

Prioritising Factors Influencing Mountain Tourism Using a Fuzzy Analytic Hierarchical Process: A Case Study of Mount Nyangani, Zimbabwe

Emmanuel Mutambara^{ORCID}

Graduate School of Business and Leadership, University of KwaZulu-Natal, Durban, South Africa, Email, mutambarae@ukzn.ac.za

Joe Muzurura*^{ORCID}

Department of Economics, Faculty of Business Sciences, Midlands State University, Gweru, Zimbabwe, Email, muzururaj@staff.msu.ac.zw

Emiriya Manzote

Department of Economics, Faculty of Business Sciences, Midlands State University, Gweru, Zimbabwe, Email, manzotee@staff.msu.ac.zw

**Corresponding Author*

How to cite this article: Mutambara, E., Muzurura, J. & Manzote, E. (2023). Prioritising Factors Influencing Mountain Tourism Using a Fuzzy Analytic Hierarchical Process: A Case Study of Mount Nyangani, Zimbabwe. African Journal of Hospitality, Tourism and Leisure, 12(2):688-701. DOI: <https://doi.org/10.46222/ajhtl.19770720.393>

Abstract

The purpose of the study was to prioritise factors that may influence mountain tourism in Zimbabwe. Zimbabwe has diverse mountain ecosystems that can attract tourists with various motives ranging from self-fulfillment, spirituality growth, wellness, local culture and religious experiences to simple outdoor adventures. Quantitative data was collected using a ten-point structured questionnaire that was administered to ten mountain tourism experts who were selected using purposive sampling. The findings show that key factors that influence mountain tourism in Zimbabwe include destination image, tourist satisfaction, community participation and local physical infrastructure. Policy makers should encourage green investments in mountain regions in order to unlock growth opportunities in mountain-based communities. Investing in quality complementary touristic infrastructure may also help to improve destination image. Raising awareness about the negative impacts of tourism on mountains' unique ecological and social systems, as well on behaviour change in the people who live there, is also needed at all levels, including individual mountain tourists, tourism businesses and local communities. The study contributes to literature by pioneering the use of the fuzzy analytic hierarchical approach in order to interrogate factors that influence mountain tourism in Zimbabwe.

Keywords: Mountain tourism; Zimbabwe; Mount Nyangani; FAHP; destination image

Introduction

Mountainous regions have extensive diversity of ecosystems, weather patterns, fauna, flora that are supported by an array of indigenous cultures, traditions and subjective norms that can appeal to visitors from diverse backgrounds. Visitors to mountain areas are often beguiled by opportunities of enthralling adventures, cooler temperatures, cascading natural landscapes, and numerous complementary outdoor activities. To a nonchalant visitor, inimitable and idiosyncratic features of the mountain cultural heritage including soaring heights shore up a sisyphian sense of spirituality, mysticism and self-fulfillment.

The World Tourism Organisation (UNWTO) (2022) reports that mountain tourism is continually growing and diversifying to the extent that it has become one of the world's largest growing economic sectors. The same report reveals that global tourism has increased by over USD5.8 trillion from pre-Covid 19 period levels and now contributing over 6.7% of the global

gross domestic product (GDP). There is incontrovertible evidence that mountain tourism if properly yoked within the mainstream economy has a strong potential for vivifying rapid social community progress in countries like Zimbabwe that have been going through a sustained period of economic degrowth. This is because mountain tourism has broader multiplier effects due to the close complementarity with other touristic activities such as cultural and religious ceremonies, learning of medicinal and native plants, handicrafts and other activities associated with rural activities (Muzurura et al., 2022; Chigora et al., 2020) wellness tourism and community-based tourism (Romeo et al., 2021). Mountain tourism has been defined as tourism activity which happens in a defined and limited geographical space such as mountains or hills with distinctive characteristics and attributes that are inherent to a specific landscape, topography, climate, biodiversity and local community (UNWTO, 2019; Nigg and Eichelberger, 2021; Zeng et al., 2021). Mountains and hills areas account for approximately 27% of the total global land, of which 54% of the global mountainous areas are located in developing countries (WTO, 2021). Zimbabwe is one of the most mountainous countries in the world with at least 4518 named mountains (Government of Zimbabwe (GoZ), 2022).

Besides the world renowned Matopo and Domboshawa hills, one of the fastest growing mountain tourist destinations in Zimbabwe if properly managed and sustainably developed could be Mount Nyangani. This mountain stands at an imposing height of 2592 meters and is cozily nested within the precincts of the picturesque Nyanga National Park. It is found in Zimbabwe eastern highlands about 20 kilometers from resort town of Inyanga. Mount Nyangani consists of a wide moor of largely lurching hills and rugged hammocks. The plateau extends approximately 8 square kilometers with its edges cascading precipitously to both the west and east. The vegetation is mostly composed of heath that stand sentry to the peak of a rugose plateau. Whilst glum evergreen forests blanket the surfactant eastern slopes, the western side is covered by an amalgam of never-ending grasslands and seemingly unkempt shrubs. Despite the feigned serenity and superficial quietude that embody Mount Nyangani, it has gained insidious notoriety among locals resulting from its insalubrious reputation as a mountain that ‘swallows’ human visitors. Most local communities believe that Mount Nyangani to be sacred, enshrined and perchance, a ‘troubled’ mountain that is haunted by implacable and notoriously vengeful ancestral spirits that feed on human blood. An unknown number of domestic and foreign tourists have disappeared without ever being found whilst trekking to the summit, hence the moniker the ‘mountain that swallows people’. Everything about Mount Nyangani—shrubs, animals and ecology—exudes a demonic and fiendish feeling.

For instance, the weather around this mountain is reported by local communities and visitors alike as almost having a pernicious and malevolent mind of its own. At unpropitious times gusty and spooky and unnerving winds appear to portentously growl at visitors. Dense and gloomy fogs/mists often materialise surreptitiously after mid-morning and seem to fumble at the neck of the mountain with octopus-like translucent tentacles. Towards sunset, the mist takes a different form and appears to flounce at hikers around as if stalking or threatening them. In the early morning, the mountain is blanketed by hue fogs that give the mountain an abysmal, enigmatic and mysterious appearance.

Despite stories by local communities about the mountain being haunted by supernatural beings, adventurous and wellness and spirituality seeking visitors find this mountain irresistibly intriguing. This is because this mountain is also home to a number of wild animals including; lions, leopards, hyenas, duikers, kudus, zebras, dwalas, monkeys and baboons. It also hosts more than 3500 *recherché* plant species, scores of bird species and unknown number of colourful snakes, frogs, geckos and lizards (GoZ, 2022). The precipitous peaks, rough-hewn trails, and rich cultural, religious traditions and priceless heritages of the Nyangani mountain-based communities is suitable for a plethora of mountaineering activities like trekking,

climbing, cycling, bird viewing, sight-seeing and unadulterated adventuring. The major problem that confronts Mount Nyangani as a sustainable mountain tourism destination is that the area is undergoing rapid gentrification. In addition, the mountain's historical obloquy and infamy for "swallowing" visitors could be contributing to domestic and foreign tourism phobia. In the past, Nyangani mountain tourism has been an important fount of revenues, employment generation, and a major source of food security for local communities. Touristic activities in Mount Nyangani have declined significantly despite the increasing demand for mountain tourism in other regional countries like South Africa and Zambia. Mountain tourism as an antecedent for economic growth and development for communities living in mountainous regions has received little interrogation in empirical literature that focus on Zimbabwe's tourism sector. This is despite the fact that the country is one of the few countries in Africa that has the highest numbers of named mountains.

The main objective of this paper is utilizing the FAHP to prioritise factors that influence mountain tourism using the case of Nyangani Mountain. In Zimbabwe, mountains are often contested sites among cultural tourists, religious tourists and leisure-seeking tourists. In this regard, the secondary objective is to proffer some recommendations on how policymakers can ensure co-existence among different types of tourists that visit mount Nyangani and mountain-based communities. This study is significant for a number of reasons. Mount Nyangani has the potential to change local communities by attracting cultural, rural, wellness, spiritual, sport, wellness and mountain tourists. A number of studies on mountain tourism show that mountains with their cooler temperatures are cathartic, ecological and recreationally priceless and hence, the need to manage them sustainably for the betterment of local communities (Nigg & Eichelberger, 2021; Zeng et al., 2021; Tian & Ming, 2021). In fact, environmental protection and ecological sustainability are main imperatives for the development of sustainable mountain tourism. Mutare and Nyanga towns are located on the peripheries of Mount Nyangani. An increase of mountain tourists to the Nyangani mountain is likely to spur local economic growth and development by making these towns competitive tourist destinations. Mountain tourism in Zimbabwe is heavily under-developed and hence, attracting more tourists to Mount Nyangani may increase awareness on the need to develop mountain tourism as a key economic sector. Besides diversifying the country's source of foreign direct investment investing in mountain tourism may also help to improve local public infrastructure such as roads, telecommunication systems and, water and ablution facilities in the country's mountainous areas (Muzurura, 2016). In addition, mountain tourism can help developing countries like Zimbabwe to generate quality employment opportunities among mountain-based communities (Muzurura, 2017).

Numerous studies show that mountain communities are characteristically less affluent and also that poverty and food insecurity are an actual reality in many mountainous areas (Hall and Saarinen, 2021; Sisto et al., 2021). The environmental impact of developing mountain tourism is particularly critical in mountain regions, where the above-mentioned factors are magnified (Perles-Ribes et al., 2021; Maques et al., 2021; Milecevic et al., 2021). Mountain ecosystems are unique and idiosyncratic habitats. Most mountains have short breeding and growing seasons for a variety of fauna and flora. As a consequence, mountain areas are largely sensitive to slightest changes caused by uncontrolled human activities. In fact, mountain landscapes can vary brusquely for various reasons that include landslides, rockfalls, drought and avalanches.

Compared to other tourism's fortes like religion tourism, cultural tourism, gastronomy tourism, rural tourism, spirituality tourism and sight-seeing tourism, mountain tourism provides more opportunities for tourists to pursue fitness, wellness and related interests. In many developing countries, mountain bike tourism has become a critical aspect of sport tourism (see Sisto et al., 2021; Buning & Lamont, 2021; Bausch et al., 2021). Mountains are

typically high-altitude ecosystems that are also intrinsically fragile due to low soil resiliency (Li et al., 2021; Zeng et al., 2021) and human activities such as trekking (Wang et al., 2020; Romeo et al., 2021; Apollo & Andreychuk, 2020), muddiness, vegetation trampling, and soil compaction (Zeng & Zhong, 2020; Tian & Ming, 2021; Sisto et al., 2021). Furthermore, mountain touristic activities such as the use of firewood by campers and introduction of exotic species can decrease biodiversity (Romeo et al., 2020), lead to loss of fragile mountain species (Duglio & Letey, 2019; Hall & Saarinen, 2021; Duran-Roman et al., 2021) cause wildlife disturbances, mountain habitat fragmentation, degradation and deforestation (Vij et al., 2021; Buning et al., 2019; Chin et al., 2020). Mountain bikes and trekking destroy everglades, heath and meadows and in turn, may lead to destructive soil compaction in camping areas as well as accumulation of waste (Barros & Pickering, 2015).

Local people residing in mountain areas can be highly sensitive to damaging effects caused by mountain tourists. Adverse impacts associated with mountain tourism include diluting cultural authenticity, cultural expropriation, disruption of local communities, loss of shared communal values and lifestyles, disrespect of religious sites and loss of land (Muzurura et al., 2022). The communal lands surrounding Nyangani mountain like most mountainous areas in developing economies have unfertile soils to permit sustainable agricultural and pastoral activities. Therefore, mountains like Nyangani mountain if properly and sustainably managed and developed can become prime tourism assets offering considerable opportunities for their conservation, revenue and employment generation. According to UNWTO (2021), mountain destinations can provide beneficial relationship between tourism revenues and the conservation of natural ecosystems. Popular tourist destinations in Zimbabwe like the enigmatic Victoria Falls and Kariba Dam are largely affected by seasonality and tourist saturation at peak tourism seasons. Thus, developing mountain tourism in areas like the Nyangani can help not only to transform mountain areas but to generate substantial revenues in the shoulder season. As the country lethargically emerges from that woebegone cloud of Covid 19 global pandemic, developing mountain tourism in Zimbabwe could also be an elixir for re-envisioning and rethinking of other forms of tourism in order to stimulate faster economic growth and sustainable development. Many domestic and foreign tourists are more and more seeking at new avenues through which to reconnect with local traditions, nature and cultures. Mount Nyangani is located in a remote area and hence, a less crowded tourist destination. Immense opportunities for self-fulfillment, spirituality and wellness activities, in turn these activities could be a source of sustainable livelihoods for mountain-based communities.

Mountain tourism if properly harnessed and incubated can help mountain-based communities to build collaborative partnerships between urban and local communities that are aimed at nurturing innovation and local entrepreneurship. In the long run, this collaboration may help to steer forward sustainable developments, broaden revenue diversification opportunities, improve and strengthen communal food insecurity resilience whilst also reducing endemic poverty associated with mountain-based communities. The rest of the paper is arranged as following: the second section covers literature review, the third presents the methodology, the fourth is a discussion of key findings. The last section provides conclusions and recommendations.

Literature review

With their broad diversity of ecosystems, multiplicity of communities and cultures and species mountain regions provides a lot of fascination to tourists (UNWTO, 2021; Wong et al., 2020). Due to the less hospitable terrain and climate, mountain regions are not suitable for agriculture (Cronje and du Plessis, 2020). In many countries, mountain tourism can provide a lifeline for many mountain-based communities. Unlike other forms of tourism mountain tourism can

include many complementary activities such as relaxation, wellness exercises, hiking, sledding, biking, mountaineering and bird seeing (Romeo et al., 2021; Zeng & Zhong, 2020; Dornier and Mauri, 2018; Deng et al., 2021). These activities pose significant damages to fragile mountain ecosystems (Milecivic et al., 2021; Vij et al., 2021).

Increasing tourism visitation to mountains increases the risk of biodiversity and conservation (Chakraborty, 2019; Weber et al., 2019; Mourey et al., 2020). Walking tourism allows visitors to experience mountain landscapes, fauna and flora as well as local cultural heritages (WTO, 2020). Zeng et al (2021) argue that the fragility of the natural, social and cultural heritage that is unique to mountain regions may determine the competitiveness and quality of tourism initiatives provided in mountains. Mountain tourism is filled with many challenges such as tourist-saturation destinations, lack of supporting infrastructure due to their remoteness, and increasingly fierce competition among other tourist destinations (Ye et al., 2021; Tian and Ming, 2021; Hall and Saarinen, 2021).

Preconditions for mountain tourism include adequate infrastructural facilities (Vij et al., 2021; Pan et al., 2019; Marques et al., 2021), possibilities of participating on other leisure activities associated with mountains (Le et al., 2021; Chin et al., 2020; Bausch et al., 2021), transport accessibility to tourist destinations (Dunet et al., 2020; Chimalyjevic et al., 2019; Le et al., 2021). Mountains are perfect setting for rural tourism since activities happen in areas with low population density. The WTO (2021) says that mountain tourism is dominated by traditional social structures and lifestyles. Zeng et al (2021) concur and aver that natural and cultural activities often represent the backbone of mountain tourism. Another form of tourism linked to mountain tourism is spiritual tourism which has various motivations that range from traditional religious tourism, alternative medicine to deep immersion with nature (WTO, 2019;2021; Ye et al., 2021; Lusticky et al, 2021; Kling 2020). Tourists visit mountains for wellness and fitness reasons (Chin et al., 2020; Bausch et al., 2021). Others are motivated by wanting to improve and balance the main domains of human life including, mental, emotional, physical, spiritual, intellectual and occupational (WTO, 2019).

According to Sisto et al (2021), mountains and their association with nature and spirituality help the development of experiences related to wellness. According to Do and Chen (2013), prioritizing factors that affect tourism performance is perceived as multi-criteria decision-making problem. Wang et al (2016) employed the Fuzzy Analytical Hierarchy Process to evaluate sustainable tourism in Taiwan. They find factors like environment and ecology, culture, climate, management policy and value creation as indicators of tourism satisfaction.

İlban and Yildirim (2017) used a multi-attribute method known as the Technique for Order Performance by Similarity to Ideal Solution (TOPSIS) to evaluate tourism destinations in 15 countries. They report that United States ranked number one in terms of tourist arrivals. Lakicevic and Duarkalic (2018) utilised a multi-criteria decision-making method to measure tourism market performance in European Union countries. The number of domestic tourists, pollution, cost of living and population density were shown as performance criteria in the European Union.

Lakicevic and Durkalic (2018) used the preference ranking for organisation method for enrichment evaluation (PROMETHEE) a multi-criteria decision-making method to measure tourism market performance in European Union countries. The number of foreign tourists, the number of domestic tourists, the number of hotels, pollution, population density, railway lines, airline terminals, and cost of living were revealed as performance criteria. Niavis and Tsiotas (2019) used data envelopment analysis to assess the tourism performance of Mediterranean coastal destinations in terms of effectiveness and efficiency. In their study, performance dimensions, location, bed, shore, and labor capacity as input and total demand as output were

shown as key factors that influence tourism in the Mediterranean region. The above studies have mainly focused on tourism in general. The contribution of the paper is on utilizing the FAHP to examine and prioritise factors that affect mountain tourism in developing countries like Zimbabwe.

Methodology

The paper prioritised eight criteria shown in figure 1 using the FAHP and extension of Saaty (1980) analytical hierarchy process (AHP) and fuzzy set theory. This approach has been widely employed in business and social sciences to prioritise decision making in cases of limited or scarce resources. Many domestic and international tourists often work with budgetary constraints. This is because most of them combine visits with complementary activities such as wellness, spirituality, and buying local mementos and souvenirs. These activities require significant amounts of money. The incorporation of fuzzy set theory into the AHP in this paper is based on the contention that human (tourist) judgements and preferences in visiting mountains as a form of tourism cannot be reduced to numbers due to the uncertainty in human perceptions. According to Merdivenci and Karakas (2020), ignoring the fuzziness of tourist behavior may lead to wrong decisions about factors that attract tourist to mountain areas.

Conceptual framework

Tourism criteria that were used in evaluating mountain tourism to Mount Nyangani include; perceived economic benefit (Dunets et al., 2020; Dornier and Mauri, 2018; Hall and Saarinen, 2021), environmental sustainability (Li et al., 2021; Sisto et al., 2021; Buning & Lamont, 2021), destination image (Pan et al., 2019; Wang & Ming, 2020; Dornier & Selmi, 2018), community participation (Nigg & Eichelberger, 2021; Diaz & Rodriguez, 2016), natural features (Apollo & Andreychouk, 2020; Sisto et al., 2021), perceived social costs (Chin et al., 2020; Cronje & du Plessis, 2020), human factors and supporting infrastructure (Chigora et al., 2020; Chimalyjevic et al., 2019; Chin et al., 2020; Bausch et al., 2021; Altuntaş and Yilmaz, 2016). In this paper, these terms are given the following definitions.

Perceived social costs refers to any social cost that has an impact on mountain-based communities such as cultural adulteration and expropriation and heightened conflicts between imported tourist values and indigenous norms and beliefs. Environment sustainability refers to damages to natural habitats, waste management and efforts to reduce biodiversity loss. Supporting infrastructure includes public transportation and communication systems, availability of hotels, security and health facilities that maybe needed by tourists.it may also include facilities such as those supporting biking, trailing, bird watching, handicrafts and wellness activities.

Perceived economic benefits is the perception that mountain-based communities are able to extract some benefits from various touristic activities and this include revenue inflows, foreign currency generation, employment creation and learning of new cultures and values. Tourist satisfaction refers to other activities that are directly or indirectly linked to mountain tourism that help to fulfil tourist needs for example, the ability to engage in other forms of tourism such as local gastronomy tourism, spiritual tourism, wellness tourism and rural tourism.

Destination image is the totality of factors that attract tourists to a specific destination and can include infrastructure, government support, perceived prices, natural features, and health and safety concerns. Community participation refers to the ability of mountain- based communities to make decision regarding tourist activities. This may help to reduce conflicts around culture, traditional beliefs and spiritual related particularly if these clash with foreign values, social norms and cultures. Finally human factors refer to attitudes of mountain-based

communities to visitors, skills, disseminating knowledge about resources availability, birds, plant species, and local traditions. These are illustrated in the conceptual framework below.

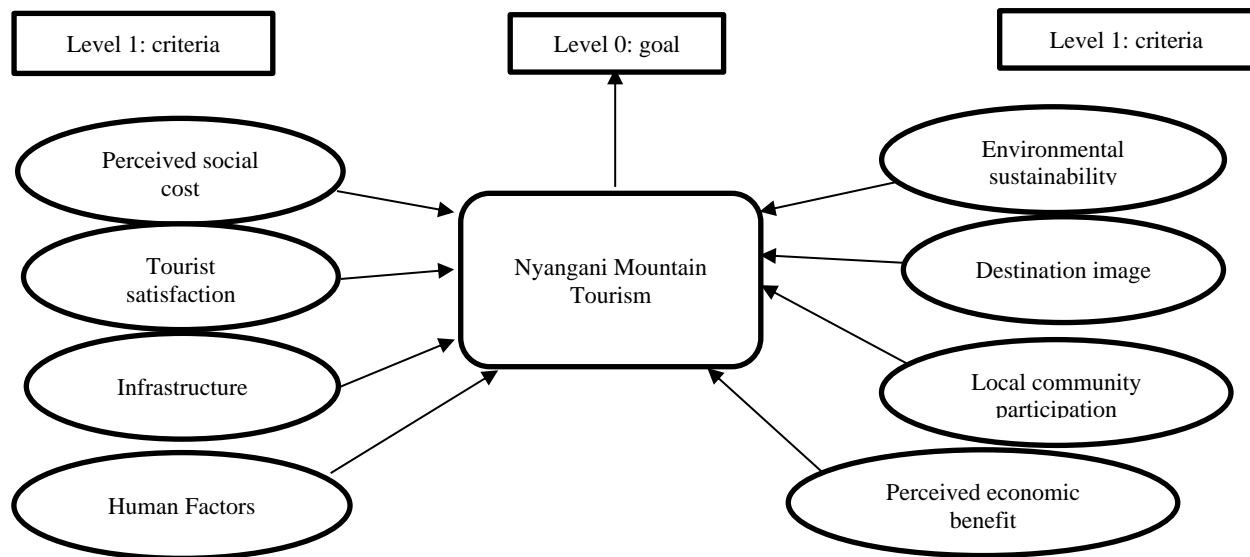


Figure I: an evaluation framework for factors that influence mountain tourism

Theoretical framework development

Various multi-criteria decision-making techniques such as the DEMATEL, PROMETHEE, and TOPSIS can be used to analyse the causal relationship of complex factors that attract mountain tourists. Whilst these techniques have been used successfully to rank tourists' decision criteria, the extant study adopts the (FAHP) for the following reasons. Many recent studies have indicated the appropriateness of co-opting fuzzy theory-based approaches in analysing mountain tourists' decisions and behaviour (Merdivenci & Karakas, 2020; Nilashi et al., 2019; Altuntaş & Yilmaz, 2016). In addition, the FAHP helps to eliminate or eradicate the complexity of meanings created by other methods such as the DEMATEL and PROMETHEE (see Li, 1999; Lin & Wu, 2008; Baykaşoğlu et al., 2013; Nilashi et al., 2019; Sheng-Li et al., 2018). Many studies indicate that FAHP is useful when dealing with the ambiguity of human language and thought during decision making (Lhee et al., 2011; Ribeiro et al., 2018; Han et al., 2018; Altuntaş & Yilmaz, 2016). Researchers such as Lin and Wu (2008) argue that the FAHP is an intuitive, user friendly and easy to handle multi-criteria method that also helps to find consistency in judgements.

In order to the FAHP to convert linguistic judgements into triangular fuzzy numbers the following procedures were adopted. Let $S \in F(Z)$ be a fuzzy number if it exists $y_0 \in Z$ such that $\theta_S(y_0) = 1$. $B_\alpha = \{y \in Z \mid \theta_S(y) \geq \alpha\}$ is a closed interval for any $\alpha \in \{0.1\}$. $F(Z)$ is representing all fuzzy number sets. S is the set of real numbers. A triangular fuzzy number is then represented as $Z = (l, c, u)$ if its membership function $\theta_S(y): Z \rightarrow [0,1]$ is equal to;

$$\theta_S y = \begin{cases} \frac{y-l}{c-l}, & y \in [l, c] \\ \frac{y-u}{c-u}, & y \in [c, u] \\ 0, & \text{Otherwise} \end{cases} \quad (1)$$

Where $l \leq c \leq u$, l, c and u are lower, upper and middle-values of the support of S respectively. The support of S is the set of all elements $\{y \in Z \mid l < y < u\}$

Let triangular fuzzy numbers Z_1, Z_3, Z_5, Z_7 and Z_9 represent the assessment from equally to extremely important and $Z_2, Z_4, Z_6,$ and Z_8 are the middle values.

Let $Y = \{y_1, y_2, y_3, \dots, y_n\}$ be an object set and $U = \{u_1, u_2, u_3, \dots, u_n\}$ be an objective set. Each of the object is taken to execute extent analysis for each goal respectively. Then the s extent analysis values for each object can be discovered with the following signs.

$S_{g_i}^1, S_{g_i}^2, \dots, S_{g_i}^s$, where $i = 1, 2, 3, \dots, n$;

Where $S_{g_i}^j = \{l_{g_i}^j, n_{g_i}^j, u_{g_i}^j\}$, $j = 1, 2, \dots, s$ are triangular fuzzy numbers. The value of the fuzzy synthetic extend with respect to the i^{th} object is expressed as;

$$R_i = \sum_{j=1}^n S_{g_i}^j \times \left\{ \sum_{i=1}^n \sum_{j=1}^n S_{g_i}^j \right\}^{-1} \quad (2)$$

The degree of possibility of $S_1 \geq S_2$ is expressed as in equation below

$$V\{S_1 \geq S_2\} = (\sup | \min) \{u_{S_1}(x), u_{S_2}(y)\} \text{ where } y \geq x \quad (3)$$

When a pair (x, y) exists such that $x \geq y$ and $u_{M_1}(x) = u_{M_2}(y) = 1$, then $V(R_1 \geq R) = 1$, if $c_1 \geq c_2$. If $c_1 < c_2$, $V(S_1 \geq S_2) = \text{hgt}\{S_1 \cap S_2\}$, then

$$V(S_1 \geq S_2) = \left\{ \frac{l_2 - u_1}{(c_1 - u_2) - (c_2 - l_2)} \right\}^{l_2} \leq u_2, \text{ otherwise} \quad (4)$$

The degree of possibility for a triangular fuzzy number that is greater than K triangular fuzzy number $S_1 (i = 1, 2, 3, \dots, k)$ can be expressed as $V(S \geq S_1, S_2, \dots, S_k) = \min V(S \geq S_i)$. Assume that $d'(A_t) = \min V(S_t \geq S_k)$ where d' is the abscissa of the highest intersection point between B_i and B_2 and A_t is the i^{th} element of the k^{th} level for $k = 1, 2, \dots, n; k \neq i$. The weight vector of the k^{th} level is $W' = (d'(B_1), d'(B_2), \dots, d'(B_n))^T$. The normalised weight vector is then obtained by normalization as $W = (d(B_1), d(B_2), \dots, d(B_n))^T$

Where W is not a fuzzy number. The reliability obtained from pairwise comparison is determined as a measure for the consistency index. A reasonable evaluation is less than 0.1 whilst an acceptable evaluation is less than 0.2 (Lhee et al., 2011).

Data collection

The data was collected from ten respondents comprising of two community leaders, five tourists and 3 experts that are knowledgeable about mountain tourism. A ten-point structured questionnaire was administered covering the eight criteria. The goal was to select the best factors or criterion that can be used to explain mountain tourism in Mount Nyangani. In order to increase reliability and validity of the findings a consistency test was applied on pairwise comparison. The responds were transformed into triangular fuzzy numbers (TFNs) using the FAHP.

Findings and discussions

The FAHP findings in Table 1 show that the most important factor that mountain tourism to Mount Nyangani is the destination image with a weight of 0,198 and closely followed by tourist satisfaction with 0,191. A number of studies also show that tourist satisfaction and destination image influences mountain tourism loyalty, customized health and wellness activities such as a suitable climate and complementary activities such as biking, trailing, bird watching and game viewing of mountain wild life is like to increase tourist satisfaction and destination image (Altuntaş & Yilmaz, 2016; Hall & Saarinen, 2021; Bausch et al., 2021). Other factors that at the top list of many mountain tourists shown by the FHAP include community participation (0,182), supporting infrastructure (0,181), environmental sustainability (0,177), perceived economic benefit (0,171) and perceived social costs (0,152). These findings have support in empirical literature (see for example, Dornier & Selmi, 2018; Buning & Lamont, 2021; Chigora et al., 2020). From the above ranking human factors attracted the least weight with 0,130. Community participation through job creation, building complementary infrastructure,

involving tourists in local traditions and cultures as well as improved revenue generation for mountain-based tourism has been reported to increase perceived economic benefits of mountain tourism (Chin et al., 2020; Cimbaljević et al., 2019). The above findings also agree with Merdivenci and Karakas (2020) and Li et al (2021) who observed mountains have connection with nature and spirituality and hence can set the scene for the development of tourist experiences that are connected with other wellness programs.

Table 1: Weights of factors that influence mountain tourism

Environmental sustainability	0,177
Perceived social costs	0,152
Perceived economic benefit	0,171
Community participation	0,182
Tourist satisfaction	0,191
Infrastructure	0,181
Human factors	0,130

Recommendations

Policy implications

Despite the magnificence of Mount Nyangani, supporting infrastructure such as roads, hotels, restaurants and communication systems around Mount Nyangani is under-developed. Policy makers are recommended to consider using green investments as a source of revenue to fund public infrastructure. The advantage of using green investment is that they support a circular economy that addresses sustainability in mountain tourism through conservation, waste management, enhancing natural landscape and cultural heritage, promoting greater energy efficiency, and ensuring resilient, low carbon and resource-efficient mountain-based tourism. The use of green investment could be a good strategy that allows public sector investment in mountain communities to unlock opportunities that increases mountain community resilience against the effect of climatic change on mountain regions that largely infertile and hostile to normal economic activities. In order to attract green investments, it be important that government invests also in local human capital and maintenance of tourism statistics to this mountain. Innovative circular economy models, waste management, skills development, digital infrastructure and access to green finance are some of the key areas where efforts and investment are needed in order to promote sustainable tourism in mountain areas.

Implication for tourist management

There is a need to create strong synergies with other key economic sectors in Zimbabwe such as the transport and retail sectors. This can enable a full integration of mountain tourism within the key economic sector in order to create a win-win synergy. For instance, strategies that ensure symbiotic relation between mountain tourism and agriculture, culture, education and health, natural hazard prevention, waste management and biodiversity conservation can help leverage mount Nyangani as a safe and attractive destination for both domestic and foreign tourists. This may also to reduce the perceived costs of visiting mount Nyangani. Mountain destinations are well known for their remoteness, inaccessibility and weak public infrastructure. For any sustainable mountain tourism development strategy, digitilisation is therefore imperative in order to improve and simplify marketing, traveling logistics, commercialisation of mountain-based activities, administrative, and pricing processes.

This will help not only to reduce costs, diversify clientele, strengthen synergies with other non-mountain tourism such as spirituality and wellness, but also to increase efficiencies both in the upstream and downstream mountain tourism value chains. Working with global

players in the tourist industry such as Airbnb and Vrbo, digitilisation mountain-based communities may assist in improving perceived benefits by increasing the productivity of mountain tourism. Consequently, this will make Mount Nyangani a competitive tourist destination. Enhancing perceived benefits could involve engaging in sustainable mountain tourism through targeted marketing innovations and initiatives such as those respect cultural values, beliefs and subjective norms given the background that Mount Nyangani is considered sacred by local communities. Raising responsiveness regarding the adverse effects of mountain tourism particularly the likelihood of damaging the unique environment, ecological and social systems might also help to minimise resource-based conflicts on contested sites such as Mount Nyangani. Community participation was found to be a key factor influencing mountain tourism. Therefore, traditionally marginalised indigenous people together with women and youth must be empowered in order for them to benefit from perceived benefits of tourism particularly job creation and income generation. The advantage of improving community participation is the ability to manage the potentially adverse impacts of tourism such as cultural appropriation and ecological damages.

Mountain communities, and in particular traditionally marginalized groups (women, youth, indigenous people), need to be empowered, so that they can benefit from the opportunities that tourism can bring to their regions and handle the potentially negative impacts on the environment and their culture. Destinations should encourage sustainable travel practices, with the help of targeted marketing initiatives. These should include promoting community-based tourism, with activities and experiences that respect local cultures and values. Awareness-raising about the negative impacts of tourism on mountains' unique ecological and social systems, as well on behaviour change in the people who live there, is also needed at all levels, including for individual mountain tourists, tourism businesses and service providers, and policy-makers. Mountain communities, and in particular traditionally marginalized groups (women, youth, indigenous people), need to be empowered, so that they can benefit from the opportunities that tourism can bring to their regions and handle the potentially negative impacts on the environment and their culture. Innovative circular economy models, waste management, skills development, digital infrastructure and access to green finance are some of the key areas where efforts and investment are needed in order to promote sustainable tourism in mountain areas. From other recommendations include: promoting low-impact and climatic-sensitive mountain tourism by encouraging better management of litter and waste produced, respecting the carrying capacity or saturation of mountains and empowering mountain-based communities to take responsibility of tourism development.

Conclusions

Mountainous areas have diverse ecosystems that can be used to attract visitors with various motives ranging from self-fulfillment, spirituality growth, wellness, local culture and religious experiences to simple outdoor adventures. The paper employed the fuzzy analytic hierarchical process to prioritise factors that influences mountain tourism using the case of Mount Nyangani, Zimbabwe. Our findings show that improving tourist destination image, local community participation, tourist satisfaction and improving local infrastructure are some of the factors that attract tourist to mountain areas.

References

- Apollo, M. & Andreychouk, V. (2020). Trampling Intensity and Vegetation Response and Recovery according to Altitude: An Experimental Study from the Himalayan Miyar Valley. *Resources* 9, 98.

- Aggarwal, A., Frey, H., McDowell, G., Drenkhan, F., Nusser, M., Racoviteanu, A. & Hoelzle, M. (2021). Adaptation to Climate Change Induced Water Stress in Major Glacierized Mountain Regions. *Climate and Development*, 21–13.
- Altuntaş, S. & Yilmaz, M. K. (2016). Fuzzy DEMATEL Method to Evaluate the Dimensions of Marketing Resources: An Application in SMEs. *Journal of Business Economics and Management*, 17(3), 347-364.
- Bausch, T., Gartner, W. C. & Humpe, A. (2021). How Weather Conditions Affect Guest Arrivals and Duration of Stay: An Alpine Destination Case. *International Journal of Tourism Research*, 23(6),1006–1026.
- Baykaşoğlu, A., Kaplanoğlu, V., Durmuşoğlu, Z. D. & Şahin, C. (2013). Integrating Fuzzy DEMATEL and Fuzzy Hierarchical TOPSIS Methods for Truck Selection. *Expert Systems with Applications*, 40(3), 899-907.
- Buning, R. & Lamont, M. (2021). Mountain Bike Tourism Economic Impacts: A Critical Analysis of Academic and Practitioner Studies. *Tourism and Economic Journal*, 20(27), 500–509.
- Buning, R.J., Cole Z. & Lamont, M. (2019). A Case Study of the US Mountain Bike Tourism Market. *Journal of Vacation Marketing* 25(4), 515–527.
- Chigora, F., Mutambara, E., Ndlovu, J., Muzurura, J. & Zvavahera, P. (2020). Towards Establishing Zimbabwe Destination Brand Equity Variables Through Sustainable Community Involvement. *The African Journal of Hospitality, Tourism and Leisure* 9(5), 1094-1110.
- Chin, C.H., Lo, M.C., Bin Razak, Z., Pasbakhsh, P. & Mohamad, A.A. (2020). Resources Confirmation for Tourism Destinations Marketing Efforts Using PLS-MGA: The Moderating Impact of Semirural and Rural Tourism Destination. *Sustainability*, 12, 6787.
- Cimbaljević, M., Stankov, U. & Pavluković, V. (2019) Going beyond the Traditional Destination Competitiveness—Reflections on a Smart Destination in the Current Research. *Current Issues on Tourism* 22, 2472–2477.
- Cronjé, D.F. & du Plessis, E. (2020) A Review on tourism destination competitiveness. *Journal of Hospitality and Tourism Management* 45, 256–265.
- Deng, J., Che, T., Jiang, T. & Dai, L. Y. (2021). Suitability Projection for Chinese Ski Areas Under Future Natural and Socioeconomic Scenarios. *Advances in Climate Change Research*, 12(2), 224–239.
- Díaz, M., R. & Rodríguez, T. F. E. (2016). Determining the Sustainability Factors and Performance of a Tourism Destination from the Stakeholders' Perspective. *Sustainability*, 8(9), 1-17.
- Do, Q. H. & Chen, J. F. (2013). Prioritizing the Factor Weights Affecting Tourism Performance by FAHP. *International Journal of Engineering Business Management*, 5(51), 1-10.
- Dornier, R. & Selmi, N. (2018). Peer-to-peer Accommodation and Sustainability in Mountain Areas. *Worldwide Hospitality and Tourism Themes*, 10(2), 259-266.
- Dornier, R. & Mauri, C. (2018). Conclusions: Managing tourism Sustainability in Mountain Destinations. *Worldwide, Hospitality and Tourism Themes*,10(2), 267-273.

- Duglio, S. & Letey, M. (2019). The Role of a National Park in Classifying Mountain Tourism Destinations: An Exploratory Study of the Italian Western Alps. *Journal of Mountain Sciences* 16, 1675–1690.
- Dunets, A.N., Yankovskaya, V., Plisova, A.B., Mikhailova, M.V., Vakhrushev, I.B. & Aleshko, R.A. (2020). Health Tourism in Low Mountains: A Case Study. *Entrepreneur. Sustainable Issues*, 2(7), 2213–2227.
- Durán-Román, J.L., Cárdenas-García, P.J. & Pulido-Fernández, J.I. (2021). Tourists' Willingness to Pay to Improve Sustainability and Experience at Destination. *Journal of Destination Marketing and Management*, 19, 100540.
- Hall, M. C. & Saarinen, J. (2021). 20 Years of Nordic Climate Change Crisis and Tourism Research: A Review and Future Research Agenda. *Scandinavian Journal of Hospitality and Tourism*, 21(1), 102–110.
- Han, H., Kiatkawsin, K., Jung, H. & Kim, W. (2018). The role of Wellness Spa Tourism Performance in Building Destination Loyalty: The Case of Thailand. *Journal of Travel & Tourism Marketing*, 35(5), 595-610.
- Kılavuz, E. (2018). Medical Tourism Competition: The Case of Turkey. *International Journal of Health Management and Tourism*, 3(1), 42-58.
- Kristjánsdóttir, K.R., Ólafsdóttir, R. & Ragnarsdóttir, K.V. (2018). Reviewing Integrated Sustainability Indicators for Tourism. *Journal of Sustainable Tourism*, 26, 583–599.
- Leung L. C. & Cao, D. (2000). On Consistency and Ranking of Alternatives in Fuzzy AHP. *European Journal of Operational Research*, 124 (1) 102–113.
- Lhee, S.C., Choi, Y.J. & Choi, Y. (2011) Determining the Priority of Factors for Reducing Energy at Deteriorated School Buildings Using AHP Method. *Journal of the Korea Institute of Ecological Architecture and Environment*, 11, 127-132.
- Li, T.; Liu, F. & Soutar, G.N. (2021). Experiences, Post-Trip Destination Image, Satisfaction and Loyalty: A Study in An Ecotourism Context. *Journal of Destination Marketing Management*, 19, 100547.
- Li, R. J. (1999). Fuzzy Method in Group Decision Making. *Computers & Mathematics with Applications*, 38(1), 91-101.
- Lin, C. J. & Wu, W. W. (2008). A Causal Analytical Method for Group Decision-Making Under Fuzzy Environment. *Expert Systems with Applications*, 34(1), 205-213.
- Marques, C., da Silva, R.V. & Antova, S. (2021). Image, Satisfaction, Destination and Product Post-Visit Behaviours: How Do They Relate in Emerging Destinations? *Tourism Management*, 85, 104293.
- Merdivenci, F. & Karakas, H. (2020). Analysis of Factors Affecting Health Tourism Performance Using Fuzzy Dematel Method. *Advanced Hospital and Tourism Research*, 8, 371–392.
- Milicevic, S.; Boskovic, N. & Lakicevic, M. (2021). Sustainable Tourism Development in Mountain Areas in Sumadija and Western Serbia. *Journal of Mountain Sciences*, 18, 735–748.
- Muzurura, J., Mutambara, E. & Mahohoma T. (2022). In Search of Heterotopia religiosity? Motives for Religious Tourism and Pilgrimages to Zion Christian Church Mbungu Shrine: A Case from Zimbabwe. *Pharos Journal of Theology*, 103 (1), 1-16

- Muzurura, J., (2016): Determinants of foreign direct investment (FDI) in Zimbabwe: What factors matter? Published in: *Research in Business and Economics Journal* 1(1), 1-19.
- Muzurura J., Sikwila, M. & Nesongano T. (2017). The Impact of Foreign Direct Investment (FDI) on Export Growth: Evidence from Zimbabwe-1980 to 2011. *Research in Business and Economics Journal*, 12(1),1-17.
- Nigg, J.J.& Eichelberger, S. (2021). Sustainable Product Development for Accessible Tourism: Case Studies Demonstrating the Need for Stakeholder Collaboration. *Sustainability*, 13, 11142.
- Niavis, S. & Tsiotas, D. (2019). Assessing the Tourism Performance of the Mediterranean Coastal Destinations: A Combined Efficiency and Effectiveness Approach. *Journal of Destination Marketing & Management*, 14, 1-11.
- Nilashi, M., Samad, S., Manaf, A. A., Ahmadi, H., Rashid, T. A., Munshi, A., Almukadi, W., Ibrahim, O. & Ahmed, O. H. (2019). Factors influencing medical tourism adoption in Malaysia: A DEMATEL-Fuzzy TOPSIS approach. *Computers & Industrial Engineering*, 137(106005), 1-11.
- Pan, X., Yang, Z., Han, F., Lu, Y., Liu, Q. (2019). Evaluating Potential Areas for Mountain Wellness Tourism: A Case Study of Ili, Xinjiang Province. *Sustainability*, 11, 5668
- Perles-Ribes, J.F., Moreno-Izquierdo, L. & Torregrosa, T. (2021). Satisfaction, Seasonality and Tourist Expenditure in Consolidated Tourist Destinations. *Journal of Tourism Hospitality Research*, 2(32), 489–500.
- Ribeiro, M. L., Vasconcelos, M. L. & Rocha, F. (2019). Monitoring performance indicators in the Portuguese hospitality sector. *International Journal of Contemporary Hospitality Management*, 32(2), 790-811.
- Romeo, R., Russo, L., Parisi, F., Notarianni, M., Manuelli, S. & Carvao, S., UNWTO. (2021). *Mountain tourism – Towards a more sustainable path*. FAO
- Saaty, T.L. (1980). *The Analytic Hierarchy Process: Planning, Priority Setting, Resources Allocation*. McGraw, New York.
- Saaty, T. (1994). A Ratio Scale Metric and the Compatibility of Ratio Scales: The Possibility of Arrow's Impossibility Theorem. *Applied Mathematics Letters* 7 (6), 51–57.
- Sheng-Li, S., Xiao-Yue, Y., Hu-Chen, L. & Zhang, P. (2018). DEMATEL Technique: A Systematic Review of the State-of-the-art Literature on Methodologies and Applications. *Mathematical Problems in Engineering*, 1-33.
- Sisto, R., Cappelletti, G.M., Bianchi, P., Sica, E. (2021). Sustainable and Accessible Tourism in Natural Areas: A Participatory Approach. *Current Issues on Tourism*, 1–18.
- Tian, J. & Ming, Q. (2021). Spatial Connection Between Mountainous Scenic Spot and Town in Mountain Tourism Destination and Coupling Mechanism: A Cases Study from Lijiang, Yunnan. *Economic and Geography*, 41, 212–220.
- Vij, S., Biesbroek, R., Adler, C. & Muccione, V. (2021). Climate Change Adaptation in European Mountain Systems: A Systematic Mapping of Academic Research. *Mountain Resources Development*.
- Wang, J., Liu, H. & Ming, Q. (2020). The Composition of Mountain Tourism Attractiveness in Coastal Provinces: Case Study of Guangxi. *Journal of Coastal Resources*, 103, 1153–1157.



- Ye, S., Wei, W., Wen, J., Ying, T. & Tan, X. (2021). Creating Memorable Experience in Rural Tourism: A Comparison between Domestic and Outbound Tourists. *Journal of Travelling Research*, 60, 1527–1542.
- Zadeh, L. A. (1965). Fuzzy Sets. *Information and Control*, 8(3), 338-353.
- Zadeh, L. (1976). A Fuzzy-algorithmic Approach to the Definition of Complex or Imprecise Concepts. *International Journal of Man-Mach Studies*, 8, 249–291.
- Zeng, L., Li, R. & Huang, X. (2021). Sustainable Mountain-Based Health and Wellness Tourist Destinations: The Interrelationships between Tourists' Satisfaction, Behavioral Intentions, and Competitiveness. *Sustainability*, 13, 13314
- Zeng, Y.X. & Zhong, L.S. (2020). Identifying Conflicts Tendency Between Nature-Based Tourism Development and Ecological Protection in China. *Ecology Indicator*, 109.