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Anticipating the Evolution of Tourism Services in Albania: A Unified Approach of Picture Fuzzy Z-AHP & TOPSIS Techniques

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This study offers a comprehensive analysis of tourism services in Albania through a survey-based approach, focusing on tourists' perceptions and satisfaction levels. The analysis employs two methods: fuzzy TOPSIS and fuzzy Z-AHP. The survey, which assessed tourists' views on the country's cultural heritage, natural attractions, and overall appeal, gathered data from a diverse group of both domestic and international visitors. Key findings reveal that tourists are attracted to Albania for its stunning landscapes, historical landmarks, and vibrant local culture. The insights from this study provide valuable implications for Albania's tourism industry, aiding stakeholders in enhancing service delivery and strategic marketing efforts. Policymakers, destination marketers, and service providers can utilise these findings to transform Albania's tourism landscape into a memorable and enticing destination for travellers worldwide.

Keywords: decision matrix; FPIS; FNIS; fuzzy Z-AHP; fuzzy TOPSIS; tourism services

I. INTRODUCTION

Tourism is a vital component of the global economy, with destinations around the world vying to attract travellers in search of unique and memorable experiences (Henok, 2021). The experiences offered play a crucial role in shaping tourists' perceptions and satisfaction. To understand tourists' experiences and the quality of service provided, destination management organisations and service providers must enhance their offerings to become more competitive in the market (Gidebo, 2021; Reinhold *et al.*, 2023).

Tourism services encompass a diverse range of elements, including accommodation, transportation, dining options, guided tours, and recreational activities (Provotorina *et al.*, 2023). By examining the correlations between factors such as accommodation quality and overall satisfaction, service providers can pinpoint priority areas for improvement (EMIROGLU, 2022; Gulati *et al.*, 2024). Additionally, understanding the impact of demographics on service perceptions can guide targeted marketing and personalised offerings. Moreover, integrating qualitative insights from open-ended responses enhances quantitative analysis, offering valuable context and shedding light on the underlying reasons for tourists' satisfaction or dissatisfaction (Trebicka *et al.*, 2023; Trebicka & Tartaraj, 2023).

This study seeks to develop two innovative fuzzy methods: fuzzy TOPSIS and fuzzy Z-AHP. The fuzzy TOPSIS method begins by constructing decision matrices based on evaluations from several decision makers who have assessed the complex problem in line with the structured problem. In contrast, fuzzy Z-AHP starts with a single decision matrix that encompasses the judgments of all decision makers

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regarding the complex problem (Halidini Qendraj *et al.*, 2023; Xhafaj *et al.*, 2025).

The study aims to achieve three primary objectives:

- to identify and rank the most influential tourism services in Albania from the tourists' perspective, moving beyond aggregate satisfaction to provide detailed, prioritised insights;
- to introduce and validate a novel, unified MCDM framework—Picture Fuzzy Z-AHP integrated with Fuzzy TOPSIS—that explicitly models decision-maker reliability and solution optimality; and
- to offer actionable, evidence-based recommendations for Albanian stakeholders to enhance service quality, marketing positioning, and long-term competitiveness (Prendi *et al.*, 2023).

The need for innovation is highlighted by three trends.

- Methodological stagnation: Most tourism studies in the Balkans rely on basic descriptive statistics or single-criterion analysis.
- Rising tourist expectations: Post-pandemic travellers demand personalised, value-driven, and digitally integrated experiences. Albania's current information and cultural interpretation services are lagging behind this shift (Trebicka, 2023).
- Strategic urgency: With neighbouring destinations (Montenegro, Greece, Croatia) investing heavily in service digitisation and experience design, Albania risks losing its cost advantage if service quality doesn't evolve (Kullolli *et al.*, 2024).

A. Literature Review

The theoretical foundation of this study rests on three interconnected pillars: (1) Service Quality and Tourist Satisfaction, (2) Multi-Criteria Decision-Making (MCDM) in Tourism, and (3) The Application of Fuzzy Logic and Z-Numbers.

1. Service Quality and Tourist Satisfaction

The relationship between service quality and tourist satisfaction is well documented but remains complex. Parasuraman, Zeithaml, and Berry's (1988) SERVQUAL model, which identifies dimensions like reliability, responsiveness, and empathy, has been foundational (Berry *et al.*, 1988). In the tourism context, studies have adapted these dimensions to destination-specific factors.

A recent study by Gulati, Duggal & Kumar (2024) emphasises the psychological aspects of travel, arguing that satisfaction is not just a function of service delivery but also of perceived value and emotional experience (Gulati *et al.*, 2024).

Similarly, Ali *et al.* (2021), and Kullolli (2024) in their study on hotel service quality, found that quick problem resolution and seamless experiences are critical drivers of satisfaction, often outweighing the physical attributes of a service (Ali *et al.*, 2021; Kullolli *et al.*, 2024). This aligns with Hanafiah *et al.*'s (2016) assertion that a performance-based approach to destination competitiveness is necessary. Our study builds on this by examining not just the presence of services, but their relative importance as perceived by the tourist, providing a prioritised hierarchy for improvement (Hanafiah *et al.*, 2016).

2. MCDM in Tourism

MCDM techniques are growing ever more essential not only in tourism development but across a wide range of sectors facing complex decision-making challenges (Kosova *et al.*, 2022; Xhafaj *et al.*, 2024).

As noted by Liao *et al.*, (2023) in their comprehensive bibliometric review of 85 selected papers from 1997 to 2022, fuzzy MCDM methods have become indispensable tools for hotel managers, destination marketers, and policymakers over the past two decades (Liao *et al.*, 2023).

Techniques like AHP, TOPSIS, and ELECTRE are frequently used for site selection, performance evaluation, and policy prioritisation (Kosova *et al.*, 2024).

Shabah (2025) successfully applied a fuzzy MCDM model for international hotel location selection, demonstrating its practical utility (Shahab *et al.*, 2025). Baki (2020) used fuzzy AHP and TOPSIS to evaluate hotel websites, identifying "trust" and "information quality" as paramount criteria (Baki, 2020).

3. *Fuzzy Logic and Z-Numbers*

Traditional MCDM methods often struggle with the vagueness and imprecision inherent in human judgment. Fuzzy set theory, introduced by Zadeh (1965), addresses this by allowing for degrees of membership (Zadeh, 1965). Triangular Fuzzy Numbers (TFNs), as used in many tourism studies are a common way to operationalise linguistic terms like "moderate" or "strong"(Mehdiabadi *et al.*, 2021).

The true innovation in our methodology comes from the integration of Z-numbers, a concept also introduced by Zadeh (Zadeh, 2011). A Z-number is an ordered pair (A, B), where 'A' represents a fuzzy restriction and 'B' represents a measure of the reliability of that assessment.

This is a significant advancement over standard fuzzy AHP, as it accounts for the confidence level of the decision-maker, adding a crucial layer of realism to the analysis. The work of Azadeh (2013), who first proposed "Z-AHP," and Sergi & Ucal Sari (2021), who applied it to prioritise public services for digitalisation, provides the theoretical basis for our application in tourism (Azadeh *et al.*, 2013; Sergi & Ucal Sari, 2021). To the best of our knowledge, this is one of the first studies to apply Z-AHP to evaluate tourism services, making it a significant contribution to the methodological toolkit of the field.

4. *Studies and Research in Albania*

Current literature on Albanian tourism remains largely descriptive or macro-economic, focusing on arrival statistics, GDP contributions, or broad policy recommendations, economic development (Noti & Myshketa, 2024; Taraku & Taraku, 2024). While valuable, these studies seldom dissect the micro-level service attributes that directly shape tourist satisfaction and behavioural intentions (e.g., revisit, recommend).

Stojanović *et al.* (2022) compared the countries of the Western Balkans according to the characteristics of innovative competitiveness on the Global Innovation Index level. According to his study, the best innovation indicators were seen in Montenegro, followed by Serbia, while the worst ones were visible in Albania (Stojanović *et al.*, 2022).

According to the literature review, measuring tourist services has many different ways. Kosova & Sinaj have studied the tourist arrivals (i.e. the number of tourists) in Albania in the years 1994-2020, which is considered the most important variable to describe the tourism development (Kosova & Sinaj, 2021).

Matuka (Matuka & Asafo, 2021) studied the long-run co-integrated relations between service subsectors and economic growth in Albania via an autoregressive distributed lag (Matuka & Asafo, 2021).

Rahmi Baki, in his study, assessed the e-commerce sites, particularly those focused on hotels, tourism, and travel. The results of the paper showed that the criteria to estimate the hotel websites are trust and information quality, as well as special discounts, assurance, and reservation information (Baki, 2020).

II. METHODOLOGY

The target population of this study included tourists of different places in Albania. It is used the Google Form, and in total 350 questionnaires were completed. A questionnaire was distributed through the email address, Facebook, and through WhatsApp web groups.

The questionnaire is formed in two parts, firstly included questions about gender, education and age, and secondly questions about the accommodation in the destination that they have visited, the information found in web or other, the local cuisine, the security in staying in that place, about the friendly people, the transport and finally the expenses for visiting a certain place in Albania.

A. *Data Collection Instrument*

The survey employed a 5-point Likert scale (ranging from 1 = "Strongly Disagree" to 5 = "Strongly Agree") to measure respondents' levels of agreement with statements regarding each service. This scale is a widely used and reliable tool in social science research for capturing attitudes and perceptions (Kosova & Sinaj, 2020).

1. Fuzzy Z-AHP

Making an optimal decision, useful and reliable is always difficult. To deal with data uncertainty, fuzzy Z-AHP is a useful theory in the context that crisp numbers are expressed in fuzzy numbers (Qendraj *et al.*, 2021). The Z-numbers include fuzzy reliability related to the fuzzy restriction that enables to analyse the uncertainty that happened from the reliability of the decision maker (Ibrahim, 2019).

The Z-number is associated with an uncertain variable Z and denoted as $Z = (A, B)$. A is a fuzzy subset of the domain X of the uncertain variable Z, and B is a fuzzy subset that shows the probability of A.

Assume that $X = \{x_1, x_2, \dots, x_n\}$, and A a fuzzy set in X, $\mu_A: X \to [0,1]$ the membership function of the triangular fuzzy number $x_i = (a_1{}^{(i)}, b_1{}^{(i)}, c_1{}^{(i)})$ is shown by equation (1). The linguistic restriction number of the fuzzy set A is evaluated with the triangular fuzzy numbers as shown in Table 1 while B is a discrete fuzzy set with triangular fuzzy numbers and the membership function $\mu_B: X \to [0,1]$ (see Equation 2, Table 1). The elements of B are defined as $x_i = (a_2{}^{(i)}, b_2{}^{(i)}, c_2{}^{(i)})$.

$$\mu_A(x_i) = \begin{cases} \frac{x_i - a_1{}^{(i)}}{b_1{}^{(i)} - a_1{}^{(i)}} & a_1{}^{(i)} \le x_i \le b_1{}^{(i)} \\ \frac{c_1{}^{(i)} - x_i}{c_1{}^{(i)} - b_1{}^{(i)}} & b_1{}^{(i)} \le x_i \le c_1{}^{(i)} \\ 0 & c_1{}^{(i)} < x_i \le +\infty \end{cases} \quad (1)$$

$$\mu_B(x_i) = \begin{cases} \frac{x_i - a_2{}^{(i)}}{b_2{}^{(i)} - c_2{}^{(i)}} & a_2{}^{(i)} \le x_i \le b_2{}^{(i)} \\ \frac{c_2{}^{(i)} - x_i}{c_2{}^{(i)} - b_2{}^{(i)}} & b_2{}^{(i)} \le x_i \le c_2{}^{(i)} \\ 0 & c_2{}^{(i)} < x_i \le +\infty \end{cases} \quad (2)$$

Table 1. Z fuzzy number with its components (A, B)

Relative importance	**Importance**	**TFN A, fuzzy numbers**	**TFN B, fuzzy numbers**
1	Equally	(1,1,1)	(1,1,1)
3	Moderately	(2,3,4)	(.2, .3, .4)
5	Strongly	(4,5,6)	(.4, .5, .6)
7	Very strongly	(6,7,8)	(.6, .7, .8)
9	Extremely strong	(9,9,9)	(.8, .9, 1)
2	Intermediate values	(1,2,3)	(.1, .2, .3)
4	Intermediate values	(3,4,5)	(.3, .4, .5)
6	Intermediate values	(5,6,7)	(.5, .6, .7)
8	Intermediate values	(7,8,9)	(.7, .8, .9)

The Z-number $Z = (A, B) = (x_1, x_2), x_1 \in A, x_2 \in B$, the reliability (x_2) is converted into a crisp number with the equation:

$$\alpha = \frac{\int x_i \mu_B(x_i) du}{\int \mu_B(x_i) du} \quad (3)$$

The first component (x_1) is calculated by adding the weight of the reliability to the part of the restriction, as:

$$Z^\alpha = \{x_i, \mu_{A^\alpha}(x_i) | \mu_{A^\alpha}(x_i) = \alpha \mu_A(x_i), x_i \in [0,1]\} \quad (4)$$

The weighted restriction is converted into a regular fuzzy number as:

$$Z' = \left\{x_i, \mu_{Z'}(x_i) \middle| \mu_{Z'}(x_i) = \mu_A\left(\frac{x_i}{\sqrt{\alpha}}\right), \mu(x_i) \in [0,1]\right\} \quad (5)$$

The numbers Z^α and Z' are equal related to the fuzzy expectation. After converting the Z-number into Z' is formed the decision matrix with fuzzy numbers, which initialise the fuzzy Z-AHP method.

$$\tilde{A} = \begin{pmatrix} 1 & \cdots & \widetilde{\alpha_{1n}} \\ \vdots & \ddots & \vdots \\ \widetilde{\alpha_{n1}} & \cdots & 1 \end{pmatrix} \text{ where } \alpha_{ij} = \frac{1}{\alpha_{ji}} \quad (6)$$

The decision matrix has to be consistent according Saaty index of consistency IC, that must be less than .1 (Saaty, 2008). For each of the constructs is calculated the fuzzy geometric mean value $\tilde{r}_i$:

$$\tilde{r}_i = \left(\prod_{i=1}^{n} \widetilde{\alpha_{ij}}\right)^{1/n} \quad (7)$$

After $\tilde{r}_i$, are evaluated the fuzzy weights $\widetilde{\omega}_i$

$$\widetilde{\omega}_i = \tilde{r}_i \otimes (\tilde{r}_1 \oplus \tilde{r}_2 \oplus \dots \oplus \tilde{r}_n)^{-1} \quad (8)$$

The defuzzification of the weights $\widetilde{\omega}_i = \left(\omega_i^{(1)}, \omega_i^{(2)}, \omega_i^{(3)}\right)$ is denoted with a_{ij} using the method of Centre of Area (COA) (Qendraj *et al.*, 2021).

$$a_i = \frac{\omega_i^{(1)}+\omega_i^{(2)}+\omega_i^{(3)}}{3} \quad (9)$$

The last step is to normalise the weights

$$a_i : N_i = \frac{a_i}{\sum a_i} \quad (10)$$

2. *Fuzzy TOPSIS*

The Technique for Order of Preference by Similarity to Ideal Solution (TOPSIS), developed by Hwang and Yoon (1981), is a popular MCDM method (Hwang & Yoon, 1981). The core principle is to select the alternative that is closest to the Positive Ideal Solution (PIS) and farthest from the Negative Ideal Solution (NIS). When criteria weights and ratings are expressed as fuzzy numbers (typically TFNs), the method becomes Fuzzy TOPSIS (Sun *et al.*, 2022).

The steps for Fuzzy TOPSIS are as follows:

1) Aggregate Ratings and Weights: Combine the fuzzy ratings and weights from all decision-makers (DMs) into aggregated fuzzy ratings and weights.
2) Normalise the Decision Matrix: Convert the aggregated matrix into a normalised form, differentiating between benefit criteria (to be maximised) and cost criteria (to be minimised).
3) Construct Weighted Normalised Matrix: Multiply the normalised values by their respective criteria weights.
4) Determine FPIS and FNIS: Identify the Fuzzy Positive Ideal Solution (FPIS) and Fuzzy Negative Ideal Solution (FNIS) for each criterion.
5) Calculate Distances: Compute the Euclidean distance of each alternative from the FPIS and FNIS.
6) Compute Closeness Coefficient (CC): The CC for each alternative is calculated as: CC = Distance to FNIS / (Distance to FPIS + Distance to FNIS). A higher CC indicates a better alternative.

III. RESULTS

The main aim of the study was to analyse the development of the tourism services in Albania. The questionnaire methodology used the 5-likert scale in order to enable respondents to express their level of agreement or disagreement for the following tourism services: the accommodation in the destination, the information provided from web and other, the local cuisine, the cultural and historical heritage, the overall safety and security, the expenses during the stay, how hospitable the locals are and finally the transport options.

All the responses of the questionnaire were analysed from the decision makers, a group of mathematicians, that have used some decision models and Saaty scale to construct the decision matrix related with the importance that each of the tourism services has compared to each other according to the goal: the most important service.

A. Fuzzy Z-AHP Results

By using Z-numbers is constructed the decision matrix with the linguistic restriction variables and linguistic reliability variables, Table 2. Equations (4-10) generated the results showed in Table 3.

Table 2. The decision initial matrix with Z= (A, B)

The best tourism service	Security	Local Cuisine	Transportation	Hospitability	Cultural heritage	Information	Expensiveness	Accommodation
Security	(1, 1, 1) (1, 1, 1)	(1, 2, 3) (.1,.2,.3)	(1, 2, 3) (.1,.2,.3)	(.33,.5, 1) (.8,.9,1)	(.33,.5, 1) (.8,.9,1)	(.33,.5, 1) (.8,.9,1)	(.33,.5, 1) (.8,.9,1)	(1, 2, 3) (.1,.2,.3)
Local Cuisine	(.33,.5, 1) (.8,.9,1)	(1, 1, 1) (1, 1, 1)	(1, 2, 3) (.1,.2,.3)	(.33,.5, 1) (.8,.9,1)	(.33,.5, 1) (.8,.9,1)	(2,3,4) (.2,.3,.4)	(.33,.5, 1) (.8,.9,1)	(.33,.5, 1) (.8,.9,1)
Transportation	(.33,.5, 1) (.8,.9,1)	(.33,.5, 1) (.8,.9,1)	(1, 1, 1) (1, 1, 1)	(.25,.33,.5) (.7,.8,.9)	(.33,.5, 1) (.8,.9,1)	(.33,.5, 1) (.8,.9,1)	(.25,.33,.5) (.7,.8,.9)	(.33,.5, 1) (.8,.9,1)
Hospitability	(1, 2, 3) (.1,.2,.3)	1, 2, 3) (.1,.2,.3)	(2,3,4) (.2,.3,.4)	(1, 1, 1) (1, 1, 1)	(.33,.5, 1) (.8,.9,1)	(1, 2, 3) (.1,.2,.3)	(1, 2, 3) (.1,.2,.3)	(1, 2, 3) (.1,.2,.3)
Cultural heritage	(1, 2, 3) (.1,.2,.3)	(1, 2, 3) (.1,.2,.3)	(1, 2, 3) (.1,.2,.3)	(1, 2, 3) (.1,.2,.3)	(1, 1, 1) (1, 1, 1)	(1, 2, 3) (.1,.2,.3)	(1, 2, 3) (.1,.2,.3)	(1, 2, 3) (.1,.2,.3)
Information	(1, 2, 3) (.1,.2,.3)	(.25,.33,.5) (.7,.8,.9)	(1, 2, 3) (.1,.2,.3)	(.33,.5, 1) (.8,.9,1)	(.33,.5, 1) (.8,.9,1)	(1, 1, 1) (1, 1, 1)	(.25,.33,.5) (.7,.8,.9)	(1, 2, 3) (.1,.2,.3)
Expensiveness	(1, 2, 3) (.1,.2,.3)	(1, 2, 3) (.1,.2,.3)	(2,3,4) (.2,.3,.4)	(.33,.5, 1) (.8,.9,1)	(.33,.5, 1) (.8,.9,1)	(2,3,4) (.2,.3,.4)	(1, 1, 1) (1, 1, 1)	(.33,.5, 1) (.8,.9,1)
Accommodation	(.33,.5, 1) (.8,.9,1)	(1, 2, 3) (.1,.2,.3)	(1, 2, 3) (.1,.2,.3)	(.33,.5, 1) (.8,.9,1)	(.33,.5, 1) (.8,.9,1)	(.33,.5, 1) (.8,.9,1)	(1, 2, 3) (.1,.2,.3)	(1, 1, 1) (1, 1, 1)

Table 3. The ranked results.

Tourism services	$\tilde{r}_i$	$\tilde{\omega}_i$	a_{ij}	N_i	Rank
Security	(.3,.48,.79)	(.048,.12,.32)	.162	.126	4
Local Cuisine	(.36,.53,.89)	(.06,.14,.36)	.186	.144	2
Transportation	(.31,.433,.74)	(.05,.11,.3)	.153	.118	6
Hospitability	(.29,.5,.78)	(.047,.13,.32)	.165	.127	3
Cultural heritage	(.24,.45,.64)	(.039,.117,.26)	.138	.107	7
Information	(.27,.417,.64)	(.044,.10,.26)	.135	.105	8
Expensiveness	(.37,.57, .88)	(.06,.148,.36)	.189	.146	1
Accommodation	(.29,.47,.78)	(.048,.122,.32)	.163	.125	5

B. Fuzzy TOPSIS Results

Three decision makers have evaluated the importance of each of the tourism services according to the goal of the decision problem to find the most important between them. Each of the decision matrices (DM1, DM2, DM3) must be consistent according Saaty inconsistence (IC) less than .1. Table 4 shows the results for the decision matrices related to decision maker DM1 (first row), decision maker DM2 (second row), and decision maker DM3 (third row).

Each of the decision matrices has the following consistency index $IC_1 = .093 \leq .1, IC_2 = .0994 \leq .1, IC_3 = .09957 \leq .1$. Applying equations from step 1 to step 5 is obtained the weighted normalised fuzzy decision matrix. Table 5 shows the weighted normalised fuzzy decision matrix. After the calculations of fuzzy positive ideal solution FPIS and fuzzy negative ideal solution FNIS is computed the closeness coefficient CC_i. Table 6 shows the ranked results.

Table 4. Initial decisions of fuzzy TOPSIS

The best tourism service	**Security**	**Local Cuisine**	**Transportation**	**Hospitability**	**Cultural heritage**	**Information**	**Expensiveness**	**Accommodation**
Security	(1, 1, 1)	(.25,.33,.5	(1,2,3)	(.25,.33,.5)	(1,2,3)	(1,2,3)	(.33,.5, 1)	(.33,.5, 1)
	(1, 1, 1)	(.33,.5, 1)	(2,3,4)	(.25,.33,.5	(.2,.25,.33)	(.33,.5, 1)	(.33,.5, 1)	(1,2,3)
	(1, 1, 1)	(1,2,3)	(2,3,4)	(.33,.5, 1)	(.2,.25,.33)	(.33,.5, 1)	(.33,.5, 1)	(1,2,3)
Local Cuisine	(2,3,4)	(1, 1, 1)	(2,3,4)	(1,2,3)	(1,2,3)	(3,4,5)	(.25,.33,.5)	(1,2,3)
	(1,2,3)	(1, 1, 1)	(1,2,3)	(.25,.33,.5)	(.33,.5, 1)	(1,2,3)	(.33,.5, 1)	(.33,.5, 1)
	(.33,.5, 1)	(1, 1, 1)	(1,2,3)	(.33,.5, 1)	(.33,.5, 1)	(.33,.5, 1)	(.2,.25,.33)	(.25,.33,.5)
Transportation	(.33,.5, 1)	(.25,.33,.5)	(1, 1, 1)	(.25,.33,.5)	(.33,.5, 1)	(.33,.5, 1)	(.2,.25,.33)	(.33,.5, 1)
	(.25,.33,.5)	(.33,.5, 1)	(1, 1, 1)	(.2,.25,.33)	(.25,.33,.5)	(.33,.5, 1)	(.33,.5, 1)	(.33,.5, 1)
	(.25,.33,.5)	(.33,.5, 1)	(1, 1, 1)	(.2,.25,.33)	(.33,.5, 1)	(.33,.5, 1)	(.33,.5, 1)	(.33,.5, 1)
Hospitability	(2,3,4)	(.33,.5, 1)	(2,3,4)	(1, 1, 1)	(2,3,4)	(2,3,4)	(2,3,4)	(2,3,4)
	(2,3,4)	(2,3,4)	(3,4,5)	(1, 1, 1)	(1,2,3)	(3,4,5)	(2,3,4)	(2,3,4)
	(1,2,3)	(1,2,3)	(3,4,5)	(1, 1, 1)	(2,3,4)	(3,4,5)	(.33,.5, 1)	(1,2,3)
Cultural heritage	(.33,.5, 1)	(.33,.5, 1)	(1,2,3)	(.25,.33,.5)	(1, 1, 1)	(1,2,3)	(1,2,3)	(1,2,3)
	(3,4,5)	(1,2,3)	(2,3,4)	(.33,.5, 1)	(1, 1, 1)	(1,2,3)	(1,2,3)	(.25,.33,.5)
	(3,4,5)	(1,2,3)	(2,3,4)	(.33,.5, 1)	(1, 1, 1)	(1,2,3)	(1,2,3)	(.25,.33,.5)
Information	(.33,.5, 1)	(.2,.25,.33)	(1,2,3)	(.25,.33,.5)	(.33,.5, 1)	(1, 1, 1)	(.33,.5, 1)	(.33,.5, 1)
	(1,2,3)	(.33,.5, 1)	(1,2,3)	(.2,.25,.33)	(.33,.5, 1)	(1, 1, 1)	(.25,.33,.5)	(.33,.5, 1)
	(1,2,3)	(1,2,3)	(1,2,3)	(.2,.25,.33)	(.33,.5, 1)	(1, 1, 1)	(.2,.25,.33)	(.25,.33,.5)
Expensiveness	(1,2,3)	(2,3,4)	(3,4,5)	(.25,.33,.5)	(.33,.5, 1)	(1,2,3)	(1, 1, 1)	(1,2,3)
	(1,2,3)	(1,2,3)	(1,2,3)	(.25,.33,.5)	(.33,.5, 1)	(2,3,4)	(1, 1, 1)	(1,2,3)
	(1,2,3)	(3,4,5)	(1,2,3)	(1,2,3)	(2,3,4)	(3,4,5)	(1, 1, 1)	(2,3,4)
Accommodation	(.33,.5, 1)	(.33,.5, 1)	(1,2,3)	(.25,.33,.5)	(.33,.5, 1)	(1,2,3)	(.33,.5, 1)	(1, 1, 1)
	(.33,.5, 1)	(1,2,3)	(1,2,3)	(.25,.33,.5)	(2,3,4)	(1,2,3)	(.33,.5, 1)	(1, 1, 1)
	(.33,.5, 1)	(2,3,4)	(1,2,3)	(.33,.5, 1)	(1,2,3)	(2,3,4)	(.25,.33,.)	(1, 1, 1)

Table 5. Weighted normalised fuzzy decision matrix

Weightage	(2,3,4)	(5,6,7)	(3,4,5)	(5,6,7)	(6,7,8)	(2,3,4)	(4,5,6)	(4,5,6)
	COST	BENEFIT	COST	BENEFIT	BENEFIT	COST	COST	BENEFIT
The best tourism service	**Security**	**Local Cuisine**	**Transportation**	**Hospitability**	**Cultural heritage**	**Information**	**Expensiveness**	**Accommodation**
Security	(.66,.99,1.3)	(.25,.4,4.2)	(.75,1.48,)	(.4,.72, 2.31)	(.3,1.4,6)	(.12,.6,2.)	(.8, 2, 3.6)	(.32,1.85,4.5)
Local Cuisine	(.16, .54,4)	(1, 1.2, 1.4)	(.75,1.72,5)	(.55,1.86,7)	(.48,1.75,6)	(.08,.27,08)	(.8, 2.75, 6)	(.24,1.15,4.5)
Transportation	(.66, 2.58,5.28)	(.25,.48, 1.4)	(3, 4, 5)	(.3,.54,1.12)	(.36,.77, 2)	(.4,1.2,2.4)	(.8, 2.4, 6)	(.32,.6, 1.5)
Hospitability	(.16, .36, 1.32)	(.3,2.16, 5.6)	(.6, 1.08, 2.5)	(1.65,1.98,2.31)	(1.5,4.62,8)	(.08,.15,.4)	(.2,.45,3.6)	(1,3.3,6)
Cultural heritage	(.12, .33,4)	(.3, 1.8,4.2)	(.75,1.48, 5)	(.4,.84,2.31)	(1.5, 1.75, 2)	(.12, .3,.8)	(.24, .5,1.2)	(.24,1.1,4.5)
Information	(.22,.66, 4)	(.2,1.08,4.2)	(.99,2,5)	(.3,.54,1.16)	(.48,.84, 2)	(.4, .6, .8)	(.8,2.75, 6)	(.24,.55, 1.5)
Expensiveness	(.22,.48,1.3)	(1,3.6,7)	(.6,1.48,5)	(.4,1.74,7)	(.48,2.31, 8)	(.08,.18,.8)	(.8, 1, 1.2)	(1,2.9,6)
Accommodation	(.66,1.98, 4)	(.3,2.16, 5.6)	(.99,2,5)	(.4,.72,2.31)	(.48,3.29, 8)	(.1, .3, .8)	(.8, 2.25, 4.8)	(1, 1.25, 1.5)
A^*	(.66, 2.58,5.28)	(1,3.6,7)	(3, 4, 5)	(1.65,1.98,2.31)	(1.5,4.62,8)	(.4,1.2,2.4)	(.8,2.75, 6)	(1,3.3,6)
A^-	(.12, .33,4)	(.2,1.08,4.2)	(.6, 1.08, 2.5)	(.3,.54,1.1)	(.3,1.4,6)	(.08,.15,.4)	(.2,.45,3.)	(.24,.55, 1.5)

Table 6. The ranked results

Tourism services	d_i^*	d_i^-	CC_i	Rank
Security	13.32	8.186	.38	6
Local Cuisine	15.334	1.36	.40	5
Transportation	12.46	1.64	.46	3
Hospitability	9.32	9.24	.49	2
Cultural heritage	14.74	8.397	.36	7
Information	14.7	5.862	.28	8
Expensiveness	13.13	14.61	.52	1
Accommodation	1.31	7.98	.43	4

IV. DISCUSSION

The importance of this study lies in its empirical approach, using real-time data collected directly from tourists through a questionnaire.

A. The Importance of Cost (Expensiveness)

Both the Fuzzy Z-AHP and Fuzzy TOPSIS methods unequivocally ranked "Expensiveness" as the most critical factor for tourist satisfaction in Albania. This finding strongly resonates with the broader literature on value-for-money in tourism.

Ali *et al.* (2021) and Gulati *et al.* (2024) both emphasise that tourists evaluate their experience through a cost-benefit lens. Our results confirm that for Albania, perceived affordability and the alignment of price with the quality of services received are the primary determinants of a positive experience.

This is particularly relevant for Albania, which markets itself as a budget-friendly destination in Europe. The consistency of this finding across two distinct methodological approaches (Z-AHP and TOPSIS) lends it exceptional robustness.

B. The Underperformance of Cultural Heritage and Information Services

A striking and somewhat counterintuitive finding is that "Cultural and Historical Heritage", and "Information" were consistently ranked as the least important factors by tourists. This appears to contradict the common assumption that Albania's rich history is a primary draw.

However, this finding can be interpreted through the lens of Baki's (2020) research. If the information provided (via websites, guides, signage) is poor, it can diminish the perceived value of the heritage itself. Tourists may be surrounded by historical sites but, without adequate context or easy access to information, they fail to engage with them meaningfully, leading to a lower perceived importance.

This suggests that the issue is not the heritage, but the presentation and accessibility of information about it. Future strategies should focus on enhancing digital platforms, multilingual guides, and interactive experiences to unlock the true potential of Albania's cultural assets.

C. Methodological Divergence and Convergence

While both methods agreed on the top (Expensiveness) and bottom (Information, Cultural Heritage) factors, they showed variations in the ranking of middle-tier services like Local Cuisine, Hospitality, and Accommodation (see Table 3 and Table 6). This is not a weakness but a strength of our unified approach. The divergence stems from the core methodological difference: Z-AHP synthesises all decision-makers' inputs into a single matrix with reliability weights, while TOPSIS aggregates individual matrices. The fact that both methods converge on the most and least critical factors validates those findings. The variations in the middle rankings highlight areas where stakeholder perceptions might be more ambiguous, suggesting a need for more targeted research or flexible service development strategies in these areas.

D. Contribution to Theory and Practice

This study makes several key contributions. Theoretically, it demonstrates the practical applicability and value of Z-AHP—a relatively new and sophisticated tool—in the tourism domain. It shows that incorporating decision-maker reliability can provide a more realistic assessment of complex, subjective problems. Practically, it provides Albanian stakeholders with a clear, evidence-based hierarchy of service priorities. The overwhelming focus on cost suggests that marketing should emphasise value, while investments in digital information infrastructure could yield significant returns by enhancing the appeal of cultural sites.

In conclusion, this research not only offers specific, actionable insights for Albania but also provides a replicable methodological framework for other emerging destinations seeking to understand and optimise their tourism service ecosystems in an increasingly competitive global market.

V. CONCLUSIONS

This research study aimed to enhance the understanding of factors influencing tourism service development in Albania, a country that has experienced a significant surge in international tourists. By employing an innovative, unified decision-making framework—combining Fuzzy Z-AHP and Fuzzy TOPSIS—the study provided deeper, more nuanced insights into the key drivers of tourist satisfaction.

The findings revealed that overall expenses (value for money) are the most critical factor, as highlighted by both methods. This underscores the importance of offering cost-effective, high-value experiences. Additionally, the study emphasised that tourists prioritise efficient service delivery and seamless experiences.

Interestingly, services related to historical culture and information were ranked as the least influential, indicating a significant opportunity for improvement. Enriching the content and usability of tourism websites and enhancing guided experiences could substantially elevate Albania's appeal.

While factors like local cuisine, hospitality, and accommodation were ranked differently by the two methods, these variations are attributable to their distinct methodological foundations and serve to validate the robustness of the top and bottom rankings.

The study offers valuable, prioritised guidance for stakeholders to optimise service delivery and refine marketing strategies. A key limitation is its focus on Albania; future research should expand geographically and incorporate emerging service trends to provide a more comprehensive global understanding, contributing to the sustainable growth of the tourism industry worldwide.

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Credit author statement

All authors have contributed equally. All authors have read and agreed to the published version of the manuscript.

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