Senior tourism: travel motivators and perceived constraints and risks for the elderly

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Abstract

Purpose – To cater to the senior tourist market, it is essential to comprehend the factors motivating and deterring them from international travel post-COVID-19. This study aims to focus on senior citizens’ destination choice intentions and aims to develop a model that prioritizes positive and negative factors leading to international travel destination choices. It uses push-pull factors, perceived travel risks (PTRs) and perceived travel constraints (PTCs).

Design/methodology/approach – Decision-making trial and evaluation laboratory (DEMATEL) and fuzzy technique for order of preference by similarity to ideal solution (Fuzzy TOPSIS) are two multi-criteria decision-making (MCDM) techniques used to identify connections between variables and determine their relative importance in the decision-making model.

Findings – DEMATEL found push and pull factors are “effects” while PTCs and PTRs are “causes” affecting senior citizens’ destination choices. Push factors and PTCs have a greater impact than pull factors and PTRs. Fuzzy TOPSIS highlighted “improving health and wellness” and “self-fulfilment and spirituality” as key push factors, “health safety and security quotient” as the most important pull factor, and “interpersonal constraints” as the most critical PTC. Finally, “health risks” is the top PTR.

Originality/value – This paper adds to the tourism literature by looking at the relationship between senior tourists’ motivation, pull and push factors, and perceived constraints and risks for senior citizens’ destination choices. It is unique in that it targets senior citizens as a market and uses DEMATEL and Fuzzy TOPSIS techniques to analyse the relationships between variables.

Keywords DEMATEL, Fuzzy TOPSIS, Perceived travel constraints, Travel motivators, Perceived travel risks, Senior tourism

Paper type Research paper

老年人旅游：老人人的旅行动机和感知约束和风险

摘要

目标：为了成功迎合蓬勃发展老年旅游市场，了解激发和阻止老人人国际旅行的因素尤为重要。尤其是在COVID-19之后，本研究侧重于老年人的目的地选择意愿，并基于推拉因素、感知旅行风险（PTR）和感知旅行限制（PTC），旨在开发影响老年人国际旅游目的地选择的积极和消极因素的模型。

设计方法路径：决策试验和评估实验室（DEMATEL）和与理想解决方案相似的模糊偏好排序（Fuzzy TOPSIS）是两种多标准决策（MCDM）技术。用于识别变量之间的关系并找出它们在决策模型中的相对重要性。

发现：DEMATEL的结果表明，推力和拉力因素是“影响”而感知旅行约束（PTC）和感知旅行风险（PTR）是影响老年人目的地选择意愿因素中的“原因”。推力因素和 PTC 比拉力因素和 PTR 发挥更重...
Turismo senior: Motivadores del viaje y limitaciones y riesgos percibidos por las personas mayores

Resumen

Objetivo: Para atender a un mercado turístico de la tercera edad, es esencial comprender los factores que les motivan y les disuaden de realizar viajes internacionales tras el COVID-19. Este estudio se centra en las intenciones de elección de destino de las personas mayores y pretende desarrollar un modelo que priorice los factores positivos y negativos que conducen a la elección de un destino de viaje internacional. Utiliza los factores push-pull, los riesgos de viaje percibidos (PTR) y las limitaciones de viaje percibidas (PTC).

Diseño/metodología/enfoque: Decision Making Trial and Evaluation Laboratory (DEMATEL) y Fuzzy Order of Preference by Similarity to Ideal Solution (Fuzzy TOPSIS) son dos técnicas de toma de decisiones multicriterio (MCDM) utilizadas para identificar las conexiones entre variables y determinar su importancia relativa en el modelo de toma de decisiones.

Resultados: DEMATEL descubrió que los factores de empuje y atracción son “efectos,” mientras que las PTC y las PTR son “causas” que afectan a las elecciones de destino de las personas mayores. Los factores de empuje y los PTC tienen un mayor impacto que los factores de atracción y los PTR. El Fuzzy TOPSIS destacó la “mejora de la salud y el bienestar” y la “autorealización y espiritualidad” como factores de empuje clave, el “cociente de seguridad y protección de la salud” como el factor de atracción más importante y las “limitaciones interpersonales” como el PTC más crítico. Por último, los “riesgos para la salud” son el principal PTR.

Originalidad/valor: Este artículo se suma a la literatura turística al estudiar la relación entre la motivación de los turistas seniior, los PTR y las PTC y mostrar cómo afectan los subfactores a su elección del destino. Las técnicas de análisis de datos empleadas en este estudio también son novedosas, ya que nunca se habían utilizado en la investigación sobre el turismo senior. Por último, aunque existen muchas investigaciones sobre el turismo senior, el comportamiento de los turistas de la tercera edad en la India es relativamente desconocido. A la luz de los resultados del estudio, se ofrecen recomendaciones prácticas a las partes interesadas en el turismo de todo el mundo, interesadas en aprovechar el mercado de los turistas senior indios emisores o en reposicionar la oferta de productos o destinos para tener en cuenta este prometedor mercado o mercados similares.

Palabras clave Palabras clave DEMATEL, Fuzzy TOPSIS, Limitaciones de viaje percibidas, Motivadores de viaje, Riesgos de viaje percibidos, Turismo senior

Tipo de papel Trabajo de investigación

1. Introduction

By 2050, the number of individuals aged 65 or older is expected to reach 1.5 billion worldwide (United Nations, Department of Economic and Social Affairs, Population Division, 2019). This aging population is becoming more important to tourism businesses (Patterson et al., 2021), and the senior tourist market is growing steadily (Silva et al., 2021). However, this market is underdeveloped in terms of strategic commercialization, perpetuating the assumption that it lacks diversity (Kelly and Kelliher, 2021). Several reasons, such as perceived travel constraints and risks, may discourage elderly people from traveling, particularly in the aftermath of COVID-19 (Nazneen et al., 2022; Pan et al., 2020). Existing studies have not yet focused on the aggregate impacts of both negative and positive factors on senior individuals’ travel-related intentions, which this study aims to showcase. Destination marketing companies and tourism organizations should understand the market of senior tourists in greater depth (Bulut and Nazli, 2020) by considering a variety of facilitators and deterrents (Wen et al., 2020), as the latter tend to stay longer and spend more on travel than other age groups (Teruel-Sanchez et al., 2021).
This study aims to develop a multicriteria decision-making (MCDM) model based on four pillars – push and pull factors, perceived travel risk (PTR) factors and perceived travel constraint (PTC) factors – to target the senior tourist market. Two MCDM techniques, decision-making trial and evaluation laboratory (DEMATEL) and Fuzzy Technique for Order of Preference by Similarity to Ideal Solution (TOPSIS), are used to determine interrelationships and ranks of associated sub-aspects. The findings aim to demonstrate that tourism destinations may lose senior tourists if they fail to address these four aspects.

Following is a summary of the contributions from this research:

1. Senior citizens’ travel-related intentions have been studied rarely by researchers (e.g., López-Marfil et al., 2021; Seyanont, 2017). However, as far as we know, no studies have looked at the relationships between motivating factors such as motivation and stopping factors such as risks and constraints in the context of senior citizens’ destination choice intentions. In senior tourism research, the push factors, pull factors, PTRs and PTCs have never been looked at the same time. Thus, this study contributes to the advancement of existing knowledge by proposing a model that assesses the interrelationships among senior citizens’ push factors, pull factors, PTRs and PTCs. Furthermore, the study examines the relative priorities of various sub-factors within the above factors that affect senior tourists’ destination choice intentions.

2. Existing studies on elderly tourists do not offer much innovativeness in terms of approach, focus and theoretical orientation (Dashper et al., 2021). The travel-related intentions of senior citizens have been studied in the past based on individual tourists’ views. The model proposed in the present study, however, incorporates the views of tourism experts and industry leaders. To conduct this study, industry executives, government officials and academicians with substantial experience in practice and research into the leisure and travel behavior of senior citizens were consulted.

3. The data analysis methods used in this study are also distinctive. Prior research demonstrated that studies on senior tourism mostly used structural equation modeling or regression analysis. However, to the best of our knowledge, no study has applied MCDM methods to senior tourism. The present study fills this research gap by applying two of the most widely used MCDM methods, namely, DEMATEL and Fuzzy TOPSIS (Fu and Liao, 2019; Zhu et al., 2019).

4. Last but not least, despite extensive research on senior travel, Indian senior travelers have received relatively scant attention. The study’s findings focused on practical recommendations for tourism stakeholders worldwide, looking to tap into the market of Indian outbound senior tourists or similar markets and reposition products or destinations accordingly.

Following is an outline of the research undertaken. Section 2 presents the proposed framework. Section 3 gives an overview of the data analysis methods. Section 4 presents the results and analysis. Section 5 discusses the study’s implications. Section 6 provides the conclusion and discusses limitations and future scope.

2. Model development

The following sections discuss existing studies on senior tourism and the theoretical framework. The proposed model for promoting senior tourism is also presented.

2.1 Existing studies on senior tourism and theoretical framework

Age is commonly used to define the senior tourist market, but there is no agreed-upon definition (Wen et al., 2020). Senior tourists are usually defined as those aged 60 or 65 and above (United Nations, Department of Economic and Social Affairs, Population Division, 2019).
Destination choice intentions refer to the decision-making process for choosing a vacation destination (Gómez et al., 2018). Wijaya et al. (2019) and Pestana et al. (2020) studied the push and pull factors that influence senior tourists’ destination choices. “Push factors” are internal, psychosocial reasons for traveling, whereas “pull factors” are external factors such as destination attributes and attractions (Dann, 1977). However, the interrelationship between these factors has not been explored in any of the abovementioned studies. Previous research has found that status, family time, spiritual enlightenment, novelty, escape and relaxation and improving well-being are all “push factors” for senior travelers (Patuelli and Nijkamp, 2016; Wijaya et al., 2019; Moal-Ulvoas, 2017; Chen and Shoemaker, 2014; Shavandasht, 2018; Zolotovskiy and Stelnik, 2019). “Pull factors” that are important for senior tourists include friendliness and familiarity, health safety and security and ease of consumption of tourism experiences (Hajra and Aggarwal, 2022).

COVID-19 is expected to increase perceived risks among senior travelers, who are already considered a vulnerable market (Wang et al., 2022; Hall et al., 2020). Perceived travel risk (PTR) plays a crucial role in decision-making related to travel (Wen et al., 2020; Li et al., 2021), and the concept was first proposed by Roehl and Fesenmaier (1992). Studies on senior tourists’ perception of travel risks are limited, with some categorizing them into technology-related, time-related, psychosocial, economic and health-related concerns (Le Serre et al., 2013, 2017).

Seniors face various constraints that affect their tourism participation, which must be identified and sufficiently addressed (Wen et al., 2020). Perceived travel constraints (PTCs) are factual present-focused barriers that impede tourism activities (Dale and Ritchie, 2020) and influence destination choice intentions (Küçükergin et al., 2021). In contrast to perceived travel risks (PTRs), which are potential adverse scenarios (Khan et al., 2020), PTCs are present realities (Monterrubio et al., 2021). Existing studies have examined PTCs and PTRs separately (Aziz and Long, 2022; Khan et al., 2020). PTCs can be categorized as participant-related (intrapersonal and interpersonal constraints) and external (structural constraints), as per the leisure constraints model proposed by Crawford et al. (1991).

Tourists’ cultural backgrounds play a significant role in their destination choices (Wijaya et al., 2019). This study identified a few cultural considerations that influenced the selection of push and pull factors, PTRs and PTCs among senior tourists. Asian tourist behavior is often linked to collectivism and uncertainty avoidance (Yang et al., 2018). Therefore, to better understand Asian senior tourists’ decision-making, it was crucial to investigate factors such as destination familiarity and friendliness, spending time with family, interpersonal constraints and functional risks, among others.

2.2 Proposed model for senior tourism

Existing studies on senior tourism have usually relied on information from tourists and individuals. However, during a crisis such as the pandemic, it is important to take expert opinions into account (Baniya and Potts, 2021). This study offers a model based on expert opinions that predicts the destination choice intentions of senior tourists. Successful promotion of senior tourism depends on how well tourist destinations cater to the needs of senior citizens. The study proposes a tripod model for senior tourism that considers a destination’s preparedness and the push and pull factors, PTR factors and PTC factors influencing senior tourists’ destination choice intentions.

The model used in this study is based on Ajzen’s (1991) Theory of Planned Behavior (TPB), which has been expanded by Rahmafitria et al. (2021) to incorporate perceived risk factors and other variables in the context of the COVID-19 pandemic. The proposed model adds background predictors of behavioral intention to the TPB framework, which may influence destination choice intentions through behavioral, normative and control beliefs. The hierarchical model has three levels: the goal (destination choice intention), the aspect
levels (PTCs, PTRs, pull factors and push factors) and the criteria levels. The study aims to identify which aspects of a destination contribute to senior tourism promotion and facilitation and the interrelatedness of these aspects. Table 1 lists the criteria and their associated sub-criteria (Figure 1).

3. Analytical procedure

This study applies DEMATEL and Fuzzy TOPSIS to analyze data and show the importance and relationships of components in the model. Figure 2 depicts the proposed methodology. Figure 2 outlines three phases of the study. Phase 1 identifies criteria and sub-criteria for senior tourism through a literature review and expert discussions. In Phase 2, weights for each criterion are determined using the DEMATEL technique. Phase 3 uses the Fuzzy TOPSIS technique to rank identified sub-criteria. Further details on the techniques used are discussed in subsequent sections.

3.1 Decision-making trial and evaluation laboratory

The Battelle Memorial Institute came up with a popular MCDM method (Gabus and Fontela, 1973) for figuring out how the system’s factors and sub-factors are related to each other. DEMATEL involves steps such as direction and intensity measurement between factors, creation of an initial direct relation matrix, normalization and identification of cause-and-effect factors (Chang and Chen, 2018). A digraph map is created to show cause and effect, and important factors are found (Nilashi et al., 2019; Ortiz-Barrios et al., 2020). The steps are explained below in more detail:

Step 1: The average matrix M is constructed using equation (1) after calculating the average influence of one factor on other factors and vice versa. The influences between factors are given by the domain experts. Suppose there are n factors, and then matrix M will have the size of n*n:

$$ M = \begin{bmatrix} 0 & m_{12} & m_{13} & m_{14} & \cdots & m_{1n} \\ m_{21} & 0 & m_{23} & m_{24} & \cdots & m_{2n} \\ m_{31} & m_{32} & 0 & m_{34} & \cdots & m_{3n} \\ \vdots & \vdots & \vdots & \ddots & \ddots & \vdots \\ m_{n1} & m_{n2} & m_{n3} & m_{n4} & \cdots & 0 \end{bmatrix} $$

where $m_{pq}$ is denoted as the average of the degree to which the factor p influences the factor q.

Table 1  Criteria and sub-criteria

<table>
<thead>
<tr>
<th>Criteria</th>
<th>Sub-criteria</th>
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<tbody>
<tr>
<td>Push</td>
<td>Improving health and wellness (C1)</td>
</tr>
<tr>
<td></td>
<td>Escape and relaxation (C2)</td>
</tr>
<tr>
<td></td>
<td>Novelty and knowledge-seeking (C3)</td>
</tr>
<tr>
<td></td>
<td>Status and pride (C4)</td>
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<tr>
<td></td>
<td>Self-fulfilment and spirituality (C5)</td>
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<tr>
<td></td>
<td>Socialization and spending time with family (C6)</td>
</tr>
<tr>
<td>Pull</td>
<td>Familiarity and friendliness quotient of a destination (C7)</td>
</tr>
<tr>
<td></td>
<td>Ease of consumption of tourist experiences (C8)</td>
</tr>
<tr>
<td></td>
<td>Health safety and security quotient of a destination (C9)</td>
</tr>
<tr>
<td></td>
<td>Functional or physical equipment risks (C10)</td>
</tr>
<tr>
<td></td>
<td>Health risks (C11)</td>
</tr>
<tr>
<td>Risk</td>
<td>Intrapersonal constraints (C12)</td>
</tr>
<tr>
<td></td>
<td>Interpersonal constraints (C13)</td>
</tr>
<tr>
<td></td>
<td>Structural constraints (C14)</td>
</tr>
</tbody>
</table>

Source: Compiled by authors
Step 2: Now, calculate the normalized direct-influence matrix $N$ by using equation (2):

$$N = zM$$  

$$z = \min_{pq} \left[ \frac{1}{\max_{0 \leq s \leq n} \sum_{q=1}^{n} m_{pq}}, \frac{1}{\max_{0 \leq s \leq n} \sum_{p=1}^{n} m_{pq}} \right]$$  

where $z > 0$ and $p = 1,2,3,\ldots,n$, $q = 1,2,3,\ldots,n$

Step 3: Find out the indirect-influence matrix $Q$ and use equation (4) to calculate it:

$$Q = \sum_{p=2}^{n} N^p$$  

When equation (4) is solved, it results in equation (5) and its proof can be found in Kleinman (2009):

$$Q = N^2(I - N)^{-1}$$  

where $I$ is the identity matrix.

Step 4: Calculate the total influence matrix $T = [m_{pq}]_{n \times n}$ using equation (6):

$$T = N + Q = \sum_{p=1}^{n} N^p = N(I - N)^{-1}$$
Step 5: Construct the causal diagram:

Calculate the sum of the rows of the matrix T, denoted as Ri, and the sum of the columns of the matrix, denoted as Cj, by using equations (7) and (8):

\[
R_i = \sum_{q=1}^{n} m_{pq}
\]  
(7)

\[
C_j = \sum_{p=1}^{n} m_{pq}
\]  
(8)
Compute the “prominence” \((R_i + C_j)\) and “relationship” \((R_i - C_j)\) by adding \(C_j\) to \(R_i\) and subtracting \(C_j\) from \(R_i\), respectively. To make a cause-and-effect diagram, use \((R_i + C_j)\) on the horizontal axis and \((R_i - C_j)\) on the vertical axis. With the help of a diagram, the importance of factors along with cause-and-effect factors can be acknowledged and congregated. The “prominence” helps in knowing the importance of the factor, whereas the “relation” helps in figuring out the cause-and-effect factors. If the value of the relationship is positive, then it is a cause, else it is an effect. Calculate the normalized weight for each factor \(w_k\) using equation (9):

\[
\text{Normalized weight of each factor} = \frac{1}{\sum_{k=1}^{n} \left( \sqrt{\left( \sum_{q=1}^{n} m_{pq} + \sum_{p=1}^{n} m_{pq} \right)^2 + \left( \sum_{q=1}^{n} m_{pq} - \sum_{p=1}^{n} m_{pq} \right)^2} \right)}
\]

(9)

3.2 Fuzzy technique for order of preference by similarity to ideal solution

The concept of Fuzzy TOPSIS was unveiled by the authors Hwang and Yoon (1981). Before determining the appropriate solution, this multicriteria approach considers both positive and negative ideal solutions. The use of MCDM techniques is becoming more common (Zhu et al., 2019; Fu and Liao, 2019). The Fuzzy TOPSIS technique, as an MCDM strategy (Chen, 2000), has proved effective in identifying the optimal answer amid uncertainty (Mehta et al., 2019; Nilashi et al., 2019) from the perspective of experts. Using Fuzzy TOPSIS, this study identifies the most influential factors in senior citizens’ destination choice intentions. As shown in Table 2, TOPSIS scales were used to collect data. This method is described below.

Step 1: The Linguistic Scale of Triangular Fuzzy Numbers (TFNs) in Table 2 is used to rate the influence between criteria and sub-criteria for aiding senior citizens’ destination choice intentions. Criteria and sub-criteria were rated by 48 experts, whose results are shown in Table 15.

Step 2: Equation (10) is used to generate the aggregate fuzzy matrix. This matrix computes the aggregate fuzzy matrix after taking inputs from 48 experts.

Equation (10) depicts the aggregation function used to sum the ratings of all experts:

\[
F = \min \left( \sum_{q=1}^{Q} d_{qij} \right), \quad e = 1/q \sum_{q=1}^{Q} e_{qij}, \quad f = \max \left( \sum_{q=1}^{Q} f_{qij} \right)
\]

(10)

<table>
<thead>
<tr>
<th>Table 2</th>
<th>Fuzzy linguistic rating scale</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Linguistic term</strong></td>
<td><strong>TFNs (a, b, c)</strong></td>
</tr>
<tr>
<td>Equal</td>
<td>1 = (1, 1, 1)</td>
</tr>
<tr>
<td>Strong</td>
<td>5 = (4, 5, 6)</td>
</tr>
<tr>
<td>Intermediate value between strong and very strong</td>
<td>6 = (5, 6, 7)</td>
</tr>
<tr>
<td><strong>Source:</strong> Compiled by authors</td>
<td></td>
</tr>
</tbody>
</table>
Step 3: Normalize the aggregated function.

Step 4: By applying equation (11) to each of the six solutions, obtain the weighted fuzzy evaluation matrix:

$$
\tilde{N} = \text{Normalized fuzzy matrix } \ast W_j \\
\tilde{N} = [\tilde{N}_{ij}]_{s \times t}, \quad i = 1, 2, \ldots, s, \quad j = 1, 2, \ldots, t \\
\text{where } \tilde{N}_{ij} = \tilde{r}_{ij}(\cdot)W_j. \quad (11)
$$

Step 5: Use equations (12) and (13), respectively, to calculate the fuzzy positive ideal solution \(A^+\) and fuzzy negative ideal solution \(A^-\) for each solution:

$$
A^* = \left( \tilde{N}^*_{1}, \tilde{N}^*_{2}, \ldots, \tilde{N}^*_{n} \right) \text{ where } \tilde{N}^*_{j} = \left( \tilde{C}^*_{j}, \tilde{\bar{C}}^*_{j}, \tilde{\bar{C}}^*_{j} \right) \text{ and } \tilde{C}^*_{j} = \max_i \{ \tilde{C}_{ij} \} \quad (12)
$$

$$
A^- = \left( \tilde{N}^-_{1}, \tilde{N}^-_{2}, \ldots, \tilde{N}^-_{n} \right) \text{ where } \tilde{N}^-_{j} = \left( \tilde{C}^-_{j}, \tilde{\bar{C}}^-_{j}, \tilde{\bar{C}}^-_{j} \right) \text{ and } \tilde{a}^-_{j} = \min_i \{ \tilde{a}_{ij} \} \quad (13)
$$

Step 6: Use equations (14) and (15) to calculate the distance from \(A^+\) and \(A^-\):

$$
F^+_i = \sum_{j=1}^{n} d_N(\tilde{N}_{ij}, \tilde{N}^*_j) \quad i = 1, 2, \ldots, m \quad (14)
$$

$$
F^-_i = \sum_{j=1}^{n} d_N(\tilde{N}_{ij}, \tilde{N}^-_j) \quad i = 1, 2, \ldots, m \quad (15)
$$

Step 7: Determine the closeness of coefficient \(CC_i\) using equation (16) and rank the solutions based on \(CC_i\):

$$
CC_i = \frac{F^-_i}{F^-_i + F^+_i} \quad (16)
$$

### 3.3 Data collection

India is a fast-growing outbound tourism market (UNWTO, 2019), projected to reach 29 million trips by 2025 (Nangia Andersen LLP and FICCI, 2022), with 14.6% expected to be accounted for by senior citizens (Amadeus and Frost & Sullivan, 2013). It is estimated that there will be 230 million senior citizens in India by 2036 (Government of India, Department of Health and Family Welfare, Ministry of Health and Family Welfare, 2020). India’s population is aging (Maity and Sinha, 2021), and outbound senior tourism from India has significant potential yet has received little academic attention. With the COVID-19 pandemic adversely affecting the tourism industry, examining the current sentiments and reasoning of practitioners and academics (Liu et al., 2022b; Assaf et al., 2022), particularly for sectors such as senior tourism, is pertinent.

Experts were selected using the Delphi technique by a panel of senior industry personnel and academics. Homogeneous panels should have 10–15 experts, whereas heterogeneous panels can have hundreds (Skulmoski et al., 2007). MCDM research suggests that a sample size of 30 is sufficient (Kukreja et al., 2022; Nilashi et al., 2019). Judgmental sampling was used due to the limited sample size of 48. It was decided that industry participants must hold a middle- or top-level managerial position with five years of experience in curating, selling or counseling senior citizens on tourism products or handling seniors in tour groups. It was also decided that academic participants must have five years of teaching experience in tourism or consumer psychology and publications on leisure or tourism behaviors across age groups. Data were collected online from a diverse group of respondents, including managing directors, chief executive officers, regional managers, senior travel managers, regional industry chairmen and professors from various Indian states. Experts from top travel companies and associations such as SOTC, Thomas...
Cook India, Balmer Lawrie, the Network of Indian MICE Agents and the Indian Association of Tour Operators participated, with 65% having over 20 years of experience in tourism and academia. Most participants were from West Bengal (55%), followed by Delhi (20%), Maharashtra (10%), Andhra Pradesh (5%), Kerala (5%) and Uttarakhand (5%).

For performing the DEMATEL and Fuzzy AHP, researchers used the python programming.

For performing the DEMATEL, pydematel library has been used from which DEMATEL class has been imported (that is from pydematel import DEMATEL)

The DEMATEL class provides various functions to perform the analysis, such as calculating the total relation matrix by using the method total_relation_matrix(), prominence and relation of each factor using the method prominence_relation().

For fuzzy AHP, these libraries are used.

Import numpy as np from pyDecision.algorithm import fuzzy_ahp_method

The first line in fuzzy AHP imports the NumPy library and gives it an alias or shorthand name “np.” NumPy is a popular Python library used for numerical computing and working with arrays, matrices and other mathematical operations.

The second line in fuzzy AHP imports the fuzzy_ahp_method module from the pyDecision. algorithm package.

4. Results and analysis

4.1 Implementation of decision-making trial and evaluation laboratory

A survey was conducted to ascertain the influence of factors on senior citizens’ destination choice intentions. While working on DEMATEL, the influence of one factor or aspect upon other factors was collected. The four main factors that impact senior citizens’ decision-making are push factors, pull factors, PTRs and PTCs.

Each expert who took part in the DEMATEL survey rated the effect of one factor on other factors on a five-point Likert scale ranging from 0 to 4, where 0 means there is no effect, 1 means there is very little effect, 2 means there is some effect, 3 means there is a lot of effects and 4 means there is a lot of effects. After performing DEMATEL on the collected 48 responses, the first average matrix is calculated as shown in Table 3. Table 4 shows the normalized direct-influence matrix, and then Table 5 shows how to figure out the total influence matrix for all relationships. The values C, R, R-C and R+C from Table 5 are calculated and represented in Table 6.

The next step after calculating the average matrix M was to normalize it to get the normalized direct-influence matrix N using equations (2) and (3), which is presented in Table 4. For example, the direct influence value of Push → Constraint is around 0.1762.

The results of Table 4 have been used to calculate the total matrix T. It is computed using equations (5) and (6). Equation (5) calculates the indirect influence matrix. This declines as the power of the matrix increases as N, N², ..., N^∞. This results in the convergent solutions to the matrix inversion. As a result, the identity matrix is used in the calculation of the indirect influence matrix Q. Equation (6) is used to compute the total matrix. Table 5 shows matrix T.

Table 6 shows the results of DEMATEL. In the results, R_i denotes the sum of direct and indirect influences of factor i on other factors, whereas C_j denotes the sum of direct and indirect influences of factor j on other factors. R_i + C_j denotes the prominence values, and it is used to know the importance of factors. The relationship is denoted by R_i - C_j. It helps in dividing the factors into a “cause group” or “effect group.” If the computed value is positive, then it belongs to the cause group, and if the computed value is negative, then it belongs to
the effect group. Table 6 shows that push and pull factors belong to the effect group, whereas constraint and risk factors belong to the cause group.

Figure 3 presents a model that depicts the relationships between the main criteria based on the T values in Table 5. The threshold value, the average T value in Table 5, is used to construct the relationships. T values are used to indicate the influence rate of significant relationships among factors. PTRs influence pull factors, push factors and PTCs at rates of \( T = 0.799286, T = 1.050603 \) and \( T = 0.720856 \), respectively. PTCs influence pull factors and push factors at rates of \( T = 0.86208 \) and \( T = 1.010819 \), respectively. Pull and push factors are significantly related, with an influence rate of \( T = 0.903888 \).

Figure 4 depicts the causal diagram for four factors based on Table 6 analysis. The figure shows that pull factors, push factors, PTCs and PTRs are, respectively, net receiver, net receiver, net causer and net cause, with R-C values of \(-1.2336, -0.0656, 0.5864\) and \(0.7129\).

### Table 3 Average matrix \( M \)

<table>
<thead>
<tr>
<th>Matrix ( M ) (average matrix)</th>
<th>Push</th>
<th>Pull</th>
<th>Constraint</th>
<th>Risk</th>
</tr>
</thead>
<tbody>
<tr>
<td>Push</td>
<td>0.0000</td>
<td>1.6875</td>
<td>1.5417</td>
<td>1.8542</td>
</tr>
<tr>
<td>Pull</td>
<td>2.5625</td>
<td>0.0000</td>
<td>2.2292</td>
<td>1.5417</td>
</tr>
<tr>
<td>Constraint</td>
<td>2.8125</td>
<td>2.7292</td>
<td>0.0000</td>
<td>1.8542</td>
</tr>
<tr>
<td>Risk</td>
<td>3.3750</td>
<td>2.1458</td>
<td>1.9167</td>
<td>0.0000</td>
</tr>
</tbody>
</table>

Source: Compiled by authors

### Table 4 Normalized direct-influence matrix \( N \)

<table>
<thead>
<tr>
<th>Matrix ( N ) (Normalized direct-influence matrix)</th>
<th>Push</th>
<th>Pull</th>
<th>Constraint</th>
<th>Risk</th>
</tr>
</thead>
<tbody>
<tr>
<td>Push</td>
<td>0.0000</td>
<td>0.1929</td>
<td>0.1762</td>
<td>0.2119</td>
</tr>
<tr>
<td>Pull</td>
<td>0.2929</td>
<td>0.0000</td>
<td>0.2548</td>
<td>0.1762</td>
</tr>
<tr>
<td>Constraint</td>
<td>0.3214</td>
<td>0.3119</td>
<td>0.0000</td>
<td>0.2119</td>
</tr>
<tr>
<td>Risk</td>
<td>0.3857</td>
<td>0.2452</td>
<td>0.2190</td>
<td>0.0000</td>
</tr>
</tbody>
</table>

Source: Compiled by authors

### Table 5 Total influence matrix \( T \)

<table>
<thead>
<tr>
<th>Matrix ( T ) (Total influence matrix)</th>
<th>Push</th>
<th>Pull</th>
<th>Constraint</th>
<th>Risk</th>
</tr>
</thead>
<tbody>
<tr>
<td>Push</td>
<td>0.575046</td>
<td>0.614782</td>
<td>0.556813</td>
<td>0.56007</td>
</tr>
<tr>
<td>Pull</td>
<td>0.903888</td>
<td>0.536451</td>
<td>0.683674</td>
<td>0.60712</td>
</tr>
<tr>
<td>Constraint</td>
<td>1.010819</td>
<td>0.846208</td>
<td>0.544969</td>
<td>0.690678</td>
</tr>
<tr>
<td>Risk</td>
<td>1.050603</td>
<td>0.799286</td>
<td>0.720856</td>
<td>0.516207</td>
</tr>
</tbody>
</table>

Source: Compiled by authors

### Table 6 Final results of DEMATEL analysis

<table>
<thead>
<tr>
<th>Factors</th>
<th>( R_i )</th>
<th>( C_j )</th>
<th>( R_i + C_j )</th>
<th>( R_i - C_j )</th>
<th>Impact</th>
<th>Normalized Weight</th>
</tr>
</thead>
<tbody>
<tr>
<td>Push</td>
<td>2.30671046</td>
<td>3.5404</td>
<td>5.8471</td>
<td>-1.2336</td>
<td>Effect</td>
<td>0.264</td>
</tr>
<tr>
<td>Pull</td>
<td>2.73113322</td>
<td>2.7967</td>
<td>5.5279</td>
<td>-0.0656</td>
<td>Effect</td>
<td>0.244</td>
</tr>
<tr>
<td>Constraint</td>
<td>3.092674022</td>
<td>2.5063</td>
<td>5.5990</td>
<td>0.5864</td>
<td>Cause</td>
<td>0.249</td>
</tr>
<tr>
<td>Risk</td>
<td>3.086951968</td>
<td>2.3741</td>
<td>5.4610</td>
<td>0.7129</td>
<td>Cause</td>
<td>0.243</td>
</tr>
</tbody>
</table>

Source: Compiled by authors
4.2 Implementation of fuzzy technique for order of preference by similarity to ideal solution

Fuzzy TOPSIS is a ranking method that looks at the fuzzy positive ideal solution (A⁺) and the fuzzy negative ideal solution (A⁻) to find the optimal sub-factor, which is farthest from A⁻ and closest to A⁺. This method has gained wide acceptance for different decision-making problems, as it can identify optimal sub-factors and integrate them with weighted methods such as DEMATEL (Baykasoğlu and Gölçük, 2017; Walczak and Rutkowska, 2017). To assess the impact of sub-factors on senior citizens' destination choice intentions, a survey was conducted with 48 experts. The experts rated the sub-factors using TFNs: “Equal (E),” “Intermediate value between Equal and Moderate (EM),” “Moderate (M),” “Intermediate value between Moderate and Strong (MS),” “Strong (S),” “Intermediate value between Strong and Very Strong (SVS),” “Very Strong (VS),” “Intermediate value between Very Strong and Tremendous (VST)” and “Tremendous (T) on a nine-point Likert scale to determine their importance in the decision-making model.

Table 7 shows the average ratings of 48 experts for the sub-factors of the push factor, with sub-factor C1 having average ratings of 1.00, 4.67 and 7.00. Table 7 lists six sub-factors of the push factor as C1, C2, C3, C4, C5 and C6. Table 8 shows the distance between the average fuzzy scores of push sub-factors and the linguistic terms. Table 8, E, EM, M, MS, S, SVS, VST and T denote the nine-point Likert scale, and the naming conventions are mentioned above in Table 7. The minimum distance for each sub-factor is calculated by taking the minimum distance value among all linguistic terms. Then, the corresponding linguistic terms are chosen based on the minimum distance value. For example, sub-factor C1 has distances between average fuzzy scores and linguistic terms of 3.22, 2.22, 1.22, 0.22, 0.77, 1.77, 2.77, 3.78 and 5.11, respectively, and the minimum distance is 0.22. The linguistic term that corresponds to that minimum value is MS (intermediate value between moderate and strong).

![Figure 3](image_url)
Table 9 shows the average ratings of all 48 experts’ opinions for the sub-factors of the pull factor. For example, the sub-factor C7 has an average rating of (3.00, 5.33 and 7.00). In the Table 9, C7, C8 and C9 are three sub-factors of the pull factor.

Table 10 shows the distance between the average fuzzy scores of the pull sub-factors and the linguistic terms. The minimum distance for each sub-factor is computed by taking the minimum distance value among all linguistic terms, and the corresponding linguistic terms are selected with respect to the selected minimum distance value. For example, sub-factor C7 has a distance between average fuzzy scores and linguistic terms of 4.11, 3.11, 2.11, 1.11, 0.11, 0.89, 1.89, 2.89 and 3.89, respectively, and the minimum distance is 0.11, and the associated linguistic term corresponds to that value is S (Strong).

Table 11 shows average ratings of sub-factors of the PTR factor by 48 experts, with C10 having an average rating of 6.00, 7.33 and 9.00 on the nine-point Likert scale. C10 and C11 are the two sub-factors.

Table 12 shows the distance between the average fuzzy scores of PTR sub-factors and the linguistic terms. The minimum distance for each sub-factor is calculated by taking the

<table>
<thead>
<tr>
<th>Table 7</th>
<th>Average rating for each sub-factor of push factor</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Sub-factors</strong></td>
<td><strong>Fuzzy rating</strong></td>
</tr>
<tr>
<td>C1</td>
<td>(1.00, 4.67, 7.00)</td>
</tr>
<tr>
<td>C2</td>
<td>(3.00, 4.33, 6.00)</td>
</tr>
<tr>
<td>C3</td>
<td>(4.00, 7.00, 9.00)</td>
</tr>
<tr>
<td>C4</td>
<td>(2.00, 4.00, 7.00)</td>
</tr>
<tr>
<td>C5</td>
<td>(2.00, 3.67, 5.00)</td>
</tr>
<tr>
<td>C6</td>
<td>(2.00, 4.00, 7.00)</td>
</tr>
</tbody>
</table>

*Source: Compiled by authors*
minimum distance value among all linguistic terms. Then, the corresponding linguistic terms are chosen based on the minimum distance value. For example, sub-factor C10 has distances between average fuzzy scores and linguistic terms of 6.44, 5.44, 4.44, 3.44, 2.44, 1.44, 0.44, 0.56 and 1.56, respectively, and the minimum distance is 0.44, and the associated linguistic term corresponds to that value of “VS” (very strong).

Table 13 shows the average ratings of 48 experts for the sub-factors of the PTC factor. Sub-factor C12 has an average rating of 5.00, 6.00 and 7.00, whereas C13 and C14 are the other sub-factors.

Table 14 shows the distance between the average fuzzy scores of PTC sub-factors and the linguistic terms. The minimum distance for each sub-factor is calculated by taking the minimum distance value among all linguistic terms. Then, the corresponding linguistic terms are chosen based on the minimum distance value. For example, the distances between average fuzzy scores and linguistic terms in sub-factor C14 are 7.00, 6.00, 5.00, 4.00, 3.00, 2.00, 1.00, 0.00 and 1.00, respectively, and the minimum distance is 0.00, and the associated linguistic term is VST (intermediate value between very strong and tremendous).

Table 15 presents the results of Fuzzy TOPSIS, where $F_i^-$ and $F_i^+$ represent the distance of each subfactor from the negative and positive ideal solutions, respectively, calculated using equations (14) and (15). $C_i$ is the index of the closeness coefficient to the ideal solution.
calculated using equation (16). The sub-factors of each factor are ranked based on their CC_i value, with the highest-ranked sub-factor having the highest CC_i value and the lowest-ranked sub-factor having the lowest CC_i value.

In Table 15, the results show that “improving health and wellness” and “self-fulfillment and spirituality,” which have CC_i values of 0.150773 and 0.091365, respectively, are the most important push factors. The three highest-ranked sub-factors in the pull factors, PTC factors and PTR factors are “health safety and security,” “interpersonal constraints” and “health risks,” respectively, with CC_i values of 0.139030, 0.066342 and 0.148167, respectively.

5. Discussion

The study reveals that PTRs impact PTCs, push factors and pull factors for senior tourists. Prior research has demonstrated that tourists’ perceptions of risk affect their travel intentions (Carballo et al., 2021; Samdin et al., 2021). However, the novel finding of this study is that PTRs affect PTCs. Additionally, the study reveals that PTCs impact push and pull factors. This supports the discovery by Küçükergin et al. (2021) that travel constraints...
affect travel motivations. The study also finds that push factors influence pull factors among senior tourists. This is an important addition to the tourism literature, as few studies have explored the interplay between push and pull factors in senior tourism.

Fuzzy TOPSIS results reveal that “improving health and wellness” and “self-fulfillment and spirituality” are the top push factors for senior tourists. This supports Koskinen’s (2019) findings that wellness consumption is increasingly popular among older adults. Additionally, the second most significant push factor aligns with Kim and Chen’s (2021) claim that sacred places are particularly attractive to elderly tourists.

“The health, safety, and security quotient of a destination” is the most crucial pull factor for senior tourists, consistent with Lu’s (2021) finding that older adults prioritize safety and cleanliness. Interpersonal constraints among PTCs have the most significant impact on the destination choice intentions of senior tourists, reinforcing Lu’s (2021) observation that friends, family and communities influence their travel decisions. Health risks have the greatest effect on senior tourists’ destination choice intentions, as perceived risks can cause individuals to change their travel plans if they feel that the destination is no longer secure (Liu et al., 2022a). The study supports previous findings that older tourists’ vacation intentions decrease during disease outbreaks (Das and Tiwari, 2021; Senbeto and Hon, 2020), and health risk perceptions strongly impact their travel intentions (Godovykh et al., 2021). The study has several theoretical and practical implications, which are discussed in the following sections.

5.1 Theoretical implications

A significant segment of the tourism industry is the senior tourist market, which if ignored could harm tourism destinations’ competitive edge (Nicolau et al., 2020). This study contributes to understanding how constraints and facilitators of senior tourism interact and affect one another. In terms of theoretical implications, PTR as the “net cause” behind PTCs and push–pull factors is a novel discovery in this study that advances existing knowledge about push–pull factors, PTRs and PTCs. Travel motivations have been found to be affected by PTRs repeatedly in earlier research, but PTRs have never been found to be an independent factor influencing PTCs. Furthermore, despite a few studies (Yang et al., 2019; Zhang et al., 2022) using the terms interchangeably or as extensions of each other, this finding further establishes the distinction between PTRs and PTCs. In this study, PTCs are found to drive push and pull factors, whereas PTRs assume the position of the “net cause.” While push factors are found to influence the pull factors, they are both the “net receivers” of

<table>
<thead>
<tr>
<th>Table 15 Final results of Fuzzy TOPSIS</th>
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<tbody>
<tr>
<td>Factors</td>
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<td>----------</td>
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<tr>
<td>Push</td>
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</tr>
<tr>
<td>Risk</td>
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<td></td>
</tr>
</tbody>
</table>

Source: Compiled by authors
the “net cause” and the “net causer.” Additionally, this study extends the theoretical understanding that when looking at the destination choice intentions of seniors, some sub-factors are more significant than others under the push, pull, PTR and PTC factors, respectively, namely, the push factors of “improving health and wellness” and “self-fulfillment and spirituality” and the pull factor of “health safety and the security quotient of a destination.” The study also identifies that “health risks” and “interpersonal constraints” have the most significant impact on senior tourists’ destination choice intentions under PTRs and PTCs. Finally, as senior tourism has been understudied in India, the current research is one of the first attempts at understanding the senior tourist market from an Indian perspective.

5.2 Practical implications
In terms of practical implications, the study makes several suggestions. The concept of wellness tourism has significant implications for strategic marketing practices (Dini and Pencarelli, 2021; Xie et al., 2022). To meet the growing demand for wellness among senior tourists, destination marketing organizations must offer wellness services to the elderly (such as spas, holistic healing, sports facilities and access to health-compliant food options). Second, destinations should be aware that pilgrimages and sacred sites generally rank high on the list of senior tourists’ preferences (Kim and Chen, 2021; Bhandari and Mittal, 2020). It is important for destinations to provide wellness and spiritual tourism offerings, prepare for public health crises and prioritize basic healthcare services in order to attract senior tourists. Health risk being the leading PTR for seniors, destination managers can reduce apprehensions by obtaining necessary medical and health certifications from regulatory authorities, thereby promoting destinations as hygienic and resilient following COVID-19. Finally, interpersonal constraints are the most important PTCs for seniors. In this regard, destinations should promote top-notch travel agencies, especially those that offer continuous support and care to senior citizens during trips. To alleviate the feeling of being alone or unsupported, tour operators may create smaller age- or gender-specific tour groups for seniors who cannot travel with loved ones.

6. Conclusion
This paper responds to previous scholars’ recommendations on innovative approaches and cultural considerations in studying elderly tourists (Dashper et al., 2021; Otoo et al., 2021). The study presents a panoptic perspective of senior tourism by analyzing push factors, pull factors, PTRs and PTCs using DEMATEL and Fuzzy TOPSIS. Unlike previous studies, this research focuses on how business leaders and academic researchers assess and predict senior tourism needs in the post-COVID-19 era, providing empirical insights into the aging Asian tourism market. Since the study was done in India, this paper gives more information about the aging tourism market in Asia. A major goal of this paper was to ensure that, in the midst of all the aggressive marketing of tourist destinations post-COVID-19 (Woyo, 2021), the elderly tourist market does not regress to being perceived as unattractive (Balderas-Cejudo et al., 2021). Furthermore, the study contributes to enhancing destination competitiveness, achieving the Sustainable Development Goal of reducing inequalities and reaffirming the industry’s commitment to the 2030 UN Agenda.

6.1 Limitations and future research directions
This paper is relevant to researchers interested in senior tourism and provides insights for destination managers and policymakers to improve senior tourists’ travel experiences. It focuses on the Indian outbound senior tourist market and uses online data from a limited number of industry experts due to COVID-19. Future research could include foreign experts from different cultures and compare the viewpoints of senior tourists with industry and
academic experts. Structural equation modeling and sensitivity analysis could be used to test the interrelationship among factors. In future studies, sensitivity analysis can be used to demonstrate how Fuzzy TOPSIS works by altering the criteria weights in distinct situations.

References


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