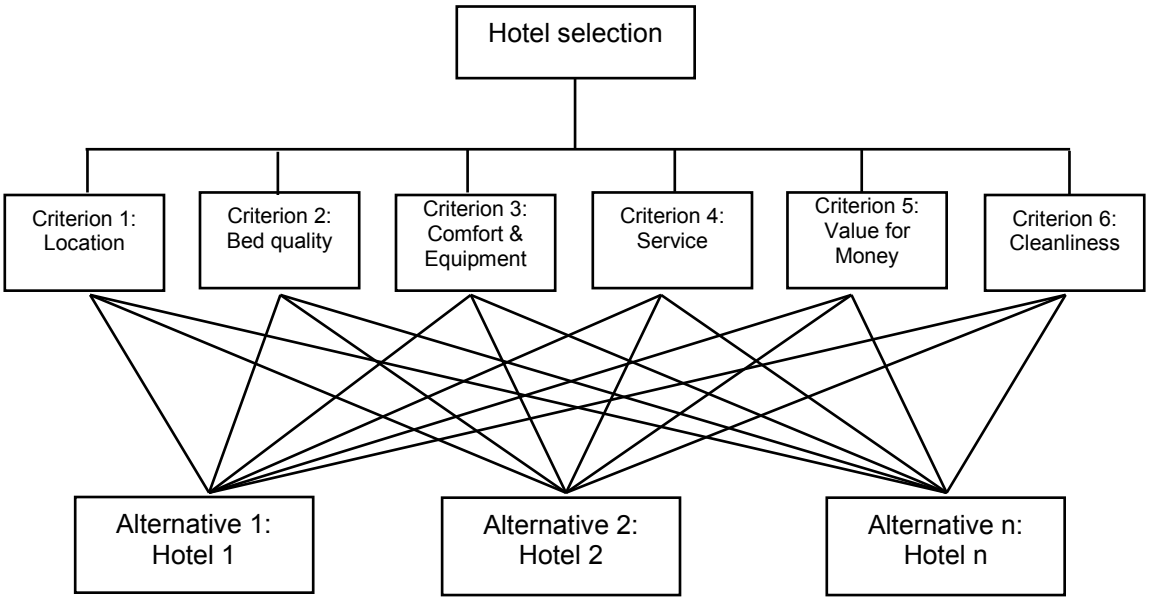

Figure 1. *Decision-Making Process on Hotel Selection* (developed from Crouch (2011: 32) and based on TripAdvisor criteria).

Table 1. *Performance Matrix*

		Decision-making criteria (C)		
		C_1	…	C_m
Alternatives (A)	A_1	R_{11}	…	R_{1m}
	…	…	…	…
	A_n	R_{n1}	…	R_{nm}
Weight (W)		W_1	…	W_m

Table 2. *Insight of Saaty Scale*

Verbal Appreciation	Numeric Rating	Reciprocal Value
Extreme importance	9	1/9
Very, very strong	8	1/8
Very strong	7	1/7
Strong plus	6	1/6
Strong importance	5	1/5
Moderate plus	4	1/4
Moderate importance	3	1/3
Weak	2	1/2
Equal importance	1	1

weight of criteria in hotel selection based on eWOM has been identified but still remained untouched.

The decision-maker needs to evaluate and decide on *n* alternatives represented by the vector *A*: (*Ai; i=1, 2, 3, …n*), which could be analysed by *m* criteria represented by the vector *C*: (*Cj; j=1, 2, 3, …, m*). The weight of criteria varies from person to person and it could be represented by the vector *W*: (*Wj; j = 1, 2, 3, ..., m*). The assessment of each of the alternatives *i* on each of the criteria *j* gives the results *Rij* as presented in Table 1.

Analytic Hierarchy Process (AHP) and the weight of criteria

AHP method has been developed by Saaty (1977, 1980) and it is very useful when the decision maker is unable to construct a utility function (Ishizaka & Nemery, 2013). In this regard, pair-wise comparison of criteria is a solution. The decision maker gives a relative verbal appreciation between two criteria rather than a numerical judgement.

If two criteria C_h and C_k are compared, e_{hk} indicates the evaluation of the criterion C_h relatively to the criterion C_k. The pair-wise comparison matrix *A* is composed of all the relative evaluations by considering that $e_{hk} = 1/e_{kh}$.

By taking into consideration the Eigen-Value formulation,

(1) Aw = mw

where $w = (w_1, w_2 \ldots, w_m)$ and *mw* could be obtained as follow:

(2) $$\begin{bmatrix} \frac{w_1}{w_1} & \frac{w_1}{w_2} & \cdots & \frac{w_1}{w_m} \\ \frac{w_2}{w_1} & \frac{w_2}{w_2} & & \frac{w_2}{w_m} \\ \cdots & \cdots & \cdots & \cdots \\ \frac{w_m}{w_1} & \frac{w_m}{w_2} & \cdots & \frac{w_m}{w_m} \end{bmatrix} \begin{bmatrix} w_1 \\ w_2 \\ \vdots \\ w_m \end{bmatrix} = m \begin{bmatrix} w_1 \\ w_2 \\ \vdots \\ w_m \end{bmatrix}$$

Since the observed matrix *A* might not be consistent, the estimation of *w* could be calculated as follow (where λ_{max} represents the maximum Eigen-Value of matrix *A*):

(3) $Aw = \lambda_{max} w$

The value of the λ_{max} could be estimated by normalizing the element of in each column. In order to measure the inconsistency (*A* is consistent if $\lambda_{max}=m$ and we always have the

λ_{max} *m*), consistency ratio (C.R.) could be calculated by using the following steps:

(4) Consistency Index (C.I.) = (λmax – m)/(m – 1)

Therefore, (5) C.R. = C.I. / R.I.

C.R. should be less or equal to 0.1 in order to get the result acceptable. The C.I. of a randomly generated pair-wise comparison matrix (Saaty, 1980) and *m* = order of matrix.

An empirical illustration based on Parisian tourists

AHP method is applied. The data was collected from 250 tourists in Paris during 2015 summer, aged between 30 to 65 years, travelling for leisure purpose and used to stay in 3 to 5 stars hotels while travelling and, needless to say, choosing their hotels on TripAdvisor. By taking into consideration TripAdvisor guests' satisfaction attributes, we consider the 6 criteria: c_1 = location of the hotel, c_2 = bed/sleep quality, c_3 = comfort & equipment, c_4 = service/personnel, c_5 = value for money and, c_6 = cleanliness.

In order to calculate the weight of each criterion for potential customers by AHP method, we conducted a pair-wise comparison between these 6 criteria by questioning 250 tourists in strategic tourist spots and some 4 star hotels in Paris (cf. survey copy in Appendix 1). The interviewees confirmed that they always consulted eWOM on TripAdvisor before making any purchase.

In Table 4, a pair-wise comparison matrix has been done which is an example for one particular tourist interrogated in Paris (31 years old, leisure traveller). In order to rapidly evaluate the weight of criteria for each questionnaire, at first, we completed the upper triangular matrix (in bold letters) by using the value from the Table 2. Then, lower triangular matrix was completed by the reciprocal values of the upper triangular matrix.

The next step consists of normalisation of the matrix. Therefore, we got the weight of each criterion from the average of each line. *C.R.* = 0.1 which means that the result is acceptable.

Thus, 250 questionnaires have been calculated individually and the average result shows that the cleanliness has the highest value, which affirms Ryan & Huimin's (2007) study. However, Albayrak & Caber (2015) found that

Table 3. *Random indices from Saaty (1977)*

m	1	2	3	4	5	6	7	8	9	10
R.I.	0.00	0.00	0.58	0.90	1.12	1.24	1.32	1.41	1.46	1.49

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Table 4. *Pair-wise comparison matrix* (example of a tourist)

Criteria	C_1	C_2	C_3	C_4	C_5	C_6
C_1	**1**	**1/2**	**1/2**	**2**	**1**	**1/2**
C_2	2	**1**	**1**	**2**	**2**	**1/3**
C_3	2	1	**1**	**2**	**2**	**1/2**
C_4	1/2	1/2	1/2	**1**	**1/3**	**1/6**
C_5	1	1/2	1/2	3	**1**	**1//2**
C_6	2	3	2	6	2	**1**
Total	**8.50**	**6.50**	**5.50**	**16.00**	**8.33**	**3.00**

Table 5. *Normalisation of matrix* (example of a tourist)

Criteria	C_1	C_2	C_3	C_4	C_5	C_6	Total	Weight of criteria
C_1	0.12	0.08	0.09	0.13	0.12	0.17	0.70	0.12
C_2	0.24	0.15	0.18	0.13	0.24	0.11	1.05	0.17
C_3	0.24	0.15	0.18	0.13	0.24	0.17	1.10	0.18
C_4	0.06	0.08	0.09	0.06	0.04	0.06	0.38	0.06
C_5	0.12	0.08	0.09	0.19	0.12	0.17	0.76	0.13
C_6	0.24	0.46	0.36	0.38	0.24	0.33	2,01	0.33
Total	**1.00**	**1.00**	**1.00**	**1.00**	**1.00**	**1.00**	**-**	**1.00**

Table 6. *Weight of criteria according to duration of stay*

	Less than 3 night stay	*More than 3 night stay*
Location (C_1)	0.24	0.09
Sleep Quality (C_2)	0.12	0.19
Comfort and Equipment (C_3)	0.07	0.15
Service (C_4)	0.10	0.11
Value for Money (C_5)	0.22	0.17
Cleanliness (C_6)	0.25	0.29

Table 7. *Weight of criteria according to income*

	Annual income less than 25000 US dollar	Annual income more than 25000 US dollar
Location (C_1)	0.16	0.20
Sleep Quality (C_2)	0.11	0.18
Comfort and Equipment (C_3)	0.07	0.14
Service (C_4)	0.08	0.14
Value for Money (C_5)	0.34	0.07
Cleanliness (C_6)	0.24	0.27

the overall cleanliness had a lower importance. The value for money was the second important criterion followed by the location. Comfort & service have lower importance however; Ryan and Saleh (1992) found that they were subject to duration of stay.

Among the 250 tourists, 69% stayed less than 3 nights and therefore, result shows that the weight of sleep quality and, comfort and equipment increases by the duration of stay.

Interviewees, who earn more than 25000 US dollar annually (36% of respondents), look for better location, comforts and additional services.

The weight of criteria not only fills the previous research gap (Serra-Cantallops & Salvi, 2014) but also gives an insight on eWOM of Trip Advisor for hoteliers in order to adopt the "best-practice".

Conclusion, limits and perspectives

This research note shows how MCDA-AHP method can be used for calculating the weight of criteria. It is the first research note that measures the weight of criteria of eWOM of TripAdvisor from a potential customers' perspective. AHP method could be used to evaluate others decision-making criteria in order to anticipate the need and desire of international tourists. One of the limitations of this research note is that the sample is based on only 250 respondents. Further studies could be focused on more detailed information such as business vs. leisure traveller, tourists' country of origin, socio-demographic situations, etc.

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Appendix 1. *Survey*

Assessing the hotel experience

The purpose of this questionnaire is to measure the relative importance of criterias for assessing the hotel experience. When you evaluate a hotel, what are the most important criterias for you? Here, we propose you 6 criterias : the location of the hotel, the quality of the bedding, comfort and equipment of the rooms (except bedding), the cleanliness of the hotel and the rooms, the qualit of service delivered by staff and the quality/price ratio (value).

If you compare 2 criterias (proposed in the column A and B), which one would you prefer? For example, if you are asked to assess the relative importance of the location of the hotel compared to it's bedding quality, which value will you choose? Here, « 1 » means that these two criterias have equal importance for you while « 5 » (on the left, towards column A) means that the location has the strong importance compared to the bedding quality. On the contrary, if you choose « 5 » (on the right of the table, towards column B), it will signify that the bedding quality has the strong importance to you vis-à-vis the location of the hotel. Please note that you can choose only one box per line. Thank you for your participation.

Column A														Column B
	Extreme importance	Very, very strong	Very strong	Strong plus	Strong importance	Moderate plus	Moderate importance	Weak	Equal importance	Weak	Moderate importance	Moderate plus	Strong importance	Strong plus	Very strong	Very, very strong	Extreme importance	
Location of the hotel	9	8	7	6	5	4	3	2	1	2	3	4	5	6	7	8	9	Sleep quality / Quality of bedding
Location of the hotel	9	8	7	6	5	4	3	2	1	2	3	4	5	6	7	8	9	Comfort & equipment of rooms (except bedding)
Location of the hotel	9	8	7	6	5	4	3	2	1	2	3	4	5	6	7	8	9	Quality of service delivered by staff
Location of the hotel	9	8	7	6	5	4	3	2	1	2	3	4	5	6	7	8	9	Value (for money)
Location of the hotel	9	8	7	6	5	4	3	2	1	2	3	4	5	6	7	8	9	Cleanliness of the hotel & the rooms
Sleep quality /Quality of bedding	9	8	7	6	5	4	3	2	1	2	3	4	5	6	7	8	9	Comfort & equipment of rooms (except bedding)
Sleep quality / Quality of bedding	9	8	7	6	5	4	3	2	1	2	3	4	5	6	7	8	9	Quality of service delivered by staff
Sleep quality / Quality of bedding	9	8	7	6	5	4	3	2	1	2	3	4	5	6	7	8	9	Value (for money)
Sleep quality / Quality of bedding	9	8	7	6	5	4	3	2	1	2	3	4	5	6	7	8	9	Cleanliness of the hotel & the rooms
Comfort & equipment of rooms (except bedding)	9	8	7	6	5	4	3	2	1	2	3	4	5	6	7	8	9	Quality of service delivered by staff
Comfort & equipment of rooms (except bedding)	9	8	7	6	5	4	3	2	1	2	3	4	5	6	7	8	9	Value (for money)
Comfort & equipment of rooms (except bedding)	9	8	7	6	5	4	3	2	1	2	3	4	5	6	7	8	9	Cleanliness of the hotel & the rooms
Quality of service delivered by staff	9	8	7	6	5	4	3	2	1	2	3	4	5	6	7	8	9	Value (for money)
Quality of service delivered by staff	9	8	7	6	5	4	3	2	1	2	3	4	5	6	7	8	9	Cleanliness of the hotel & the rooms
Value (for money)	9	8	7	6	5	4	3	2	1	2	3	4	5	6	7	8	9	Cleanliness of the hotel & the rooms