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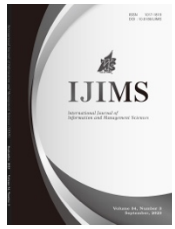

Building an Evaluation Model for Travel Risk Decision-Making

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Keywords

Traveling risk, Backpacker, Modified Delphi approach, Decision-making trial and evaluation laboratory (DEMATEL)

Abstract

This study explored the characteristics associated with the option to reduce travel risk. Using the modified Delphi approach and relevant literature reviews, a total of 34 distinct indicators of travel risk were selected. These indications can help make informed decisions about choosing a trip. Additional indicators were discovered through a decision-making trial and evaluation laboratory (DEMATEL). The research results listed critical indicators of transportation, law and order, food and hygiene, accommodation, weather and other environments, sightseeing, and other recreational facilities. Finally, law and order, Food and hygiene, sightseeing, and other recreational facilities strongly impact other indicators; therefore, strategically allocating resources is essential. Considering these factors, travel policymakers should prioritize the development of strategies that promote social stability, political stability, healthcare management, and local epidemic containment. An extensive transit system can attract a more significant number of international tourists.

1. Introduction

Global disasters, such as the September 11, 2001, terrorist attack, the 2011 Tohoku earthquake and tsunami, the COVID-19 pandemic, the 2023 earthquake in Turkey-Syria, and the Icelandic volcanic eruption, had significantly affected how travelers perceive many tourist destinations. Contemporary travelers increasingly consider the safety considerations specific to the local area when visiting foreign nations, in addition to traditional criteria such as accommodation and transportation. This uneasiness is caused by the subjective feeling of risk. In addition to their complexity, decision-making procedures in tourism involve inherent risks and uncertainties (Chou et al., 2024). Research had indicated that travelers' evaluations of danger and safety are a more reliable predictor of their decision to visit or avoid certain places (Wong & Yeh, 2009). The travel industry has been significantly affected by the COVID-19

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pandemic. Over 900 million tourists traveled internationally in 2022, double those in 2021, though still 37% fewer than in 2019 (UN Tourism, 2024). According to LnData report in 2023, only 0.02% of the international tourists to Taiwan in 2021 had already visited the country in 2019. However, in 2023, free travel became increasingly popular, and visitors typically engage in extensive journeys (LnData, 2023).

Tourism risk is a significant deterrent for visitors when it comes to traveling abroad, and it is challenging to eliminate. The allure of well-known tourist destinations may also diminish because of local calamities that impact them. Recent scholars had emphasized the importance of considering factors such as the well-being, security, and financial stability of tourists (Balaz et al., 2024). They have highlighted problems related to health, safety, duration cost, and distance of travel. Prior studies had demonstrated that risk can impact the final decisions made by travelers. The risks related to travel encompass financial concerns (Husser & Ohnmacht, 2023), interpersonal issues (Xue et al., 2022), societal factors (Li et al., 2021), and health considerations (Saha et al., 2024). Tourists visiting prominent destinations may encounter various advertised situations, such as potential risks to their well-being or the loss of money or valuable possessions, which could discourage them from traveling altogether. The presence of risks in tourism can significantly impact travel intentions and behaviors (Wong & Yeh, 2009).

Compared to methodologies such as the Analytical Hierarchy Process (AHP) and the Analytical Network Process (ANP), DEMATEL presents unique benefits in evaluating internal relationships among criteria. AHP and ANP frequently encounter challenges in addressing interdependence, while DEMATEL's thorough methodology positions it as the optimal choice for examining the complex network of risk factors in tourism. By integrating expert insights and empirical data, DEMATEL enabled researchers to pinpoint critical causal factors within interconnected risks, offering a detailed understanding of tourists' perceptions of risk. Understanding these perceptions was essential for crafting effective marketing strategies and alleviating psychological barriers to tourism, especially considering the significance of security concerns for stakeholders such as policymakers, lawmakers, marketers, and entrepreneurs (Agarwal et al., 2021). This research employed a DEMATEL-based network hierarchy, integrating quantitative and qualitative data to evaluate travel risks, underpinned by Multiple Attribute Decision Making (MADM) methodologies, utilizing expert panels and comprehensive sampling (Tsai et al., 2021; 2023). Integrating Delphi and DEMATEL methodologies enhanced the study's convergent validity (Tsai et al., 2022), providing policymakers with essential insights for prioritizing risk factors. The study thoroughly examined criteria evaluation, influential network relation maps, criteria weighting, and strategies for improvement in the travel industry through a literature review and expert consultation.

This study explores a critical research question: In what was perceived risks affect travelers' destination selections, and what strategies can be implemented to alleviate these risks and strengthen tourism resilience? This research offers valuable insights for businessman in tourism management and policymaking by analyzing travelers' perceptions of different risk factors and exploring strategies to mitigate these concerns.

2. Literature Reviews

The Review of Literature on travel risk and DEMATEL was presented in this part. Finding traveling risk factors was one of the model's functions. A new method of assessing travel risk variables was also developed using the modified Delphi and DEMATEL in addition to a review of the literature and interviews with seasoned backpackers. The method's efficacy was thoroughly evaluated. The theoretical approaches used in the current work are elaborated in the next section.

2.1 Travel Risk

Risk was generally defined as the likelihood of an undesirable event occurring (Tsai et al., 2023). It was a challenging notion to describe, comprehend, and manage, particularly within the context of tourism, a service industry characterized by intangibility, indivisibility, variability, and perishability. Tourists' perception of safety and security significantly influenced their decisions to visit certain locations. Factors such as terrible weather, unpleasant locals, striking airport employees, inedible local food, terror, crime, political turmoil, disease, and natural disasters all contribute to travelers' risk perceptions (Wang et al., 2010). Various scholars have explored different dimensions of risk in tourism. Balaz et al. (2024) highlight risked affecting cognitive functions like sensation, attention, and decision-making, while Fuchs and Reichel (2006) emphasized travel hazards such as financial, service quality, and natural disaster risks. Saha et al. (2024) categorizes risks into political, environmental, health, planning, and property risks, whereas Agarwal et al. (2021) focus on the likelihood and severity of events liked contagious diseases and terrorist attacks. Adam (2015) and Agyeiwaah and Zhao (2024) explored how financial, psychological, and social risks, among others, affect travel decisions, with cultural differences also playing a significant role.

Further expanding on these notions, Wang et al. (2010) identified political instability, terrorism, cultural barriers, and crime as key risk factors, noting that tourists' concerns vary. For instance, backpackers might perceive less risk due to their travel style, which often includes shielding from local culture and food (Wong & Yeh, 2009). Adam (2015) identified war and political instability as major deterrents to travel. Zhang et al. (2024) outlined travel safety perceptions, encompassing various activities and environments like water sports and nightlife. Overall, travel hazards are broadly classified into nine categories: equipment or functional risk, financial risk, physical risk, psychological risk, satisfaction risk, social risk, time risk, political instability risk, and terrorism risk. These risks encompass potential issues with travel infrastructure, financial expenditures, personal safety, satisfaction, social influences, time consumption, and disruptions from political or terrorist activities (Wang et al., 2010).

As a result, this study has taken the following hazards into account when traveling.

1. Transportation (Trans): Modes and risk factors for transportation, such as public transportation, private transportation, automobiles, and airplanes (Wang et al., 2010).

2. Law and order (LO): This included local attitudes towards government rules. Terrorism is linked to political instability (Husser & Ohnmacht, 2023).

3. Food and health (FH): Food risk assessment differ according to the source of risk and

country context (Husser & Ohnmacht, 2023).

4. Accommodation (ACCOM): Most backpackers chose their lodging based on cost, often selecting the cheapest option to save money and thus extend their stay (Wang et al., 2010). As a result, the housing environment was a significant risk element, including fire or electric shock, as well as cleanliness, location, and sexual harassment.

5. Weather and other conditions (WE): Weather changes, man-made disasters, garbage disposal, and flooding (Fuchs & Reichel, 2006).

6. Sightseeing and other recreational facilities (SR): This included public entertainment venues, private tourist attractions, shopping, and nightlife dangers (Wang et al., 2010).

2.2 The DEMATEL Method

DEMATEL was a powerful decision-making tool that helps scholars grasp the linkages and interdependencies between numerous aspects of a complicated problem (Fontela & Gabus, 1976). This structured approach used both qualitative and quantitative techniques to establish and assess causal linkages among components, prioritize activities, and identify essential elements that demand attention through a visual depiction of the factors' interdependence. DEMATEL outperforms other methods like AHP and the analytical network process (ANP) in addressing internal criteria relationships. By seeking professional perspectives, it provided a comprehensive understanding of the relationships between criteria. Tsai et al. (2021) further developed a fuzzy technique for order preference based on resemblance to the ideal solution (TOPSIS) combined with DEMATEL, facilitating fuzzy risk ranking problems. This technique used a hierarchical structure to locate feasible solutions and had been applied in various studies, such as developing evaluation indices for more humane correctional institutions, selecting technical indicators of CE performance (Chang & Lai, 2023), and assessing risk factors in house-for-pension reverse mortgage lending (Tsai et al., 2023).

DEMATEL was also applied in solving real-life challenges through collaborative decision-making, such as risk management, improving tourism policy implementation (Agarwal et al., 2021), and enhancing food delivery applications (Tsai et al., 2022). From a scholarly perspective, DEMATEL examined variable correlations and causal linkages while determining the relative importance of each variable. It was frequently used in business and management research to identify influencing links between standards. For instance, Tsai et al. (2021) utilized DEMATEL to develop evaluation indices for more humane correctional institutions in Taiwan. The standard DEMATEL process involved identifying fundamental evaluation aspects through literature research and expert discussions, refining dimensions and criteria, and using a questionnaire for weight assessment by subject matter experts. The empirical data was then analyzed using a matrix to identify key elements, guiding the development of critical initiatives. DEMATEL had been widely adopted across various disciplines for its effectiveness in decision-making, used by governments, universities, and corporations to uncover important variables and influence critical decisions. However, its application in the travel industry remains limited, with existing research focusing on hot spring hotels, airport service quality (Lin, 2024), and other areas. Further investigation was warranted to explore DEMATEL's practical usefulness in this context.

3. Data and Methodology

Based on the results of the literature review, the Modified Delphi Method, and the DEMATEL requirements, an initial 34 criteria list (covering six dimensions) was created. Experts were approached and urged to make recommendations for the list through mutual contacts. The screening results were used to change the dimensions and criteria, as well as to add additional elements to the list. Finally, 24 criteria with six dimensions were developed.

3.1 Modified Delphi Method

The Delphi approach, which was currently used in the commercial and government spheres, relies on expert input to forecast future occurrences or trends (Linstone & Turoff, 1975; Chang et al., 2014). Modified Delphi data were documented and then analyzed using Excel. The researchers discovered that 80% expert agreement was required for an indicator to be included in the set of questions. Notably, all indicators that received 80% agreement as “extremely” or “very” important (number 1 or 2) during the first round of the Delphi procedure were included in the questionnaire list. Counterparts with less than 80% agreement on both responses were included in the second round. All indicators with 80% agreement as “slightly important” or “not at all important” (number 4 or 5) were removed from the list. Counterparts rated as “moderately important”, but with less than 80% agreement, were also included in the second round. The unique indicators proposed by experts in the first round were also used in the second round. Zhu et al. (2022) repeated the method for three rounds, to omit all indicators with less than 80% agreement by the third round. To reduce bias from panel member conversations, questionnaire responses were provided in both numerical and text format. Text responses were compiled and analyzed to determine their relevance. Subsequently, comments reflecting the consensus perspective were generalized.

The Modified Delphi technique includes the following five procedures.

1. Choose anonymous experts.
2. Conduct the initial round of a survey.
3. Conduct the second set of questionnaire surveys.
4. Conduct the third round set of questionnaire surveys.

3.2 The DEMATEL Method

There were six steps in the computation procedure using DEMATEL:

1. Create the matrix of individual direct relations.
2. Determine the average matrix of direct-influence relations.
3. Carry out the test for consistency.
4. Determine the direct-influence relation matrix’s normalized average.
5. Compute the influence-relationship matrix in its entirety.
6. Create the influential network relationship map (INRM).

3.2.1 Generate Relationship Matrix "A."

Participants would be asked to indicate the extent to which they considered factor *I* affected factor *j*, if the study considered *H* experts and n factors. According to Fontela and Gabus (1976), pairwise comparisons between any two factors were indicated by and given an integer score ranging from 0 to 4, which suggests "No influence (0)," "Low influence (1)," "Medium influence (2)," "High influence (3)," and "Very high influence (4)." $X^k = [x_{ij}^k]$ with k = 1, 2..., H, then n x n non-negative answer matrix if produced by each respondent's sore. The corresponding response matrices of *H* experts were denoted by the letters X_1, X_2, ..., and X_H, with each element $X^k = [x_{ij}^k]_{n\times n}$ of set to 0. In this sense, the average *H* of the expert scores can be used to compute the n x n average matrix *A* of all expert opinions:

$$a_{ij} = \frac{1}{\mathrm{H}}\sum_{k=1}^{H} x_{ij}^k \tag{3.1}$$

The average matrix was the original average matrix. Matrix *A* illustrates the first direct effects of other factors for a given factor. For each factor, matrix *A* shows how other factors had an impact.

3.2.2 Normalized Matrix "D"

By normalizing the average matrix "*A*", the normalized initial direct relationship matrix "*D*" was extracted:

$$S = \max\left(\max_{1\le i\le n}\sum_{j=1}^{n} a_{ij}\,,\ \max_{1\le j\le n}\sum_{i=1}^{n} a_{ij}\right) \tag{3.2}$$

$$\text{Hence,}\ \ D = \frac{A}{\mathrm{S}} \tag{3.3}$$

The factor having the greatest direct influence on other counterparts is indicated by, since the total of each row *j* in matrix *A* suggests the direct factor influence on other counterparts. In a similar vein, the sum of each column *I* in matrix *A* indicated the direct influencing factor *i*, and hence indicates the factor most influenced by other factors. Scalar "*s*" that was positive represents the greater of two extreme sums. By assigning a scalar classification to each element *A*, matrix *D* was extracted. In essence, matrix *D*'s element, matrix *D* was extracted. In essence, matrix *D*'s elements all fall between 0 and 1 (Tsai et al., 2023).

Equations (3.2) and (3.3) were used to normalize the first direct relationship.

3.2.3 Generate Influence Matrix "T."

By using powers of *D*, the indirect effects between components were assessed. The indirect factor guarantees that the matrix inversion solutions converge to an absorbing Markov chain matrix by exerting influence along the consecutive reductions of the matrix *D*'s powers, i.e., D_2, D_3, ..., D_∞. Notably, $\lim_{m\to\infty} D^m = [0]_{n\times n}$ through n x n identity matrix was implied by the empty matrix *I*. An n x n matrix was the complete relation matrix *T*.

$$\mathrm{T} = [t_{ij}] = \sum_{i=1}^{\infty} D^i = D(1-D)^{-1} \quad i,j = 1,2,\dots n \tag{3.4}$$

$$\text{as}\ \lim_{k\to\infty} D^k = [0]_{n\times n}$$

In cases where $\mathrm{D} = [d_{ij}]_{n\times n}, 0 \le d_{ij} \le 1$ and $0 \le \left(\sum_i d_{ij}, \sum_j d_{ij}\right) \le 1$ at least one column sum $\sum_j d_{ij}$ or one row sum $\sum_i d_{ij}$ is equal to one.

Additionally, r and c are specified as n x 1 vectors, denoting the total relation matrix T's row and column sums, respectively:

$$r = [r_i]_{n\times 1} = \left(\sum_{j=1}^{n} t_{ij}\right)_{n\times 1} \tag{3.5}$$

$$c = [c_i]'_{1\times n} = \left(\sum_{i=1}^{n} t_{ij}\right)'_{1\times n} \tag{3.6}$$

in which transpositions were denoted by the superscript.

They indicate c_i the total matrix T's row ith. Thus, the overall impact that the ith component has on the other factors (direct and indirect impacts). The symbol represented the total of column j in matrix T. This symbol represented the total of column j in matrix T. This shows the total impact (r_j+c_j) that another variable (both direct and indirect) had on factor j. The index (position) of the overall effect obtained from the ith factor and the whole effect is provided by the sum, which was referred to as "Prominence." Stated differently, (r_i+c_j) represents the system's ith factor's prominence (the total of the provided and received effect). Additionally, the difference (r_i - c_i) showed how the ith element affects the system overall. According to Tsai et al. (2021), the ith factor had an impact both positively and negatively.

Using Equations (3.4), the total influence matrix that was derived from the normalized matrix was calculated.

3.2.4 Sum Rows "r_i" and Columns "c_i"

As the matrix T showed an example of how one component affects another, thresholding eliminates little or inconsequential impacts. These effects may surpass the threshold if the dataset (r_i+c_i, r_i - c_j) is mapped to a diagram.

3.2.5 Generate an INRM

The important function and relationship between each sub-criterion and the other criteria were shown in the following INRMs. The assessment criteria for travel risks, which were divided into two groups – deploying and receiving – are shown graphically in Fig. 1. To identify the criterion linkages, a cut-off value (p = 0.500) was established after discussing the rates. The important connections between the dimension criteria and sub-criteria are shown in Fig. 1 through Fig. 7. These numbers served as the basis for mapping the correlations between the r_i + c_j and r_i - c_j datasets.

4. Data Analysis and Results

The current work comprehensively and objectively examined three travel risk factors selection phases to structure a model of competitive edge for travel markets. Stage 1, which encompassed two steps, employed the modified Delphi to determine the key assessment factors. Meanwhile, Stage 2 entailed five steps and incorporated the DEMATEL theory to compute the weight of the criteria utilized to assess the recommended model's decision and effectiveness. Both stages are elaborated below.

4.1 First Stage: Applying the Modified Delphi Method to Evaluate the Travel Risk Factors.

4.1.1 Step 1: Specify the Group of Travel Experts.

A total of 3 experienced backpackers were chosen for this study. Potential panelists were selected from an initial list of three authors, who had published a minimum of one article in Tourism Management, Tourism Economics, Journal of Quality Assurance in Hospitality and Tourism, The International Journal of Hospitality Management, International Journal of Consumer Studies, Socio-Economic Planning Sciences, Decision Analytics Journal or Asia Pacific Business Review.

4.1.2 Step 2: Determine the Key Criteria for Travel Risk Factors Selection for A Competitive Edge Post-Literature Review.

The aforementioned factors were elicited by reviewing the literature on traveling risk factors selection and developing criteria via an expert questionnaire survey. Five Likert-type scales assessed the criteria weight. In a meeting, questionnaire responses were organized into 34 traveling risk factors by 30 experienced backpackers. Three rounds of surveys generated the 34 travel risk factors listed below.

1. Transportation factors (Trans) constitute five factors:
   (a) Public Transportation (C_1): Safety on buses, trains, and so on (Agarwal et al., 2021).
   (b) Private Transportation (C_2): Safety in taxis, and when driving oneself (Wang et al., 2010).
   (c) Transportation in a Car (C_3): Safety in cars (Husser & Ohnmacht, 2023).
   (d) On a motorbike or scooter (C_4): Safety on a motorbike or scooter (Husser & Ohnmacht, 2023).
   (e) Transportation on a flight (C_5): Safety on a flight (Wang et al., 2010).
2. Law and order factors (LO) encompass six factors:
   (a) Political instability (C_6): Protests or union strikes (Agarwal et al., 2021).
   (b) Criminal attack (C_7): Likelihood of criminal attack (Husser & Ohnmacht, 2023).
   (c) Interaction with locals (C_8): Helpful or trying to scam you (Xue et al., 2022).
   (d) Theft (C_9): Stolen belongings (Husser & Ohnmacht, 2023).
   (e) Terrorism (C_{10}): Attacks against the government or citizens (Agarwal et al., 2021).
   (f) Law and order (C_{11}): Corruption, bribes (Aguinis et al., 2023).

3. Food and hygiene (FH) entail five factors:
   (a) Possibility of contracting infectious diseases from humans (C_{12}) (Wang et al., 2010).
   (b) Possibility of contracting infectious diseases from animals (C_{13}) (Brady et al., 2024).
   (c) Method of food storage (C_{14}): Food storage is both a traditional domestic skill and important industrially (Wang et al., 2010).
   (d) Public facilities (C_{15}): Evaluate the potential impacts of the proposed project on those facilities and services and propose measures to mitigate those impacts (Agarwal et al., 2021).
   (e) Contracting a disease owing to poor catering conditions (C_{16}): Contracting a disease owing to poor catering conditions (Agarwal et al., 2021).
4. Accommodation elements (ACCOM) constitute six factors:
   (a) Injury caused by fire (C_{17}): Injury caused by fire (Neger et al., 2024).
   (b) Injury caused by electrocution (C_{18}): Injury caused by electrocution (Wang et al., 2010).
   (c) Health risks related to the cleanliness of hostels or hotels (C_{19}): Risk of suffering negative health effects as a specific result of the cleanliness of hostels or hotels (Saha et al., 2024).
   (d) Location of hostel or hotel (C_{20}): Location of hostel or hotel (Wang et al., 2010).
   (e) Sexual harassment (C_{21}): Sexual harassment (Husser & Ohnmacht, 2023).
   (f) Theft by hostel or hotel staff (C_{22}) (Husser & Ohnmacht, 2023).
5. Weather and Other Environmental (WE) constitutes six factors:
   (a) Changes in weather conditions (C_{23}): Differences associated with changing weather (Agarwal et al., 2021).
   (b) Natural disasters (C_{24}): Earthquakes, typhoons, floods, etc. (Agarwal et al., 2021).
   (c) Man-made disasters (C_{25}): Man-made disasters (Husser & Ohnmacht, 2023).
   (d) Outdoor air pollution (C_{26}): Risks associated with climate change, global warming, and CO2 emissions (Meena & Goswami, 2024).
   (e) Waste cleanup (C_{27}): Risks associated with lack of waste cleanup (Chebli et al., 2024).
   (f) Water hazards (C_{28}): Water hazards (Zhang et al., 2024).
6. Sightseeing and other recreational facilities (SR) entails six factors:
   (a) Safety of public recreational facilities (C_{29}): Safety of public recreational facilities (Liu et al., 2024).
   (b) Availability of civil servants in times of need (C_{30}): Risks associated with the unavailability of civil servants in times of need (Rittchainuwat & Chakraborty, 2009).
   (c) Safety of private tourist attractions (C_{31}): Safety at private tourist attractions (Husser

& Ohnmacht, 2023).

(d) The ability of management staff or tour guides to help in times of need (C_{32}): The ability of management staff or tour guides to help in times of need (Wang et al., 2010).

(e) Risk from going shopping (C_{33}): The risk associated with shopping (Zhang et al., 2024).

(f) The risk from nightlife (C_{34}): Risks associated with nightlife (Li et al., 2021).

4.1.3 Step 3: Add 30 Opinions with All Criteria.

The Likert-type scale ensured that the criteria weight exceeded the four scales, which characterize the key reference criterion. Experienced backpackers derived the traveling risk factors selection and competitive edge criteria by examining key assessment aspects. As presented in Table 1, 30 experienced backpackers were chosen via snowball sampling on the Delphi board.

4.1.4 Step 4: Develop a Travel Risk Factors Selection Model for A Competitive Edge.

The experienced backpackers determined the criterion to (i) structure a comparative advantage model for traveling risk factors selection via modified Delphi and (ii) attain expert consensus and uniform recognition. A key criterion was derived from the three rounds of survey outcomes. The panelists were selected from a preliminary list of 3 researchers, who had published a minimum of one peer-reviewed study on hospitality. Thirty experts from experienced backpackers' domains offered viewpoints on traveling risk factors selection.

Twenty-seven of the 30 experts chosen as Delphi panel members engaged in Round 1 of the study with a drop-out rate of 10.0%. The Round 1 participants were contacted and asked to complete the questionnaire before commencing Rounds 2 and 3. In this vein, 27-panel members engaged in Round 2 with a dropout rate of 7.7%. Eighteen experts subsequently participated in round three and the modified Delphi method-based decision group with a dropout rate of 0 % on 5 May 2022. Panel members were selected following their expertise and experience. Expert opinions were initially elicited to ensure non-interference. The experienced backpackers' viewpoints were subsequently synthesized to identify the key factors for traveling risk factors selection in Taiwan. The three survey rounds yielded 24 factors to be used in selecting traveling risk factors selection. The survey data determined (i) public transportation, private transportation, in a car, and on a flight as Trans and (ii) political instability, criminal attack, interaction with locals, and law and order as LO. Meanwhile, the possibility of contracting infectious diseases from humans, the possibility of contracting infectious diseases from animals, the method of food storage, and public facilities were the four factors under FH. Electrocution, health risks related to the cleanliness of hostels or hotels, location of hostel or hotel, and sexual harassment were the four factors under ACCOM. Moreover, Changes in weather conditions, man-made disasters, Waste cleanup, and Water hazards implied the four factors in the WE dimension. Public recreational facilities, private tourist attractions, going shopping, and nightlife denoted the six SR factors.

Table 1 *The Objective Factors of Each Dimension*

Dimension/ Indicators	Factors	Mean	IRQ	Rank
Transportation				
1	Public Transportation	4.6	0.5	1
2	Private Transportation	3.8	0.5	3
3	Transportation in a Car	3.9	0.5	2
4	On a motorbike or scooter	1.6	0.5	delete
5	Transportation on a flight	3.8	0.0	3
Law and Order				
1	Political instability	4.4	0.5	1
2	Criminal attack	4.0	0.5	3
3	Interaction with locals	3.8	0.5	4
4	Theft	2.6	0.5	delete
5	Terrorism	2.4	0.5	delete
6	Law and order	4.4	0.5	1
Food and Hygiene				
1	Possibility of contracting infectious diseases from human	3.9	0.5	2
2	Possibility of contracting infectious diseases from animals	4.3	0.5	1
3	Method food storage	3.8	0.5	3
4	Public facilities	3.8	0.5	3
5	Contracting a disease owing to poor catering conditions	1.8	0.5	delete
Accommodation				
1	Injury caused by fire	2.8	0.5	delete
2	Injury caused by electrocution	3.7	0.5	3
3	Health risks related to the cleanliness of hostels or hotels	4.2	0.5	2
4	Location of hostel or hotel	3.7	0.5	3
5	Sexual harassment	4.5	0.0	1
6	Theft by hostel or hotel staff	2.8	0.1	delete
Weather and Other Environmental				
1	Changes in weather conditions	3.8	0.5	3
2	Natural disasters	2.6	0.5	delete
3	Man-made disasters	3.2	0.0	4
4	Outdoor air pollution	2.7	0.5	delete
5	Waste cleanup	4.0	0.0	2
6	Water hazards	4.1	0.5	1
Sightseeing and other recreational facilities				
1	Safety of public recreational facilities	4.2	0.1	1
2	Availability of civil servants in times of need	2.6	0.5	delete
3	Safety of private tourist attractions	3.4	0.0	4
4	The ability of management staff or tour guides to help in times of need	2.2	0.0	delete
5	The risk of going shopping	3.6	0.5	3
6	The risk from nightlife	3.7	0.5	2

Note: Mean: each itemized factor of each category has been rated by panel members from strongly agree (5) to strongly disagree (1). Cutoff point: 3.5.

4.2 Second Stage: Identifying the Weight of Each Criterion in the Traveling Risk Factors Selection Model with DEMATEL for Competitive Edge.

DEMATEL was empirically employed at this point to identify the travel risk factors. The following DEMATEL steps apply as follows:

4.2.1 Step 1: Questionnaire Design

The DEMATEL questionnaires were structured for travel risk factors with empirical and expert reviews. The key decision-making factors impacting travel risk factors were evaluated using six dimensions and 24 indicators as pairwise comparison scale elements. The scale was categorized into 1 (no influence), 1 (low influence level), 2 (moderate influence level), 3 (strong influence level), and 4 (high influence level).

4.2.2 Step 2: Distribution of Questionnaire

As the current study methods aimed to elicit travel risk perspectives, the questionnaires were only disseminated among backpackers. The questionnaires were targeted at examining the decision-making factors impacting talent recruitment strategies and perspectives involving the degree of mutual influence between factors stated above.

4.2.3 Step 3: Examination of Consistency.

A total of 63 DEMATEL expert questionnaires were disseminated. The experts came from the members of CouchSurfing (blog.couchsurfing.com). They must have over two times experience of being a backpacker or couchsurfing. A 100% response rate was achieved. A consistency assessment was subsequently conducted to evaluate the data from the gathered questionnaire and affirm that the responses attained a consensus [Trans (0.020), LO (0.018), FH (0.032), ACCOM (0.037), WE (0.019), and SR (0.011)]. The responses proved consistent if the values computed during consistency testing were under 0.05.

Table 2 *The Descriptive Statistics of the Participants*

Item	Category	n	%
Gender	Male	25	39.7
	Female	38	60.3
Age	<30	3	4.8
	31-40	39	61.9
	41-50	19	30.2
	51-60	2	3.2
	>60	0	0.0
Marital Status	Single	28	44.4
	Married	35	55.6
Education	Junior high school or lower level	8	12.7
	Senior high or vocational school	11	17.5
	College	44	69.8
	Research Institute	0	0.0
Occupation	Student	0	0.0
	Service Industry	40	63.5
	Industry and Commerce	7	11.1
	Agriculture, Forestry, Fisheries, and Animal, Husbandry	1	1.6
	Military, Public Service, and Education	15	23.8
	No occupation (housekeeper, retired, or unemployed)	0	0.0
Monthly Income	<20,000	1	1.6
	20,001-30,000	4	6.3
	30,001-40,000	10	15.9
	40,001-50,000	19	30.2
	50,001-60,000	6	9.5
	>60,001	23	36.5
Past Backpack Travelling Experience	2-4 times	23	36.5
	5-7 times	21	33.3
	8-10 times	19	30.2

4.3 Create a Network Relation Map and Construct DEMATEL Data.

Step 1: Create the Relationship Matrix "A."

For each factor, the A shows how other factors had an impact. An influence diagram can also be used to map the causal link between each pair of components in the system. Each letter represents a feature of the system. The influence of c on d was shown by the arrow that points from c to d. In this case, the effect strength is 4. Overall, DEMATEL provides a clear graphic that illustrates the structural relationships between the system elements.

This step uses a modified Delphi technique to validate the traveling risk factors that had been identified through a review of the literature. In tandem with the evaluations, the impact is measured on a 0-5 scale. After that, the scores were totaled to construct a direct association matrix for the identified travel hazards.

4.3.1 Step 2: Normalized Matrix "D".

Equations (3.2) and (3.6) were used to normalize the first direct relationship.

4.3.2 Step 3: Generate Influence Matrix "T".

Using Equations (3.4), the total influence matrix that was derived from the normalized matrix was calculated. The operator dimensions threshold value was 0.062, as shown in Fig. 2 in bold, which showed which of the dimensions reached the threshold (Table 3). To determine the cause and effect, the degree of correlation was represented by $c_i + r_j$, and the degree of caused by $c_i - r_j$. The dimension is shown as an effect in the negative $c_i - r_j$, whereas it is shown as a cause in the $c_i - r_j$. These values were used to create the NRM. Concerning the operators, whose dimensions comprise the causes, and one dimension includes the impact (See Table 4).

Table 3 *The Total Influence Matrix "T" on the Transportation Dimension*

Dimensions	C1	C2	C3	C4	C5	ri
C1	0.3678	0.2966	0.2230	0.0000	0.2853	1.1727
C2	0.0083	0.1038	0.0162	0.0000	0.0052	0.1335
C3	0.0394	0.0313	0.0292	0.0000	0.0300	0.1299
C4	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
C5	0.0383	0.0309	0.0232	0.0000	0.0297	0.1221
ci	0.4538	0.4626	0.2916	0.0000	0.3502	1.5582

Note: Threshold value=0.062

Table 4 *The Sum of Influences Given and Received on Criteria.*

Dimensions	ri	ci	ri+ci	ri-ci	Rank
C_1	1.1727	0.4538	1.6265	0.7189	3
C_2	0.1335	0.4626	0.5961	-0.3291	20
C_3	0.1299	0.2916	0.4215	-0.1617	15
C_4	0.0000	0.0000	0.0000	0.0000	Delete
C_5	0.1221	0.0297	0.1518	0.0924	9
C_6	3.3404	1.9886	5.3290	1.3518	2
C_7	3.3791	4.1504	7.5295	-0.7713	23
C_8	2.4892	4.2158	6.7050	-1.7266	24
C_9	0.0000	0.0000	0.0000	0.0000	Delete
C_{10}	0.0000	0.0000	0.0000	0.0000	Delete
C_{11}	3.5401	3.1633	6.7034	0.3768	6
C_{12}	1.4820	1.5814	3.0634	-0.0994	14
C_{13}	1.1345	1.5814	2.7159	-0.4469	21
C_{14}	2.3012	1.8033	4.1044	0.4979	4
C_{15}	1.3076	0.9043	2.2119	0.4033	5
C_{16}	0.0000	0.0000	0.0000	0.0000	Delete
C_{17}	0.0000	0.0000	0.0000	0.0000	Delete
C_{18}	0.3638	1.0335	1.3973	-0.6697	22
C_{19}	2.4464	1.0032	3.4496	1.4432	1

Dimensions	ri	ci	ri+ci	ri-ci	Rank
C_{20}	1.3300	1.5778	2.9078	-0.2478	17
C_{21}	1.2269	1.4940	2.7209	-0.2671	18
C_{22}	0.0000	0.0000	0.0000	0.0000	Delete
C_{23}	0.3720	0.6993	1.0713	-0.3273	19
C_{24}	0.0000	0.0000	0.0000	0.0000	Delete
C_{25}	1.2451	1.1067	2.3518	0.1384	8
C_{26}	0.0000	0.0000	0.0000	0.0000	Delete
C_{27}	1.3563	1.3224	2.6787	0.0339	10
C_{28}	0.8338	0.8443	1.6781	-0.0105	13
C_{29}	0.7918	0.7913	1.5831	0.0005	11
C_{30}	0.0000	0.0000	0.0000	0.0000	Delete
C_{31}	0.6464	0.6459	1.2923	0.0005	12
C_{32}	0.0000	0.0000	0.0000	0.0000	Delete
C_{33}	0.8361	0.6621	1.4982	0.1740	7
C_{34}	0.6302	0.8068	1.4370	-0.1766	16

The Cause/Effect values for C_1 and C_5 are more than 0, with values of 07189, and 0.0924, respectively. C_1 and C_5 belong to the Cause group, therefore their Cause will affect other assessment criteria but are not easily affected by them. The Cause/Effect values for C_3, and C_4 are -0.3291, and -0.1617, respectively. The Cause/Effect values are all below 0. C_4 is equal to 0, therefore delete it. Thus, C_1 and C_5 belong to the Effect group, whose evaluation criteria are affected by the Cause group's (Fig. 1).

The Cause/Effect values for C_6 and C_{11} are more than 0, with values of 1.3518, and 0.3768, respectively. C_6 and C_{11} belong to the Cause group, therefore their Cause will affect other assessment criteria but are not easily affected by them. The Cause/Effect values for, C_7, and C_8 are -07713, and -1.7266, respectively. The Cause/Effect values are all below 0. C_9 and C_{10} are equal to 0, therefore delete them. Thus, C_6 and C_{11} belong to the Effect group, whose evaluation criteria are affected by the Cause group's (Fig. 2).

The Cause/Effect values for C_{14} and C_{15} are more than 0, with values of 0.4979, and 0.4033, respectively. C_{14} and C_{15} belong to the Cause group, therefore their Cause will affect other assessment criteria but are not easily affected by them. The Cause/Effect values for, C_{12} and C_{13} are -00994, and -0.4469, respectively. The Cause/Effect values are all below 0. C_{16} and C_{17} are equal to 0, therefore delete them. Thus, C_{14} and C_{15} belong to the Effect group, whose evaluation criteria are affected by the Cause group's (Fig. 3).

The Cause/Effect values for C_{19} are more than 0, with values of 1.4432, respectively. C_{19} belongs to the Cause group, therefore their Cause will affect other assessment criteria but are not easily affected by them. The Cause/Effect values for C_{18}, C_{20}, and C_{21} are -3397, -0.2478 and -0.2671, respectively. The Cause/Effect values are all below 0. C_{17} and C_{22} are equal to 0, therefore delete them. Thus, C_{19} belongs to the Effect group, whose evaluation criteria are affected by the Cause group's (Fig. 4).

The Cause/Effect values for C_{25} and C_{27} are more than 0, with values of 0.1384, and 0.0339, respectively. C_{25} and C_{27} belong to the Cause group, therefore their Cause will affect other assessment criteria but are not easily affected by them. The Cause/Effect values for C_{23} and C_{28} are -0.3273, and -0.0105, respectively. The Cause/Effect values are all below 0. C_{24} and C_{26} are equal to 0, therefore delete them. Thus, C_{25} and C_{27} belong to the Effect group, whose evaluation criteria are affected by the Cause group's (Fig. 5).

The Cause/Effect values for C_{29}, C_{31} and C_{33} are more than 0, with values of 0.0005, 0.0005 and 0.1740, respectively. C_{29}, C_{31} and C_{33} belong to the Cause group, therefore their Cause will affect other assessment criteria but are not easily affected by them. The Cause/Effect values for C_{34} are -0.1766, respectively. The Cause/Effect values are all below 0. C_{30} and C_{32} are equal to 0, therefore delete them. Thus, C_{29}, C_{31} and C_{33} belong to the Effect group, whose evaluation criteria are affected by the Cause group's (Fig. 6).

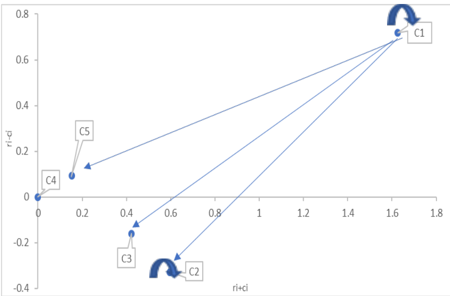

Fig. 1 *The INRM of Sub-Criteria under Trans Criteria*

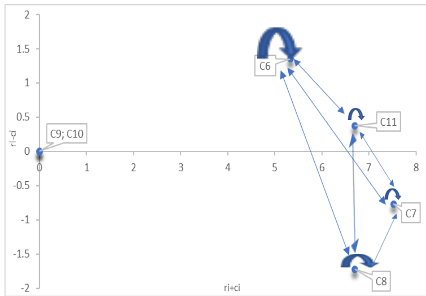

Fig. 2 *The INRM of Sub-Criteria under LO Criteria*

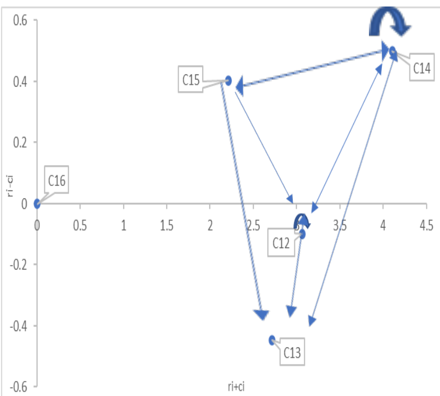

Fig. 3 *The INRM of Sub-Criteria under FH Criteria*

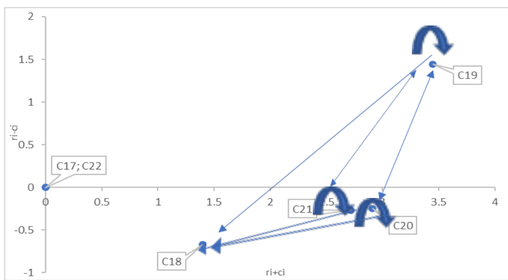

Fig. 4 *The INRM of Sub-Criteria under A CCOM Criteria*

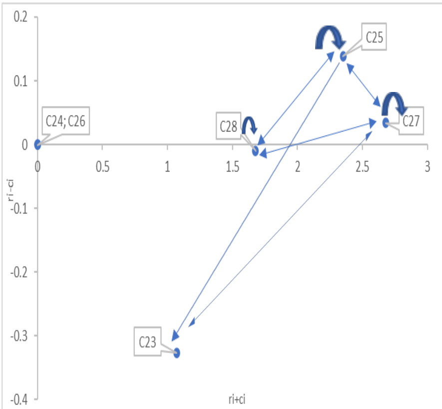

Fig. 5 *The INRM of Sub-Criteria under WE Criteria*

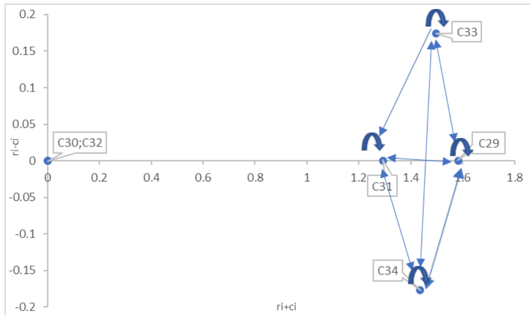

Fig. 6 *The INRM of Sub-Criteria under SR Criteria*

4.3.3 Step 4: Add to Columns "c_i" and Rows "r_i".

The total impact supplied and received by each positional sub-criterion was calculated using Equations (3.5) and (3.6) (refer to Table 5). Table 5 displays the impact matrices for each sub-criterion, together with the overall impact they received and provided in the primary dimensions, calculated using the previously discussed methodologies.

Table 5 *The Sum of Influences Given and Received on Six Dimensions*

Dimensions	r_i	c_i	r_i+c_i	r_i-c_i	Cause/Effect	Improvement Rank
Trans	1.4755	1.5141	2.9896	-0.0386	Effect	4
LO	1.4242	1.0487	2.4729	0.3755	Cause	1
FH	2.2282	1.9074	4.1356	0.3208	Cause	2
ACCOM	0.7447	1.4185	2.1632	-0.6738	Effect	6
WE	1.2262	1.2781	2.5043	-0.0519	Effect	5
SR	1.6340	1.5662	3.2002	0.0678	Cause	3

The Cause/Effect values for LO, FH, and SR are more than 0, with values of 0.3755, 0.3208, and 0.0678, respectively. LO, FH, and SR belong to the Cause group, therefore their Cause will affect other assessment criteria but are not easily affected by them. The Cause/Effect values for Trans, ACCOM, and WE are -0.0386, -0.6738, and -0.0519, respectively. The Cause/Effect values are all below 0. Thus, Trans, ACCOM, and WE belong to the Effect group, whose evaluation criteria are affected by the Cause group's (Fig. 7).

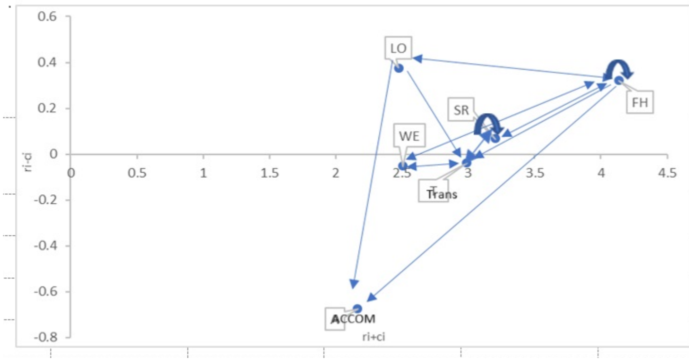

Fig. 7 *The INRM of Criteria for Traveling Risk Factors Selection*

4.3.4 Step 5: Generate an INRM

The three most important dimensions are LO, FH and SR, according to Fig. 7, which shows a representation of the intricate causal link between the six variables. On the right side of the causal graph (connection) are the LO, FH, and SR. These dimensions showed stronger relationships than other dimensions, $c_i + r_j$ with means above 2.911. For LO, FH, and SR, the value surpassed 0 and influenced the "Cause". On the other hand, Trans, ACCOM, and WE had values that were smaller than 0 and influenced the "Effect". Overall, LO, FH and SR were impacted by the travel risk factors.

5. Conclusion and Suggestions

Selecting travel risk factors is a complex due to the many aspects involved. Through three rounds of the Modified Delphi method, this study identified 34 essential elements critical for mitigating travel risks. The importance of these criteria and their causal relationships for reducing travel-related risks were then analyzed using the DEMATEL technique (Fontela & Gabus, 1976). Unlike conventional multi-criteria decision-making methods, this approach does not assume that criteria are independent, which enables decision-makers to identify correlations among contextual factors more effectively. The assessment reveals how different circumstances influence each indicator's cause-and-effect relationship. Indicators in the Cause group demonstrate a higher initiative in impacting other assessment criteria and are less susceptible to changes from other indicators. Therefore, optimizing the system requires focusing resources on managing or adjusting these Cause group indicators. In contrast, Effect group indicators are more influenced by the Cause group and are challenging to improve directly. The result is below:

(1) Centralized management of Cause group factors: Since C_1, C_5, C_6, C_{11}, C_{14}, C_{15}, C_{19}, C_{25}, C_{27}, C_{29}, C_{31}, C_{33}, LO, FH, SR, and other indicators belonging to the Cause group have strong influence but are not easily changed and management of these factors should be a priority. This can enhance its impact through resource optimization, process improvement, efficiency improvement, etc.

(2) Indirect optimization of Effect group factors: C_3, C_4, C_7, C_8, C_{12}, C_{13}, C_{18}, C_{20}, C_{21}, C_{23}, C_{28}, C_{34}, Trans, ACCOM, WE and other indicators belonging to the Effect group. These indicators are mainly affected by the Cause group indicators, and the improvement of such

indicators should rely on the effective management of the Cause group, thereby indirectly affecting its performance. For example, improving the management level of LO, FH and SR can indirectly improve ACCOM's evaluation criteria.

(3) Establish phased goals to improve overall performance: Considering the difficulty of changing the Cause group indicators, mid- and long-term goals can be set to gradually improve the levels of these indicators' levels to impact the Effect group indicators.

(4) Integrate resources to drive system-wide optimization: Focusing resources on the core metrics of the Cause group can help achieve broader performance improvements. This strategy can promote overall system optimization in the long term, thereby improving organizational effectiveness.

The DEMATEL analysis identified LO (Law and Order), FH (Food and Hygiene) and SR (Sightseeing and other Recreational Facilities), as the most influential dimensions within the system. Based on the above data, the recommendations are as follows:

Strengthen Law and Order (LO): Make sure travel destinations are secure and enforce local laws (Agarwal et al., 2021). Working with local authorities to increase police presence in tourist zones can lower crime rates and boost passengers' confidence (Husser & Ohnmacht, 2023).

Enhance Food and Hygiene Standards (FH): Prioritize food hygiene and boost eating facility health inspection. Safe restaurant certifications and hygiene requirements will comfort travelers and reduce foodborne illness risks (Wang et al., 2010).

Improve Sightseeing and Recreational Facilities (SR): Maintain, clean, and access major attractions. Updating facilities, clear signs, and educated staff to help tourists can improve their experience and generate favorable feedback, which can boost tourism (Wang et al., 2010).

Resources to Priority Areas: LO, FH, and SR strongly impact other destinations; therefore, strategically allocating resources is essential. This may involve budget increases, public awareness initiatives, and infrastructure and quality service upgrades, which will benefit other destinations.

References

Adam, I. (2015). Backpackers' risk perceptions and risk reduction strategies in Ghana. *Tourism Management, 49,* 99-108. https://doi.org/10.1016/j.tourman.2015.02.016

Agarwal, S., Page, S. J., & Mawby, R. (2021). Tourist security, terrorism risk management and tourist *safety. Annals of Tourism Research, 89,* 103207. https://doi.org/10.1016/j.annals.2021.103207

Aguinis, H., Kraus, S., Pocek, J., Meyer, N., & Jensen, S. H. (2023). The why, how, and what of public policy implications of tourism and hospitality research. *Tourism Management, 97,* 104720. https://doi.org/10.1016/j.tourman.2023.104720

Agyeiwaah, E., & Zhao, Y. (2024). A cross-cultural perspective of backpacker motivation and sustainable *behavior. Tourism Management Perspectives, 53,* 101283. https://doi.org/10.1016/j.tmp.2024.101283

Balaz, V., Chen, J. L., Williams, A. M., & Li, G. (2024). Stability of risk and uncertainty preferences in tourism. *Annals of Tourism Research, 105,* 103726. https://doi.org/10.1016/j.annals.2024.103726

Brady, R. M., Lemieux, C. J., & Doherty, S. T. (2024). Ticks and lyme disease in natural areas: A segmentation analysis *of* visitor perceptions of risk and preferred communication strategies. *Journal of Outdoor Recreation and Tourism, 47,* 1004794. https://doi.org/10.1016/j.jort.2024.100794

Chang, A. Y., & Lai, P. Y. (2023). Study on the key drivers to improve the circular economy of manufacturing industry – An *application* of fuzzy Delphi method & grey relational analysis. *International Journal of Information and Management Sciences, 34,* 117-133. https://doi.org/10.6186/IJIMS.202306_34(2).0002

Chang, S. C., Pu, C. Y., & Hsieh, P. J. (2014). A regional competition analysis of medical tourism industry – an example of *Taiwan. International Journal of Information and Management Sciences, 25,* 139-156. https://doi.org/10.6186/IJIMS.2014.25.2.4

Chebli, A., Moussa-Alloui, L. A., Kadri, B., & Falardeau, I. (2024). Dysfunctional tourism behaviors in national parks: An exploration *of* causes, typologies, and consequences in the case of Saharan tourism. *Journal of Outdoor Recreation and Tourism, 45,* 100713. https://doi.org/10.1016/j.jort.2023.100713

Chou, W. C., Yang, C. C., & Lu, C. J. (2024). A performance key features analysis model based on corporate sustainability micro-foundation and machine learning: An empirical study of the fast fashion manufacturing industry. *International Journal of Information and Management Sciences, 35,* 21-44. https://doi.org/10.6186/IJIMS.202403_35(1).0002

Fontela, E., & Gabus, A. (1976). The DEMATEL Observer. Geneva: Battelle Geneva Research Centre.

Fuchs, G., & Reichel, A. (2006). Tourist *destination* risk perception: The case of Israel. *Journal of Hospitality and Leisure Marketing, 14*(2), 81-106. https://doi.org/10.1300/J150v14n02_06

Husser, A. P., & Ohnmacht, T. (2023). A comparative study of eight COVID-19 protective measures and their impact on Swiss tourists' travel intentions. *Tourism Management, 97, 104734.* https://doi.org/10.1016/j.tourman.2023.104734

Li, C., Wang, Y., Lv, X., & Li, H. (2021). To buy or not to buy? The effect of time security and travel experience on tourists' impulse buying. *Annals of Tourism Research, 86, 103083.* https://doi.org/10.1016/j.annals.2020.103083

Lin, S. Y. (2024). A multiple criteria decision-making model for enhancing informative service quality at airports. *Decision Analytics Journal, 12, 100487.* https://doi.org/10.1016/j.dajour.2024.100487

Linstone, H. A., & Turoff, M. (1975). *The Delphi Method-Techniques and Applications.* London: Addison *Wesley.*

Liu, P., Zeng, Z., Wang, H., Zhang, H., Zhang, J., & Liu, Z. (2024). Crisis-resistant tourism markets in the pandemic recovery: Evidence from the Confucius Temple Scenic Area. *Tourism Management Perspectives, 51,* 101221. https://doi.org/10.1016/j.tmp.2024.101221

LnData. (2023). Data looks at Taiwan's tourism industry in 2022 (1): Not only has international tourism become more popular during the epidemic, but there are also more and more "top consumers". *The News Lens.* Retrieved from https://www.thenewslens.com/article/223302

Neger, C., Leon-Cruz, J. F., & Gossling, S. (2024). The tourism fire exposure index for the European Union. *Tourism Management, 103,* 104901. https://doi.org/10.1016/j.tourman.2024.104901

Pearce, P. L. (1990). *The Backpacker Phenomenon: Preliminary Answers to Basic Questions.* Department of Tourism, James Cook University, *Townsville.*

Saha, P., Ribeiro, M. A., & Roy, B. (2024). Navigating travel decisions in health crises: The interplay of message framing, regulatory focus, and perceived risk. *Journal of Hospitality and Tourism Management, 59,* 296-308. https://doi.org/10.1016/j.jhtm.2024.04.016

Tsai, P. H., Wang, Y. W., & Chang, W. C. (2023). Hybrid MADM-based study of key risk factors in house-for-pension reverse mortgage lending in Taiwan's baking industry. *Socio-Economic Planning Sciences, 86,* 101460. https://doi.org/10.1016/j.seps.2023.101460

Tsai, P. H., Wang, Y. W., & Kao, H. S. (2022). Applying DEMATEL-ANP approach to explore the intention to hold roadside wedding banquets in Penghu: A Consumers' Perspective. *Evaluation and Program Planning, 95,* 102172. https://doi.org/10.1016/j.evalprogplan.2022.102172

Tsai, P. H., Wang, Y. W., & Yeh, H. J. (2021). An evaluation model for the development of more human correctional institutions: Evidence from Penghu Prison. *Evaluation and Program Planning, 89,* 102013. https://doi.org/10.1016/j.evalprogplan.2021.102013

UN Tourism. (2024). Impact Assessment of the COVID-19 outbreak on international tourism. *UN Tourism.* Retrieved *from* https://www.unwto.org/impact-assessment-of-the-covid-19-outbreak-on-international-tourism

Wang, K. C., Jao, P. C., Chan, H. C., & Chung, C. H. (2010). Group package tour leader's intrinsic risks. *Annals of Tourism Research, 37*(1), 154-179. https://doi.org/10.1016/j.annals.2009.08.004

Wong, J. Y., & Yeh, C. (2009). Tourist hesitation in destination decision making. *Annals of Tourism Research, 36*(1), 6-23. https://doi.org/10.1016/j.annals.2008.09.005

Xue, L., Leung, X. Y., & Ma, S. (2022). What makes a good "guest": Evidence from Airbnb hosts' reviews. *Annals of Tourism Research, 95, 103426.* https://doi.org/10.1016/j.annals.2022.103426

Zhang, J., Xie, C., Lai, F., & Huang, S. (2024). The behavioral contagion effect of tourists' risk decision-making. *Journal of Hospitality and Tourism Management, 59,* 1-13. https://doi.org/10.1016/j.jhtm.2024.03.002

Zhu, Z., Mei, A. K. C., Liao, Y. H., Tzeng, G. H., & Huang, S. W. (2022). The Exploration of strategic indicators of promoting university *social responsibility* using hybrid multi-criteria decision-making methods. *International Journal of Information and Management Sciences, 33*(4), 291-311. https://doi.org/10.6186/IJIMS.202212_33(4).0002

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