Article

Selecting Bloggers for Hotels via an Innovative Mixed MCDM Model

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Abstract: The global coronavirus disease 2019 (COVID-19) outbreak had a great impact on the tourism industry. Numerous hotels have ceased operations. Because of the increasing influence of blogs, various industries have adopted blogs as a publicity and marketing strategy. Companies utilize consumers' trust and loyalty toward bloggers to effectively contact them. Hence, bloggers play a crucial role in the hotel industry. No past study has researched blogger selection by hotel managers. In this study, an innovative mixed multiple-criteria decision-making (MCDM) model including importance-performance analysis (IPA), analytic hierarchy process (AHP), and technique for order preference by similarity to ideal solution (TOPSIS) is established to assist hotel managers in selecting bloggers. We firstly collect the selection criteria via interviews with hotel managers and a review of literature on blogger selection. Messages with stick are understood, remembered, and have an enduring influence on opinions and behavior. Hence, we also introduce the concept of stick to the selection criteria. Based on IPA and the literature review, a hierarchical structure for blogger selection is constructed. Then, AHP and TOPSIS are integrated to assist the case company managers to select suitable bloggers.

Keywords: hotel; blogger; importance-performance analysis (IPA); analytic hierarchy process (AHP); technique for order preference by similarity to ideal solution (TOPSIS); stick

1. Introduction

The global COVID-19 outbreak has had a great impact on the tourism industry. Due to this pandemic, the number of tourist arrivals in Taiwan and other countries has drastically declined. In addition, all countries have implemented border control bans, which have temporarily halted business and tourism activities. Consequently, the global tourism market, particularly the hotel industry, has been severely affected. Because COVID-19 has affected hotels around the world, researchers should reinforce knowledge to help hotels accomplish efficient post-disaster recovery [1].

For the travel and tourism industry, blogs have not only positive but also negative effects if not administered properly [2]. Online tourism blogs have turned into an essential resource to share information because they can supply valuable information, mostly shared by experienced users, to new consumers [3]. Blogs have become a crucial online information exchange platform and have promoted the rapid growth of bloggers and viewers. In addition, users often search for various travel information on blogging platforms. Therefore, blogs can be considered one of the essential marketing channels for the tourism industry [4]. In addition, social media, particularly tourist blogs, have become increasingly essential to tourism practices and influence tourist destinations and businesses [5]. Bloggers play a crucial role in influencing the decision making of online social platform users. Bloggers

have the ability to disseminate news to their audiences, influencing their audiences. This ability is what companies want to utilize [6]. Bloggers can affect customers' behaviors and change their perceptions in the postmodern era [7]. Asim et al. [8] also indicated that by providing valuable information, bloggers can affect mass psychology to a broad community of fans.

In summary, bloggers play a vital role in the hotel industry. No previous study has explored blogger selection by hotel managers. The selection of bloggers is an MCDM problem, wherein the most suitable option is determined by applying appropriate selection criteria and thorough screening. Kraujalienė [9] collected the pros and cons of MCDM approaches. For example, TOPSIS is easy to utilize and widely applied. However, it is difficult to weight. Compared with TOPSIS, complex proportional assessment (COPRAS) is less stable in data variation cases. Nevertheless, it does not distort the data after transforming and is suitable to evaluate a single choice. Preference ranking organization method for enrichment evaluations (PROMETHEE) is difficult to assign weights. VlseKriterijumska Optimizacija I Kompromisno Resenje (VIKOR) needs initial weights. Moradpour et al. [10] also pointed out that PROMETHEE II needs additional information, including the weight and preference function. Moreover, when compared with AHP, PROMETHEE is weak in evaluating qualitative criteria; however, it obtains stable results. Aktaş and Demirel [11] pointed out that each approach has advantages and disadvantages, and it is very difficult to figure out the best MCDM approach. Using more than one approach is better to get robust results that help decision makers make safer decisions.

Martilla and James [12] proposed IPA in 1977. The main idea is to draw the mean score of importance and performance level into a two-dimensional diagram. The diagram can be used to distinguish the relative positions of elements and further provide practical suggestions and strategies [13]. IPA has many advantages, such as simplicity, ease of use, and low cost [14]. IPA has been widely used in business decision-making analysis [15]. Moreover, IPA can prioritize improvements in service quality [16,17]. Lai and Hitchcock [18] also declared that IPA is extensively applied in studies of tourism and hospitality. In addition, Maheshwarkar and Sohani [19] pointed out that the combination of AHP with TOPSIS is useful. Tian et al. [20] indicated that integrating TOPSIS and AHP can guarantee more satisfactory outcomes. Zhuang et al. [21] also addressed that AHP integrated with TOPSIS is a certain multiple-attribute decision-making (MADM) method. Such a combination has been successfully used in various fields. Moreover, combining AHP with TOPSIS can reduce the rate of calculation and pairwise comparisons to achieve better accuracy in computations and results. Other advantages of this combination are taking a significant number of criteria into account, used simply and with proper speed, and so on [22].

Reviewing relevant literature reveals that only two studies have investigated the topic of blogger selection. One of the studies [23] presented the limitation of an insufficient sample size. The other study [24] did not apply sufficient selection criteria. The author suggested that more selection criteria can be considered in future studies. To overcome the limitations of past research, the present study proposes an innovative mixed MCDM model including IPA, AHP, and TOPSIS to assist hotel managers in selecting bloggers. Moreover, stick refers to the fact that people understand and remember a proposed concept, and this concept has a long-term influence in changing people's opinions or behaviors [25]. Hence, this study also introduces the concept of stick to the selection criteria.

This study interviews hotel managers, reviews the relevant literature on blogger selection, and introduces the stick concept to collect the selection criteria. Subsequently, IPA is applied to explore the importance and performance of each selection criterion to screen them (high importance and low performance) and obtain the integrated weight of each selection criterion through AHP. Finally, to reduce excessive matching of pairwise comparison matrices that may lead to operational difficulties, the selection criteria weights obtained using AHP are imported into TOPSIS to select suitable bloggers and enhance the decision-making efficiency. The research objectives are described below:

(1) To collect the selection criteria through interviews with hotel managers, a review of relevant literature on blogger selection, and by applying the concept of stick. According to IPA results and the literature review, the blogger selection criteria are classified to construct a hierarchical structure. The hierarchical structure can be used by hotel managers to select suitable bloggers.

(2) To incorporate the use of the hierarchical structure in a hotel, integrate AHP and TOPSIS, and assist the case company managers to select optimal bloggers.

The other parts of the study are arranged as follows: Section 2 introduces the works in the literature on blogger selection and explains the concept of stick. Section 3 provides a description of methods. Section 4 provides an empirical case analysis to select suitable bloggers. The final section includes the conclusion and recommendations for future study.

2. Literature Review

This section reviews past studies related to the research topic and also explains the concept of stick.

2.1. Blogger Selection

In the early days, blogging had a high technical threshold, and bloggers usually established their blogging platforms. Blogging then became popular among netizens, and various well-known websites, such as Wretch and Pixnet, provide free blogging services. Because these services are simple and easy to use, netizens can create their blogs through an application process. The authors of blogs, commonly known as bloggers, can use these platforms to write diaries, record their travels, and present rich information through photos and videos. In recent years, blogs have become popular among netizens, as well as enterprises and academia [26]. Recently, blogging has become a popular media source to share thoughts, feelings, and concepts about particular incidents. On such personal websites, people share their experiences and comment on products [27].

Bloggers play a vital role in the hotel industry. However, no previous study has explored blogger selection by hotel managers. Reviewing the relevant literature shows that only two studies have investigated the topic of blogger selection. Hsu and Shao [23] selected word-of-mouth marketing bloggers based on the enterprises' perceptions. A noted Taiwanese skincare company was utilized as an illustrative application to select bloggers by their model. They utilized the modified Delphi method to define the selection criteria. Nine experts from Taiwan brand companies were investigated. However, Murry and Hammons [28] recommended that the number of experts should be more than 10. Chang [24] selected optimal bloggers for female fitness center chains. The author considered 12 selection criteria and suggested that future studies should take more criteria into account.

Many researchers have applied AHP or TOPSIS to solve personnel selection issues. Seol and Sarkis [29] applied AHP to select an internal auditor. Timor and Tüzüner [30] selected the sales representative of pharmaceutical firms by AHP. Gibney and Shang [31] utilized AHP for dean selection. Moreover, Korkmaz [32] selected logistics operation personnel by TOPSIS. Zulqarnain et al. [33] selected more suitable medical staff for the health department by means of TOPSIS. Lastly, many studies [19–22] have pointed out the advantages of integrating AHP and TOPSIS. To overcome the limitations of past studies, this study proposes an innovative mixed MCDM model (IPA, AHP, and TOPSIS) to assist hotel managers in selecting bloggers.

2.2. The Concept of Stick

Stick is when people understand and remember a proposed concept. Such a concept has a long-term influence in changing people's opinions or behaviors. The six principles of stick are as follows [25]:

(1) Simplicity

A concept should be simple and profound. Simplicity is the key. A profound statement is remembered for a lifetime. Simplicity refers to retaining the essence of and identifying

the core of a concept by using plain and clear rather than esoteric language to describe a concept. Redundant and irrelevant elements must be eliminated. The core message should enable people to know what to focus on and prevent them from making unfavorable choices. Simple messages must be concise. The less the amount of information in the concept, the stickier the concept will be. Such a concept can have a lasting impact on people.

(2) Unexpectedness

The concept should be different from people's expectations and intuitions. To hold people's curiosity for a long time, a knowledge gap should be created in an orderly manner, and then that gap should be filled. The key to attracting the attention of people is to break the pattern. Inherently sticky concepts usually arouse two emotions: surprise and interest. Presenting surprising facts in a concept can attract people's attention, and interest can help retain people's attention. Unexpected concepts are more likely to be sticky because surprise encourages people to think. Such concepts can have considerable long-term effects.

(3) Concreteness

A concrete expression ensures that the understanding of the concept is consistent among everyone. Abstraction makes concepts difficult to understand and remember. It also makes it more difficult for people to coordinate with each other's actions because each person's understanding of the abstract concepts may differ. Therefore, the element of concreteness can help people avoid such problems. Concepts that can be experienced with the senses are concrete. Such concrete concepts are easier to remember. Concrete languages can assist people in understanding new concepts, especially people who know nothing about them. To construct a concrete concept, a common language should first be identified to enable fluent communication. Constructing a concept by using an unexpected method also requires considerable effort and creativity. Nonetheless, concreteness is achievable and does not take a lot of effort. The only difficulty in achieving concreteness is forgetting that one's words are abstract and that other people do not know what the speaker knows.

(4) Credibility

Sticky concepts must have credibility. The credibility of the source depends on the honesty and trustworthiness of the source, not on the status of the source. Most of the time, the message must be credible on its own without the need for external endorsements.

(5) Emotional

A concept must be able to touch people's hearts. It is essential to understand what people care about and accordingly construct the message so that it may evoke emotions in people.

(6) Stories

Incorporating stories into concepts is essential. Stories can help input knowledge into a framework that is closer to life and everyday situations. The storytelling should be clever and must reflect one's demands.

To summarize the above, a concept becomes sticky if an individual pays attention to it, understands and remembers the concept, agrees or believes in it, and finally cares and takes action. The unexpected element makes people pay attention. Concreteness makes people understand and remember. Credibility makes people agree or believe. Emotions make people care. Stories make people take action.

Cook et al. [34] presented a framework based on the six principles of stick to improve the dissemination of special education research findings. They also pointed out that a number of messages have unbelievable staying power. Messages with stick are understood, remembered, and have an enduring influence on opinions and behavior. However, others quickly fall away. Hsiao et al. [35] researched the key factors of a storytelling blog and explored how these factors affect readers' intention to adopt travel products. Therefore, the concept of stick is introduced in this paper to obtain the selection criteria for bloggers.

3. Methods

This study presents an innovative mixed MCDM model including IPA, AHP, and TOPSIS to assist hotel managers in selecting bloggers. We firstly collect the selection criteria via interviews with hotel managers and a review of the literature on blogger selection and the stick concept. Based on IPA and the literature review, a hierarchical structure for blogger selection is constructed. Then, AHP and TOPSIS are integrated to assist the hotel managers in selecting bloggers. IPA, AHP, and TOPSIS are described as follows. The selection procedure is illustrated in Figure 1.
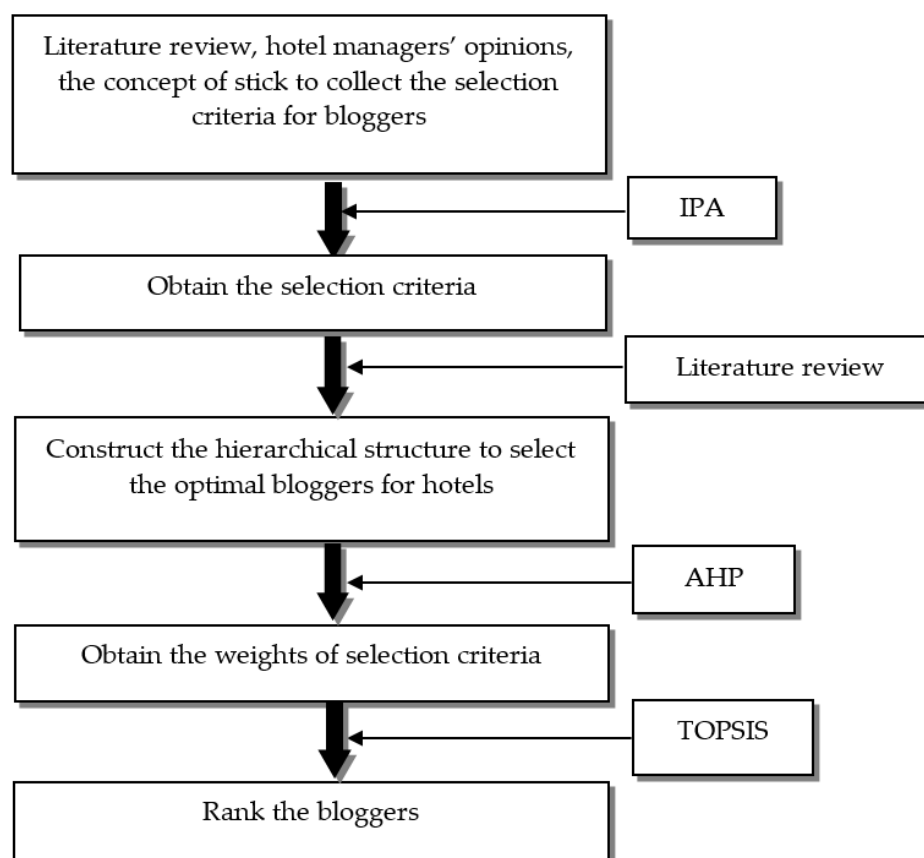

Figure 1. Steps of the selection procedure for bloggers.

3.1. IPA

IPA, proposed by Martilla and James (1977), is widely utilized in business decision-making analysis. After a company completes the satisfaction or service quality survey, the survey data obtained from valid questionnaires are collected and used to construct a two-dimensional diagram. In the diagram, the *X*-axis and *Y*-axis denote performance and importance, respectively, and the centerline from both the axes denotes the total mean of the performance and importance of each element. The elements in the high-importance and high-performance quadrant represent chances for gaining or maintaining a competitive advantage. The elements in the low-importance and high-performance quadrant indicate that excessive resources may be invested in these elements and therefore, resource allocation should be reconsidered. The elements in the low-importance and low-performance quadrant require the investment of fewer efforts and resources. The elements in the high-importance and low-performance quadrant represent the need for immediate improvement [15]. The diagram of IPA can distinguish the relative positions of elements and further provide practical suggestions and strategies [13]. IPA is a decision-support approach utilized to prioritize quality improvements in products or services [16]. To prioritize improvements to service quality, IPA is a useful and popular method [17].

Moreover, IPA applies the importance and satisfaction for evaluating numerous factors and analyzes them on the basis of the quadrant distribution. Hence, factors needed for improving urgently are found out [36]. IPA is extensively applied in studies of tourism and hospitality due to its simplicity [18]. This study considers the criteria in the high-importance and low-performance quadrant to select bloggers for hotels.

3.2. AHP

AHP is developed by Saaty, which is mainly used in decision-making problems under uncertain conditions and with several criteria. Therefore, through structured concrete expressions, it is used to analyze elements that are difficult to quantify, to facilitate the selection of alternatives. AHP can be applied to the following 12 types of decision-making problems, including determining priorities, generating alternatives, selecting the best alternative, determining requirements, assigning resources, predicting results and risk assessment, measuring performance, designing systems, assuring system stability, optimizing, planning, and resolving conflicts [37]. In general, several criteria are often considered in the selection of an alternative, and the performance of alternatives under each criterion is analyzed to determine the optimal decision. In summary, AHP is simple and practical and has been widely applied [38]. AHP is simple in theory, easy to operate, practical, and can capture the opinions of most experts, scholars, and decision makers [39]. The steps involved in AHP are as follows [39,40]:

(1)　Set up the hierarchical structure.

Analyze the goal, collect relevant literature, formulate criteria, and plan alternatives when a problem arises. When the hierarchical structure is established, a questionnaire is designed and distributed for filling.

(2)　Construct a pairwise comparison matrix.

The pairwise comparisons based on a nine-point Likert scale can represent the weights of dimensions, criteria, and alternatives.

(3)　Conduct a consistency test.

The consistency test is to verify the internal conflicts in the pairwise comparison matrix. The consistency is accepted if the consistency ratio (CR) value is less than 0.1.

$$CR = \frac{CI}{RI} \text{ with } CI = \frac{\lambda_{max} - n}{n - 1} \tag{1}$$

CI and RI respectively are the consistency index and random index. λ_{max} is the maximum eigenvalue of the pairwise comparison matrix, and n is the number of elements in the pairwise comparison matrix.

(4)　Integrate results.

The weights of dimensions, criteria, and alternatives are synthesized for ranking the alternatives.

Among the famous weighting approaches, AHP has been the most usually applied because of its popularity and applicability [41]. This study obtains the weight of each dimension and selection criterion through AHP.

3.3. TOPSIS

TOPSIS proposed by Hwang and Yoon [42] selects the alternative nearest to the ideal solution and farthest from the negative ideal solution. TOPSIS is a well-known technique that can effectively handle MCDM problems based on the calculation of the alternatives' distance from both positive and negative ideal solutions [43]. TOPSIS is a popular method that has been widely applied in past studies. The ability to find out the best alternative quickly is its advantage [44]. Bhutia and Phipon [45] pointed out that TOPSIS's advantages are ease of use, considering subjective and objective criteria, and

straightforward calculation processes. Furthermore, the relative advantages of TOPSIS include only needing limited subjective input information and figuring out the best solution quickly [46]. TOPSIS is better than other similar approaches to get the best alternative close to the ideal solution [47]. When various conflicting criteria (qualitative and quantitative) exist, TOPSIS is a logistic method for selecting the best alternative [48]. TOPSIS is the most frequently applied approach to cope with multiple-criteria group decision-making (MCGDM) conflicts [49].

The calculation process of TOPSIS is showing below [39,42,50]:

(1) Calculate the normalized evaluation value.

$$r_{ij} = \frac{x_{ij}}{\sqrt{\sum_{i=1}^{m} x_{ij}^2}} \tag{2}$$

i represents the alternatives, j represents the selection criteria, and x_{ij} represents the i alternative under the j criterion to be estimated.

Many studies [51,52] have justified using vector normalization procedure for TOPSIS.

(2) Calculate the weighted normalized evaluation value.

The weights of the selection criteria, $w = (w_1, w_2, \ldots, w_n)$, multiplied by the normalized evaluation value can be shown as

$$v = \begin{bmatrix} v_{11} & v_{12} & \cdots & v_{1n} \\ v_{21} & v_{22} & \cdots & v_{2n} \\ \vdots & \vdots & \cdots & \vdots \\ v_{m1} & v_{m2} & \cdots & v_{mn} \end{bmatrix} = \begin{bmatrix} w_1 r_{11} & w_2 r_{12} & \cdots & w_n r_{1n} \\ w_1 r_{21} & w_2 r_{22} & \cdots & w_n r_{2n} \\ \vdots & \vdots & \cdots & \vdots \\ w_1 r_{m1} & w_2 r_{m2} & \cdots & w_n r_{mn} \end{bmatrix} \tag{3}$$

(3) Establish the positive and negative ideal solutions.

$$A^* = \left\{ v_1^*, v_2^*, \ldots, v_j^*, \ldots, v_n^* \right\} = \left\{ \left(\max_i v_{ij} \middle| j \in J \right) \middle| i = 1, \ldots, m \right\}$$
$$A^- = \left\{ v_1^-, v_2^-, \ldots, v_j^-, \ldots, v_n^- \right\} = \left\{ \left(\min_i v_{ij} \middle| j \in J \right) \middle| i = 1, \ldots, m \right\} \tag{4}$$

(4) Count the Euclidean distance of the alternatives between the positive and negative ideal solutions.

$$S_i^* = \sqrt{\sum_{j=1}^{n} \left(v_{ij} - v_i^* \right)^2}, i = 1, \ldots, m \quad S_i^- = \sqrt{\sum_{j=1}^{n} \left(v_{ij} - v_i^- \right)^2}, i = 1, \ldots, m \tag{5}$$

(5) Compute the relative approximation of each alternative to the ideal solution.

$$C_i^* = \frac{S_i^-}{S_i^* + S_i^-} \tag{6}$$

(6) Determine the preference of decision makers for the alternatives in the order of relative approximation.

TOPSIS is user-friendly, as decision makers may directly input information without prior mathematical computation. Moreover, it can also be integrated with other MCDM approaches [53]. In this paper, the weights of the selection criteria obtained from AHP are imported into TOPSIS for selecting optimal bloggers for hotels.

4. Empirical Case Analysis

This study adopts a questionnaire survey as the primary method for collecting relevant information. The questionnaire items are derived from interviews with hotel managers,

the results of related studies [23,24], and the stick concept [25]. When the questionnaire is drafted, five senior managers of hotels are asked to modify the items. After that, the questionnaires are distributed for filling. The participants must answer two questionnaire scales for the following criteria: importance and performance (satisfaction). The items in the importance scale are ranked as extremely important, important, neutral, unimportant, or extremely unimportant, and those in the performance scale are ranked as extremely satisfied, satisfied, neutral, dissatisfied, or extremely dissatisfied. The expert questionnaire results are used to calculate the mean score of importance and performance for each criterion. Thereafter, the relative importance and performance of each selection criteria are analyzed and compared, and the criteria (high importance and low performance) are selected according to the analysis results. In other words, the criteria are selected based on their mean scores of importance (more than 4.3743) and performance (less than 4.3984).

According to the opinions of 66 hotel managers whose working experience is more than 10 years, 15 criteria are selected through IPA, shown in Tables 1 and 2. These criteria are classified based on a literature review [23,24], and a hierarchical structure for blogger selection is then constructed, as presented in Figure 2. The hierarchical structure is applied to a hot spring hotel to assist its managers in selecting optimal bloggers. The hierarchical structure is incorporated with AHP and TOPSIS for questionnaire design. A total of four managers from the case company are required to fill in the questionnaire for the analysis of three bloggers in Pixnet. First, AHP uses the geometric mean to present a comprehensive aggregate score for group decision making. The CR value of each pairwise comparison matrix is <0.1, and the pairwise comparison matrix and weights of the dimensions are shown in Table 3. The pairwise comparison matrix is also employed to get the weight of each criterion within the dimension. Table 4 presents an illustration of the pairwise comparison matrix within the Profession dimension. The criterion weight is then multiplied by the dimension weight to obtain the integrated weight of each criterion, shown in Table 5.
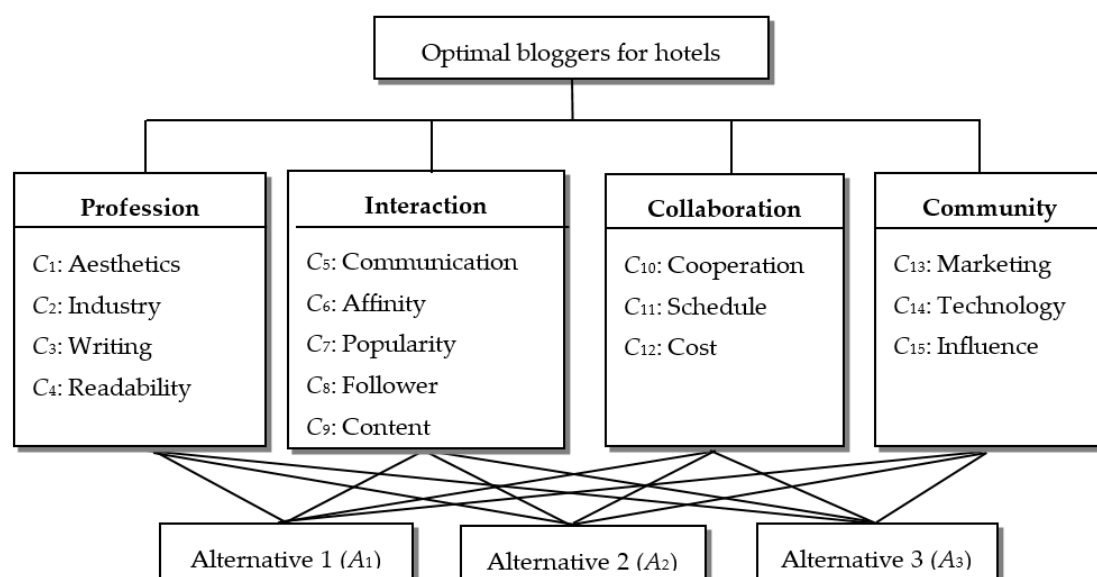

Figure 2. The hierarchical structure to select the optimal bloggers for hotels.

In TOPSIS, the decision makers score each alternative under each criterion from one to nine points, and the geometric mean is used to integrate the evaluation matrix of the four managers' opinions to establish a normalized evaluation value, as shown in Table 6. Table 7 shows that the criterion weight calculated using AHP is multiplied by the normalized evaluation value to obtain the evaluation matrix of the alternatives, which in turn is used to find out the positive and negative ideal solutions.

Table 1. Importance and performance mean scores of the criteria.

	Importance	Performance	Result
Aesthetics	4.3939	4.3939	Retained
Industry	4.3788	4.3788	Retained
Writing	4.4242	4.3636	Retained
Readability	4.4091	4.3788	Retained
Communication	4.3788	4.3636	Retained
Affinity	4.4394	4.3788	Retained
Popularity	4.3788	4.3636	Retained
Influence	4.4242	4.3333	Retained
Content	4.4091	4.3788	Retained
Time for creating the blog	4.1061	4.5758	Deleted
Cooperation	4.4242	4.3333	Retained
Cost	4.3788	4.3788	Retained
Schedule	4.4091	4.3939	Retained
Marketing	4.3788	4.3788	Retained
Technology	4.3939	4.3939	Retained
Blog in which platform	4.0455	4.6212	Deleted
Follower	4.5909	4.3636	Retained
Overall	4.3743	4.3984	

Table 2. The definitions and contributors of criteria.

Criterion	Definition	Contributors
Aesthetics	The blogger's overall aesthetics of content editing.	[23]
Industry	The blogger's industry focus.	[24]
Writing	The blogger's writing ability.	[23–25]
Readability	The blogger's content readability.	[23–25]
Communication	The blogger's communication skills.	[23,24]
Affinity	The blogger's affinity.	[23]
Popularity	The blogger's popularity.	[23]
Influence	The influence of the blogger.	[23,24]
Content	The blogger's content views.	[24]
Cooperation	The extent of cooperation between the blogger and business operator (various cooperation methods).	[23,24]
Cost	The cost of entrusting the blogger.	[24]
Schedule	The blogger's ability to cooperate on schedule.	[24]
Marketing	The blogger's ability to effectively apply social marketing tools.	[23,24]
Technology	The blogger's ability to effectively apply new technologies.	[23,24]
Follower	The number of followers.	Interviewee proposed.

Table 3. The pairwise comparison matrix and weights of the dimensions.

	Profession	**Interaction**	**Collaboration**	**Community**	**Weights ***
Profession	1.0000	1.9680	2.1147	1.5461	0.3803
Interaction	0.5081	1.0000	1.4142	1.5905	0.2469
Collaboration	0.4729	0.7071	1.0000	1.4316	0.1986
Community	0.6468	0.6287	0.6985	1.0000	0.1743

* CR = 0.0230.

Table 4. The pairwise comparison matrix and weights within the Profession dimension.

	Aesthetics	**Industry**	**Writing**	**Readability**	**Weights ***
Aesthetics	1.0000	2.3858	1.6266	2.6591	0.4097
Industry	0.4191	1.0000	1.0000	2.2361	0.2249
Writing	0.6148	1.0000	1.0000	2.1147	0.2441
Readability	0.3761	0.4472	0.4729	1.0000	0.1214

* CR = 0.0149.

Table 5. The integrated weights of criteria.

	Weights from Dimensions	**Weights**	**Integrated Weights**
Aesthetics	0.3803	0.4097	0.1558
Industry	0.3803	0.2249	0.0855
Writing	0.3803	0.2441	0.0928
Readability	0.3803	0.1214	0.0462
Communication	0.2469	0.2371	0.0585
Affinity	0.2469	0.1738	0.0429
Popularity	0.2469	0.2659	0.0656
Follower	0.2469	0.1904	0.0470
Content	0.2469	0.1328	0.0328
Cooperation	0.1986	0.3869	0.0768
Schedule	0.1986	0.2262	0.0449
Cost	0.1986	0.3869	0.0768
Marketing	0.1743	0.4463	0.0778
Technology	0.1743	0.3437	0.0599
Influence	0.1743	0.2101	0.0366

The Euclidean distance equation is used to obtain the degree of separation of the alternatives by calculating the values of each evaluation matrix, the positive ideal solution, and the negative ideal solution. The priority order is determined according to the relative approximation of each alternative. In this case, the third blogger is optimal, and the second is the worst, as shown in Table 8. The case company selects the top two bloggers according to the results of this study.

Table 6. The normalized evaluation value.

	A_1	A_2	A_3
Aesthetics	0.5410	0.4974	0.6782
Industry	0.4756	0.5226	0.7076
Writing	0.5449	0.3984	0.7378
Readability	0.5560	0.5378	0.6337
Communication	0.5115	0.5382	0.6698
Affinity	0.5001	0.4871	0.7160
Popularity	0.4885	0.4885	0.7230
Follower	0.4899	0.4840	0.7251
Content	0.5123	0.4531	0.7296
Cooperation	0.5738	0.4700	0.6707
Schedule	0.5415	0.5481	0.6374
Cost	0.5375	0.4977	0.6807
Marketing	0.4577	0.5227	0.7192
Technology	0.4888	0.5813	0.6505
Influence	0.4648	0.4672	0.7521

Table 7. The weighted normalized evaluation value.

	A_1	A_2	A_3
Aesthetics	0.0843	0.0775	0.1056
Industry	0.0407	0.0447	0.0605
Writing	0.0506	0.0370	0.0685
Readability	0.0257	0.0248	0.0292
Communication	0.0299	0.0315	0.0392
Affinity	0.0215	0.0209	0.0307
Popularity	0.0321	0.0321	0.0475
Follower	0.0230	0.0227	0.0341
Content	0.0168	0.0149	0.0239
Cooperation	0.0441	0.0361	0.0515
Schedule	0.0243	0.0246	0.0286
Cost	0.0413	0.0382	0.0523
Marketing	0.0356	0.0407	0.0559
Technology	0.0293	0.0348	0.0390
Influence	0.0170	0.0171	0.0275

Table 8. The priority order of each alternative.

	S_i^*	S_i^-	C_i^*	Priority Order
A_1	0.0497	0.0205	0.2923	2
A_2	0.0572	0.0165	0.2240	3
A_3	0.0141	0.0608	0.8123	1

Wang and Luo [54] pointed out that the rank reversal phenomenon does not only occur in AHP but also in several decision-making methods, such as TOPSIS. When adding or deleting an alternative, the rank reversal phenomenon might be normal. In this paper, we try to delete alternatives A_1 and A_3, respectively. However, the rankings of alternatives are the same. In this study, we do not find the rank reversal phenomenon. Moreover, Table 9 also shows the comparative analysis for the ranking results with AHP. The results are the same. In other words, the effectiveness of this study is confirmed.

Table 9. The rankings of alternatives under different phenomena and methods.

Different phenomena and methods	Ranking
AHP	$A_3 > A_1 > A_2$
Delete alternative A_1 (AHP and TOPSIS)	$A_3 > A_2$
Delete alternative A_3 (AHP and TOPSIS)	$A_1 > A_2$

5. Conclusions

In the early stage of the COVID-19 pandemic, most people avoided visiting crowded places, which had a significant negative impact on businesses related to hotels. For the tourism industry, the flow of people is equivalent to the flow of money. This pandemic has caused a substantial decrease in foreign tourists, which has severely affected Taiwan's tourism industry. Many hotel operators have been forced to lay off their employees for survival. With no tourist visits, numerous hotels have even ceased operations because they cannot afford fixed costs. With the rapid development of Internet technology, managing personal online blogs is common. Blogs connect netizens from different backgrounds, thus presenting diversified content. Blogs have been used in various fields for marketing. Blogging has become a vital component for customers before purchasing. However, no study has investigated blogger selection by hotel managers.

In this study, an innovative mixed MCDM model including IPA, AHP, and TOPSIS is proposed to assist hotel managers in selecting bloggers. In addition, the concept of stick is also introduced to the selection criteria. Firstly, the questionnaire items of IPA are collected from interviews with hotel managers, the results of related studies, and the concept of stick. By using IPA, managers can balance the priorities and suggest the optimal quadrants that require and deserve improvement. We use IPA to determine the selection criteria based on managerial perceptions. When the questionnaire is drafted, five senior managers of hotels are asked to re-check the items. After that, the questionnaires are distributed for filling. Based on the opinions of 66 hotel managers, 15 criteria are selected, including aesthetics, industry, writing, readability, communication, affinity, popularity, follower, content, cooperation, schedule, cost, marketing, technology, and influence. Then, a hierarchical structure for blogger selection is constructed according to past studies. The hierarchical structure is divided into four levels. The first level is the goal, the second level is the four selection dimensions, the third level is the 15 selection criteria, and the fourth level is the alternatives. The hierarchical structure is incorporated with AHP and TOPSIS for questionnaire design. A total of four managers from the case company are required to fill in the questionnaire for the analysis of three bloggers in the Pixnet. The measurement indicator design of AHP and TOPSIS questionnaire uses the nine levels for pairwise comparison and evaluating the performance of alternatives. In addition, after calculation and analysis using Excel, the priority order of each alternative is obtained.

The research contributions are summarized as follows:

(1) Blogger selection is crucial to hotels. However, no study has explored this topic. Therefore, this study proposes an innovative mixed MCDM model to assist hotel managers in selecting optimal bloggers. This practical contribution has improved the methodological deficiencies in relevant studies.

(2) In addition to interviews with hotel managers and a review of relevant literature on blogger selection, this study also introduces the concept of stick to the selection criteria.

(3) IPA is applied to screen the selection criteria to establish an effective hierarchical structure.

(4) The weight of each dimension and selection criterion is obtained through AHP. To reduce excessive matching pairwise comparison matrices that may confuse the decision makers, weights of the selection criteria obtained from AHP are imported into TOPSIS to help select the optimal bloggers and enhance the decision-making efficiency.

A comparative analysis for the ranking of alternatives with AHP is also conducted in this study. The result shows that the effectiveness of this study is confirmed.

Future studies can incorporate the opinions of more managers in the IPA decision-making process to reduce deviations and obtain more reliable results. Moreover, they can also incorporate consumers' opinions to develop a more credible and valid scale for the reference of scholars and business executives that may be suitable for use for both academic research and practical applications. Certain selection criteria are qualitative, and precise data on these could not be achieved. In addition, the criteria or alternative scores given by the managers are based on their subjective judgments. Therefore, further studies are recommended to adopt fuzzy theory. Furthermore, the study results are only applicable for blogger selection in Taiwanese hotels and cannot be applied to other countries. However, AHP assumes that the elements of each level are independent in the hierarchical structure. Therefore, future studies should consider different research methods for evaluation and analysis, such as the analytic network process (ANP), which can address the interaction between elements. Researchers can also apply other methods for ranking alternatives. For example, Piegat and Sałabun [55] pointed out that the rank reversal phenomenon is not discovered in characteristic objects method (COMET). Moreover, Dezert et al. [56] proposed stable preference ordering towards ideal solution method (SPOTIS) which is rank reversal free. Researchers can apply such approaches to avoid rank reversal phenomenon. Finally, sensitivity analysis is not conducted in this paper.

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