

**STRATEGIC ANALYSIS OF SUSTAINABLE TOURISM FOR TURKEY WITH
SWOT BASED FUZZY MCDM APPROACH**

(SWOT TEMELLİ BULANIK ÇOK KRİTERLİ KARAR VERME YAKLAŞIMIYLA
TÜRKİYE İÇİN SÜRDÜRÜLEBİLİR TURİZMİN STRATEJİK ANALİZİ)

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This is to certify that the thesis entitled

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ABSTRACT

Misuse of natural resources has dramatically increased with the tourism activities. Turkey is one of the popular tourism destinations, hence it has its share from this negative situation. One of the solutions to decrease the possible effects of those threats against the environment is sustainability studies. Selecting the significant strategies among different alternatives with different specifications drives decision makers to apply strategical analysis. For this purpose, Multi-Criteria Decision Making (MCDM) is an efficient and productive tool that is widely used for evaluating and weighting criteria which containing multiple, usually conflicting criteria. The studies around the word to maintain the sustainable tourism is as much as essential for Turkey, too. For that purpose, primarily, strengths and weaknesses, opportunities and threats of sustainable tourism in Turkey are identified by using SWOT (Strengths, Weaknesses, Opportunities, Threats) analysis based on a detailed survey analysis and tourism experts' view. After that, several strategies are created with literature survey and experts' opinion. The identified factors are prioritised with Fuzzy Analytical Hierarchy Method (fuzzy AHP). To determine the most efficient strategy or strategies fuzzy VIKOR (VIseKriterijumska Optimizacija I Kompromisno Resenje, Multicriteria Optimization and Compromise Solution) method is applied. In the literature, there are studies with regard to SWOT based method upon sustainable tourism, however; on the basis of Turkey, neither SWOT based method nor fuzzy AHP and fuzzy VIKOR method are used together in a study which is about sustainable tourism. Therefore, this study has a significant importance regarding serving as a model for both theoreticians and practitioners and making a contribution to the literature.

RESUMÉ

Le mauvais usage des ressources naturelles a augmenté de manière spectaculaire avec le développement du tourisme. La Turquie, étant une destination touristique populaire, souffre de cet abus de ressources. Les études de durabilité font partie des solutions proposant de réduire les possibles effets des menaces que porte le tourisme sur l'environnement. La sélection des stratégies les plus significatives parmi toutes les alternatives pousse les preneurs de décision à appliquer une analyse stratégique. A cette application, la Prise de Décision à Multicritères (MCDM - Multi Criteria Decision Making) est un outil efficace et productif largement employé pour l'évaluation et la pondération de multiples critères, souvent en conflit. Les études du maintien du tourisme durable à travers le monde sont essentielles au tourisme de Turquie. Cette étude propose donc de définir les forces et faiblesses du tourisme durable en Turquie, ainsi que les opportunités et les menaces contenues dans son environnement en appliquant une analyse SWOT (Strengths, Weaknesses, Opportunities and Threats), basée sur une enquête détaillée et la revue d'un expert en tourisme. Dans une deuxième étape, des stratégies sont créées en s'inspirant de la littérature et d'opinions d'experts. Les priorités sont pondérées avec la méthode Fuzzy Analytic Hierarchy Process (Fuzzy AHP). Afin d'obtenir la ou les stratégies les plus efficaces obtenues précédemment, elles ont été comparées et sélectionnées avec la méthode fuzzy VIKOR (VIseKriterijumska Optimizacija I Kompromisno Resenje). Des analyses SWOT appliquées au tourisme durable sont disponibles dans la littérature. En revanche, la méthode SWOT n'a jamais été appliquée au tourisme durable en Turquie et les méthodes FAHP et fuzzy VIKOR n'ont jamais été utilisées de manière combinée dans une étude du tourisme durable. L'importance de cette étude réside en ce qu'elle peut servir de modèle pour les théoriciens et les praticiens et qu'elle sert de contribution à la littérature.

ÖZET

Turizm aktiviteleri ile turistik bölgelerdeki doğal kaynakların yanlış kullanımı önemli ölçüde artmıştır. Turizm ülkesi olarak bilinen Türkiye de bu durumdan olumsuz etkilenen ülkelerden biridir. Çevreye karşı oluşabilecek bu tehditleri azaltmak için alınabilecek önlemlerden biri de sürdürülebilirlik çalışmalarıdır. Birçok stratejiler içeren çalışmalar arasından etkin olanlarını seçmek, karar vericileri bu konuda stratejik bir analiz yapmaya yönlendirmiştir. Bu nedenle, Çok Kriterli Karar Verme (ÇKKV) Yöntemi birden fazla ve çelişen kriterleri değerlendirerek ve ağırlıklandırarak sıralayan etkin ve verimli bir yöntemdir. Dünyada sürdürülebilir turizmi sağlamak için yaygın olan bu yöntem, Türkiye için de gereklidir. Bu amaçla öncelikle SWOT (Güçlü yönler, Zayıf yönler, Fırsatlar, Tehditler) analizi kullanılarak Türkiye’de sürdürülebilir turizmin güçlü ve zayıf yönleri, sahip olduğu fırsat ve tehditleri detaylı bir yazın taraması ve sürdürülebilir turizm uzmanlarının görüşlerine dayanılarak belirlenmiştir. Tekrar yapılan yazın taraması ve uzmanların görüşlerinin alınmasıyla Türkiye’de sürdürülebilir turizm için stratejiler oluşturulmuştur. Belirlenen SWOT kriterleri Bulanık Analitik Hiyerarşi Yöntemi (bulanık AHP) ile de ağırlıklandırılarak önceliklendirilmiştir. Oluşturulan stratejiler içinden en etkin olanı ya da olanları seçmek için bulanık VIKOR (ViseKriterijumska Optimizacija I Kompromisno Resenje) yöntemi çalışılmıştır. Literatürde, Dünya ve Türkiye bazında sürdürülebilir turizm üzerine, ne SWOT temelli ne de bulanık AHP ve bulanık VIKOR yöntemleri birlikte kullanılarak bir çalışma yapılmıştır. Bu nedenle bu çalışma hem kuramcılara hem de uygulayıcılara model olan ve bir çalışmadır.

1. INTRODUCTION

Tourism is the fastest growing industry in the world which depends on cultural and natural resources. It cannot be discussed the existence of tourism in a situation where those resources have been jeopardized. For this problem, sustainable tourism is an effective solution (Demir & Çevirgen, 2006).

The meaning of sustainable tourism is meeting the needs of the present visitors and host regions while protecting and enhancing the natural environment for future generations (World Trade Organization, 2009). Sustainable tourism is originated from sustainable development that meets the needs of the present, without compromising the ability of future generations to meet their needs (Brundtland Report, 1997). Since Turkey has many potential touristic areas and tourism is a fundamental source of income in the country, sustainable tourism has been gaining importance in Turkey. If some precautions are not taken which are about sustainability, it may cause certain unfavourable results. By using sustainable tourism, adverse effects could be turned into opportunities and threats against tourism could be reduced. Thus, there is a need for improvement (Tourism Strategy of Turkey, 2007). To improve and maintain sustainable tourism; some strategies should be constructed with the help of SWOT analysis. Despite this, there is not enough research based on SWOT analysis of sustainable tourism in Turkey (Tosun, 2001). This is the main reason for focusing on this issue and constructing the SWOT strategies. SWOT analysis includes the objective of the specific project and identifies the internal and external factors that are proper and improper to reach that aim (Ommani, 2011). In other words, SWOT analysis is a part of the planning process and the optimal technique for strategic plans to take all factors into consideration.

Furthermore, complex nature of the strategic analysis and selection processes with different objectives need to be handled by many different criteria to select the best Multi-Criteria Decision Making (MCDM) is a profound technique utilized for such problems that contain various and generally conflicting criteria (Pomerol & Barba-Romero, 2000).

The AHP (Saaty, 1980) is a quantitative procedure that structures a multi-quality, multi-individual and multi-period issue progressively with the goal that solutions are encouraged. One of the fundamental favorable circumstances of this strategy is the relative adequacy which it handles various criteria with. It can successfully handle both subjective and quantitative information. Despite the fact that the point of AHP is to catch the specialists' learning, the routine AHP still can't mirror the equivocalness in individual speculation style. In this way, fuzzy AHP, a fuzzy extension of AHP, was created to tackle the progressive fuzzy issues, and numerous fuzzy AHP strategies by different creators are proposed (van Laarhoven & Pedrycz, 1983). Moreover, AHP can adapt up to both subjective and quantitative information persuasively. In any case, then again, AHP is insufficient and imperfect in taking care of the equivocalness of the ideas that are connected with individual's subjective judgment. The fuzzy AHP method, which joins AHP and fuzzy logic, permits a more exact portrayal of the decision-making handle. The fuzzy AHP methodology broadens Saaty's AHP by consolidating it with the fuzzy set theory spearheaded by Zadeh (1965). Fuzzy set theory is intended to demonstrate the unclarity or imprecision of human psychological procedures. The key thought of the fuzzy set theory is that a component has a level of participation in a fuzzy set (Negoita, 1985; Zimmermann, 1985). It is essentially a theory of classes with non-sharp limits. It has the upside of scientifically speak to vulnerability and unclarity and give formalized apparatuses to managing the imprecision natural for some issues. It can give the adaptability and vigor required for the decision-maker to comprehend the choice issue. These benefits of the approach created would encourage its utilization in genuine circumstances for settling on compelling choices (Chan & Kumar, 2007).

Over the years, different behavioural scientists, operational researchers, and decision theorists have proposed a variety of methods describing how a decision-making might arrive at a preference judgment while choosing among the multiple attribute alternatives.

Recently, the VIKOR method has been introduced as an applicable technique to implement within MCDM (Opricovic, 1998). The VIKOR method provides a maximum group utility for the majority and a minimum of an individual regret for the opponent. It introduces the multi-criteria ranking index based on the measure of closeness to the ideal solution (Opricovic, 1998). Although the VIKOR method has several advantages, the performance ratings and criteria's weights are quantified as crisp values. On the other hand, under many circumstances, crisp data are inadequate to model real-life situations. Human judgments including preferences are often vague. Therefore, it is difficult to rate them as exact numerical values. To apply more realistic approach by using linguistic assessments, instead of crisp values, fuzzy VIKOR method is applied. Fuzzy VIKOR supposes that the ratings and weights of the criteria in the problem are obtained by means of linguistic variables.

In this study, SWOT based fuzzy MCDM methodology is proposed for making an effective evaluation of sustainable tourism strategies for Turkey with the help of wide literature survey and providing all necessary information, data, and opinions by sustainable tourism experts by applying mainly two MCDM techniques. Fuzzy AHP is applied to find the weights of each defined SWOT factors based on wide literature survey and experts' opinion and construct sustainable tourism strategies for Turkey. The selection of the most significant one among the multiple strategies is carried out with the fuzzy VIKOR method by taking into consideration of experts' consultancy.

The main contribution of this thesis is the new evaluation framework for selecting strategies to help the decision makers in sustainable tourism. There is no study in the literature applying SWOT based combined fuzzy AHP and fuzzy VIKOR methodology on sustainable tourism in Turkey. The rest of this study is constructed as follows: sustainable tourism is briefly reviewed in Section II and the previous studies in the literature are shown. Section III proposes the methods and techniques used in the study, in other words, analyses the sustainable tourism for Turkey with combined SWOT-fuzzy AHP method and applied fuzzy VIKOR methodology to select the best strategy for sustainable tourism in Turkey. Section IV includes the application of the proposed framework. Section V gives the concluding remarks with future directions.

2. SUSTAINABLE TOURISM

2.1 Definition of Sustainable Tourism and Main Characteristics

Sustainable tourism creates awareness for individuals to take a role in achieving a sustainable environment for the future and eco-tourism. Human action related to tourism activities makes it less sustainable (Learned et al., 1965).

To provide the development of sustainable tourism, all related parties should be informed, and extensive participation and composition should be maintained by means of intense political leadership skills. Sustainable tourism itself is a never ending process and to be able to keep this process productive its effects should be observed, in required situations corrective or preventive measures should be taken into account.

Sustainable tourism should have the power of achieving the high level of tourist contentedness and assuring a significant experience to the tourists while paying attention to sustainability situations and giving countenance to sustainable tourism activities between them (United Nations Educational, 2009).

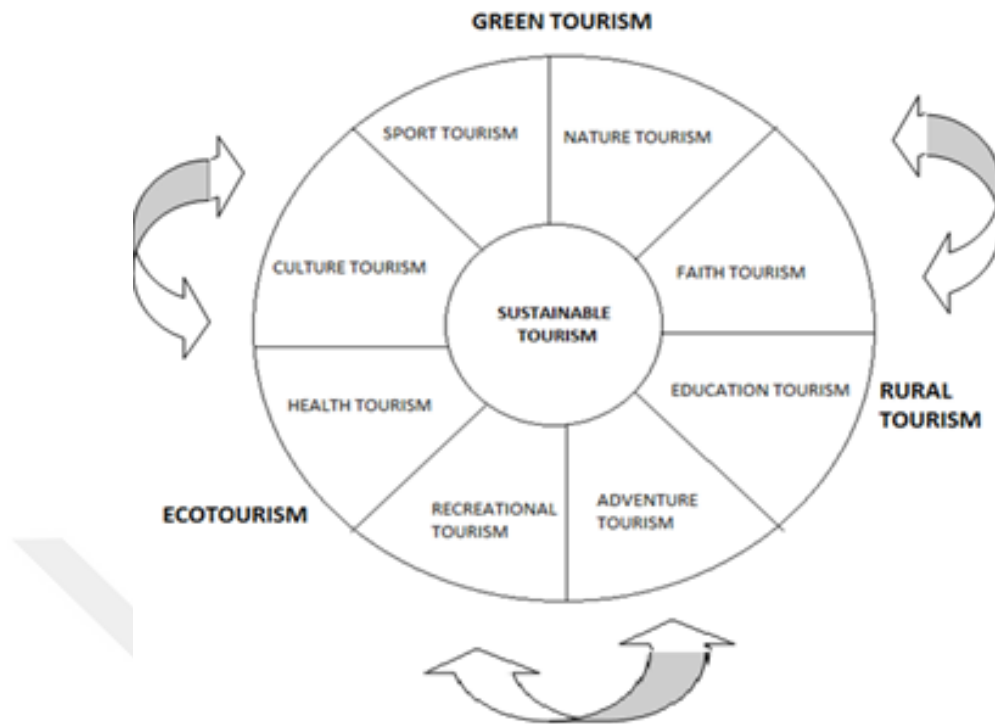


Figure 2.1: Sustainable Tourism Chart (Sustainable Tourism Definition, 2011)

Table 2.1: The objectives of sustainable tourism (Bac, 2013)

Economic	Social	Environmental
Guaranteeing long-term sustainable financial exercises	Regard the socio-cultural conventions of destinations	Finding the most ideal approaches to utilise common assets, which is the key component of tourism advancement
Guaranteeing fair financial advantages to all partners	Safeguarding of cultural legacy and conventional qualities	Securing ecological procedures
Commitment to destitution destruction	Contribute to expanding intercultural resistance	Support the protection of characteristic assets and biodiversity

In the most recent years, the tourism business began to give careful consideration to the standards of sustainable tourism. However, one can think about whether this consideration is driven by a genuine enthusiasm for regarding the principles of sustainable tourism or it is only an advertising stunt keeping in mind the end goal to draw in more voyagers. Hunter (1997) has recognised two ways to deal with sustainable tourism, introduced in Table 2.2.

Table 2.2: Two approaches to sustainable tourism (Hunter, 1997)

Light green	Dark green
Advantages of tourism expected	Advantages of tourism must be illustrated
Sustain tourism movement in existing destinations and venture into new ones	Augment economic base if high reliance on tourism and take part in the full proactive evaluation of new tourism improvement
Tourism items must be kept up and develop as per business sector need (nature is a product)	Natural assets must be kept up and affect diminished (ideally minimised) where conceivable with items customised in like manner (nature has presence esteem)
The natural activity only when required and valuable	Natural effects constantly considered as an issue of routine
Industry self-control as dominant administration approach Staff specifically included in the tourism business	Extensive variety of administration methodologies and instruments required workforce prepared in a few fields alongside tourism

2.2 Literature Survey for Sustainable Tourism

Sustainable tourism improvement has pulled in critical consideration in numerous scientific concentrates especially in tourism studies and has been one of the quickly developing regions of tourism studies research subsequent to the late 1980s. Pursuant to Buckley (2012) the particular term “sustainable tourism” was initially utilised very nearly

two decades back. Throughout the first decade, essential structures from foundations in tourism, financial aspects, and ecological administration were considered. The second decade yielded various reconceptualisation and a progression of studies including Sharpley (2000), Gossling (2002), Liu (2003), Saarinen (2006), Lane (2009), and Liu (2013). As indicated by Bramwell and Lane (1993), the two biggest authors of these ideas in the tourism business, sustainable tourism rose to a limited extent as a negative and a receptive idea in light of the numerous tourism issues, for example, natural harm and genuine effects on society and customary societies. Continuously, tourism improvement has been seen as an answer equipped for making positive differences through the thoughts of sustainable tourism. Sustainable tourism has assumed a vital part in recognising approaches to secure positive advantages and in addition the built up methodologies of direction and advancement control (Bramwell & Lane, 2012).

In the course of the most recent two decades, the idea of sustainable tourism improvement has turned out to be all around acknowledged as an attractive and politically fitting way to deal with tourism advancement (Sharpley, 2003). The tourism business ought to be urged to grasp “clean, green” tourism, which implies that organisations ought to do their best to diminish the natural effects of their operations. In the event that a destination is to accomplish sustainable tourism improvement then the activities of its constituent firms must be reliable with promoting this target. Dwyer and associates in a study expressed that tourism firms ought to embrace a Triple Bottom Line (TBL) way to deal with sustainable advancement to guarantee that organisations incorporate social, ecological and financial data into administrative decision-making. Firms must mean to accomplish maintainability in their operations if the destination all in all is to comply with sustainability standards (Dwyer et al., 2009).

Sustainable Tourism literature survey is given in the Tables 2.3.a – 2.3.g.

Table 2.3.a: Sustainable Tourism Literature Survey

Author(s)	Aim of the study	Obtained result
Tosun, 1998	To examine and explain the base of unsustainable tourism development at the domestic standard in a developing country	Sustainable tourism development needs difficult political preferences, a steady decision-making process and the cooperation of international tour organisations and donor agencies
Tosun, 2000	To submit an analysis of the difficulties to sustainable tourism development in developing countries with exclusive references to Turkey	Unless governments and international organisations support sustainable tourism development and cooperate together, it is hard to make decisions
Bayraktaroğlu et al., 2002	To see the most important points of the tourism in Turkey and define its strong and weak sides in the process of being an organization at development	It is crucial to become a learning organization regarding raising the competitiveness, however in the intensely competitive market, it will not guarantee the success of the organization
Tanrıvermiş, 2002	To designate some formations for the purpose of using agricultural land and firm protection of prime agricultural land	For sustainable agricultural land using new formations should be made
Berberoglu, 2003	To revive and lead sustainable development of the Mediterranean coastal side of Turkey	The suggested operation plan provides an advantage to the community of management in Eastern Turkey and scientific community in the Mediterranean

Table 2.3.b: Sustainable Tourism Literature Survey

Polat et al., 2004	To consider enhancing physical and financial components of existing settlements	Migration from rustic ranges to urban communities would be minimized for arranged urbanisation and improvement of provincial regions
Irtem et al., 2005	To look at the seaside zone issues	The achievement of a nearby natural security administration venture relies on upon dynamic cooperation of legislative and nongovernmental associations
Kuvan, 2005	To analyse and audit the use of forest with the end goal of tourism in Turkey	Tourism improvement in Belek has much potential for the corruption of the forests and beach front hills
Harmancıoğlu et al., 2007	To consider the extend of maintainable administration of rare assests in the waterfront zone and improvement for practical water administration	Watering system interest will be the most influenced one later on by lack of water
Sırakaya-Türk et al., 2008	To approve the sustainable tourism attitude scale, which measures occupants' dispositions toward feasible tourism improvement	Sustainable tourism attitude scale can be utilised to evaluate inhabitant states of mind toward maintainable tourism advancement in diverse settings
Kelkit et al., 2009	To decide tourism exercises touchy to the earth, to help tourism in Turkey and neighbouring nations, and to spread ecotourism by ensuring organic species	National park frameworks that are without legitimate arrangements posture difficult issues that can be kept away from via watchful arranging at the soonest organise in order to avoid harm to delicate and indispensable situations

Table 2.3.c: Sustainable Tourism Literature Survey

Açıksöz et al., 2010	To survey the ecotourism capability of Kastamonu-Bartın Kure Mountains National Park and give an introduction to ecotourism exercises to be produced for the area	Contributes fundamentally to the evaluation of the ecotourism potential for the locale concentrated on, and they apply particularly to the ensured zones and their proper improvement
Atik, 2010	To assess diverse ways to deal with the insurance of the situations of beach front entertainment destinations	Turkish Mediterranean coast may be compelling in enhancing supportable use
Kurdoğlu et al., 2010	To amplify administration adequacy for secured regions	Semi-common procedures, contamination, transformation, and tourism gave off an impression of being the best risk and weight components for the secured zones in the locale
Prashyanusorn et al., 2010	To examine the likelihood of utilising the idea of e-virtual reconnaissance framework to make the sustainable tourism	The nations will have better national pay through its tourism industry
Angelevska-Najdeska et al., 2012	To manage vacationers' inspiration and use of existing hypothetical models on inspiration in country tourism	Inspiration elements serve for fragmenting of the vacationers
Angelkova et al., 2012	To obtain sustainability	It is insufficient just to grow new types of option tourism, regarding minimising unfavourable impacts and build positive effects of tourism improvement

Table 2.3.d: Sustainable Tourism Literature Survey

Kilipiris et al., 2012	To present how maintainable tourism hypothesis can be "operationalized" putting on the tourism firm particularly the small scale tourism ventures certain issues in regards to circumstances and treats with this type of tourism	The tourism business ought to take advantage of the new types of tourism by consolidating all the new patterns in the tourism business conveying significant new items to the tourism market
Risteski et al., 2012	To exhibit the significance of the contemporary changes in tourism which requires adjustment of all members in the formation of the tourism offer in given destinations	New ideas for accomplishing aggressiveness have been created, for example, improvement of maintaining destinations, destination administration arranging and execution of incorporated quality administration
Janusz et al., 2013	To explain what the "reasonable tourism" term is	The sustainable tourism will turn into a conventional tourism
Rezzaq et al., 2013	To investigate the procedure of group limit fabricating especially on the part of mindfulness, learning, abilities and additionally mentality of the rustic group that empowers them to include themselves in tourism arranging	The comprehension and learning of the MESCOT (Communiyt Based Ecotourism Kinabatangan, Sabah, Malaysian Borneo) individuals empower the base up methodology for tourism advancement arranging
Akviros et al., 2014	To investigate the profundity of economical assets selection from tourism business visionaries	Tourism business visionaries despite the fact that they have particular preparing in the field and long experience they do not embrace sustainable operation practices and the use of sustainable resource

Table 2.3.e: Sustainable Tourism Literature Survey

Cirstea, 2014	To understand an investigation of tourism aggressiveness among the main 15 most focused nations from the financial point of view as The Global Competitiveness Report present them	As far as general intensity of human, social and regular assets, partiality for travel has an affiliation verging on nonexistent, while social and normal assets have a solid affiliation
Cosma et al., 2014	To give a photo of the inventiveness in the Romanian country tourism industry	Development of tourism must be seen as a perpetual, worldwide and dynamic procedure
Ghasemi et al., 2014	To research the suitability of tourism standards created in rustic zones from fundamental partners' perspective	Outcasts who need to bring and grow new types of tourism ought to consider local people's observations and desires of tourism endeavour in their town while listening to their voices
Idajati et al., 2014	To research the suitability of tourism standards created in rustic zones from fundamental partners' perspective	Rejuvenation arranging can oblige an extensive variety of exercises both for occupants and for guests
Nair et al., 2014	To investigate the global travellers' recognition of change of the tourism business taking into account economic transformation program	Financial transformation program can drive the tourism division to end up a high return industry

Table 2.3.f: Sustainable Tourism Literature Survey

Nicula et al., 2014	To consider possibility of sustainable improvement of Romania by advancing speciality tourism, to be specific social ecotourism	It is critical to open up the endeavours to enhance the characteristic and social environment, administrations, and exercises for a superior promoting of particular conventional items
Simkova et al., 2014	To manage vacationers inspiration and use of existing hypothetical models	Inspiration elements serve for fragmenting of the vacationers
Teo et al., 2014	To explore guest conduct to social legacy locales in Melaka	Legacy guests were grouped into noteworthy tourism experience seeker, socially critical, capable, eagerness to pay and green traveller
Amir et al., 2015a	To distinguish the idea of reasonable tourism through neighbourhood monetary advantages measurements	Melaka requirements to comprehend who the squanderers are and which division spent the most among visitors, henceforth plan as a feature of potential techniques for a higher benefit
Amir et al., 2015b	To examine the flexibility of the rustic groups in Malasia with the assistance of the maintainability arranging in provincial tourism	Sustainable tourism advancement in rustic zone will add to an enhanced flexibility inside the neighbourhood group

Table 2.3.g: Sustainable Tourism Literature Survey

Sesotyaningtyas et al., 2015	To asses the poissibility of tourism town advancement utilising positivist exploration approach	Differnt procedures should be connected for tourism town advancement by including individuals as the principle subject to maintainable advancement
Zurub et al., 2015	To talk about the connection amongst tourism and making sustainable improvement through taking out business complexities, and approaches to quantify tourism advancement	Tourism is a segment with a solid element, in many nations is in a higher build contrasted with worlwide monetary development
Habibullah et al., 2016	To research the effect of tourism on biodiversity misfortune in a specimen of 141 nations	It is basic that organizations to address biodiversity issues satisfactorily as it forces dangers on business operation
Mihalic, 2016	To propose a Triple-A Model as a device that comprehends the procedure of how a dependable tourism destination or firm really executes supportability motivation	The new term responsustable tourism completely mirrors the scholarly and common-sense civil argument and activity that is progressively named "mindful" tourism, taking into account sustainability

3. PROPOSED SWOT BASED FUZZY MCDM FRAMEWORK

In this study, a three-step methodology is used by applying SWOT based integrated fuzzy AHP-fuzzy VIKOR method. Figure 3.1 shows the structure of the proposed methodology. In section 3.1, SWOT methodology and literature review of combined SWOT-AHP, combined SWOT-VIKOR, combined AHP-VIKOR methods have been included. In section 3.2 fuzzy AHP method and in section 3.3 fuzzy VIKOR method have been clearly explained, and calculations have been presented.

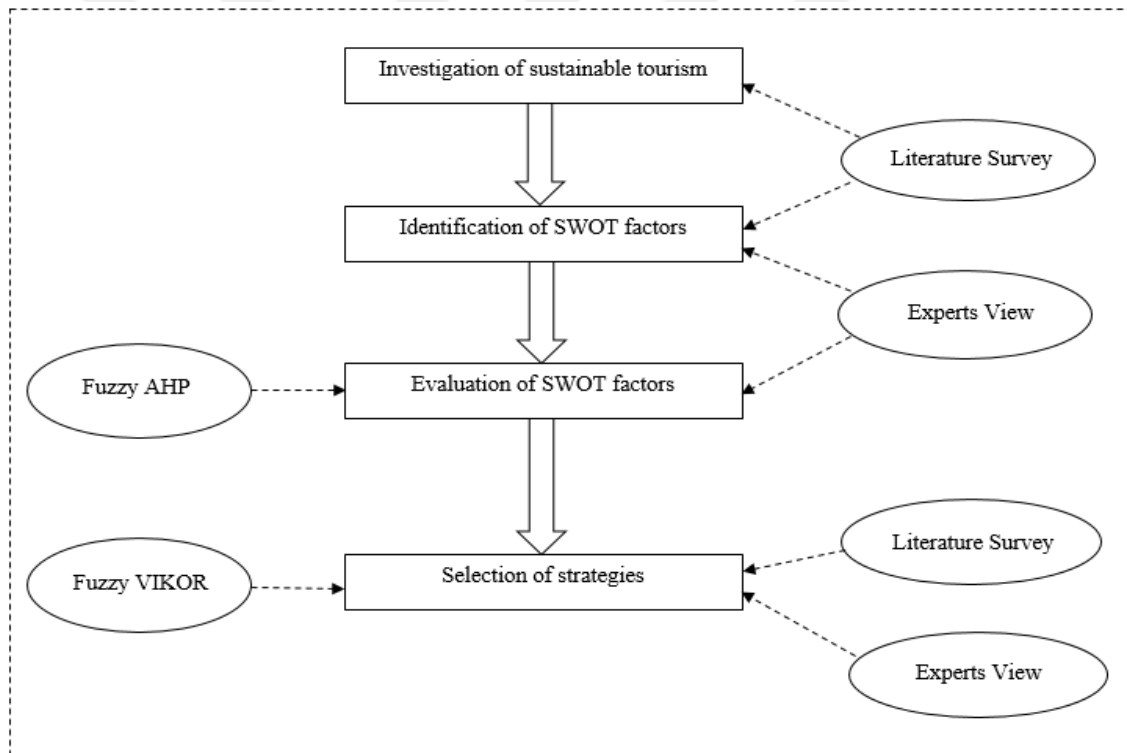


Figure 3.1: The main steps of evaluation framework

3.1 SWOT Methodology

The SWOT analysis was constructed by the professors Learned, Christensen, Andrews and Guth in the 1960's at Harvard University. It provides an efficient way to determine

a strategic plan to take all factors into consideration for business or a project (Takahashi et al., 2011). The word SWOT stands for “Strengths”, “Weaknesses”, “Opportunities” and “Threats”:

- Strengths (internal, positive factors): identification of the characteristic features of the project that means the advantage which makes itself different from others.
- Weaknesses (internal, negative factors): evaluation of the characteristic features of the project for a disadvantage for others.
- Opportunities (external, positive factors): determining the factors that the project could turn to its advantage.
- Threats (external, negative factors): consideration of the factors in the environment that are related to the specific project that could cause problems for the project.



Figure 3.2: The elements of a SWOT analysis

The main reason for this study is defining the strategies for sustainable tourism of Turkey.

In ascertaining the sustainable tourism strategies, the weights of SWOT elements are taken into consideration. While determining the strategies, it is provided to increase the strengths, eliminate the weaknesses, utilise the opportunities and reject the threats for in terms of sustainable tourism.

Turkey is a country that has high expectations about tourism. SWOT factors could be identified as the internal and external factors to maintain the sustainable tourism in Turkey. There are some studies about the SWOT analysis related to tourism, ecotourism and sustainable tourism.

Durgun (2007) applied SWOT analysis to determine how to improve the tourism of Isparta (one of Turkey's cities). There are some strengths against weaknesses of tourism in that town as well as opportunities against threats. Therefore, there are bottlenecks to overcome and advantages to make use of in city tourism.

Akova et al. (2012) state that congress tourism is gaining popularity all around the world and in Turkey. It provides great opportunities for cities to show their differences and products over the seasons. There are some cities in Turkey which have great potentials for congress tourism such as Istanbul, Antalya and Izmir. There has been a great increment in the number of congress visitors over the years, and the government gives continued support to congress tourism. To increase the importance of the congress tourism in Turkey, a SWOT analysis has been used and according to results of SWOT some strategies have been constructed.

Kahveci et al. (2003) indicate that ecotourism in Turkey is at an early stage. This situation can be taken into consideration as strength or weaknesses. There are numerous activities which can be used in ecotourism. Natural and cultural resources should be utilized in a compatible way with sustainability and education about ecotourism should be given to related individuals.

Pirselimoğlu et al. (2012) examined the sustainability of protected areas with sensitive environments as in the research of Karagöl-Sahara National Park. To determine the possible use of a national park and to propose types of ecotourism which are convenient for locals. Using the SWOT analysis, related data has been collected and examined. To achieve the effective sustainable tourism issues for Turkey, several factors should be taken into consideration related to the environmental features of Turkey. For this reason, the SWOT analysis is realist based on the existing studies.

Ali et al. (2015) determined eco tourism potential of Indus River, Pakistan with the help of SWOT analysis.

Leal Londono (2015) stated as gastronomic tourism is a key factor for local development in Catalonia, Spain. All data has been gathered and studied by virtue of SWOT analysis.

Padash et al. (2016) implemented a comprehensive strategic environmental management plan for Mond protected area which is located on Bushehr Province in Irak by using combined SWOT-AHP method. Kajanus et al. (2004) demonstrated the usability of combined SWOT-AHP method in tourism planning for Yla-Savo region in Finland. The planning task was to answer the question of whether culture can be a success factor in rural tourism.

There are some studies about environmental management all around the world which used combined SWOT-AHP method as an effective tool how to use of natural resources, protect of habitats and control of jeopardies without regard to traditional limits (Kangas et al., 2003; Dwivedi & Alavalapati, 2009; Monavari et al., 2010; Gallego-Ayala & Juizo, 2011).

The technical limitations of the SWOT analysis due to its impreciseness and lack of a quantitative examination. Hence, a combined SWOT-MCDM method has been widely used for improving usability of SWOT analysis. But in the tourism area, there are limited studies (Kajanus et al., 2004; Padash et al., 2004). In this study, SWOT based AHP-VIKOR method is applied and in real life during the decision process, considering that

the information, which has critical value, includes uncertainty, inconsistency and subjectivity, the fuzzy set of numbers are used. The linguistic variables, which are used in fuzzy MCDM methods, ensure that decision makers' thoughts (subjectivity and uncertainty) are included in the model.

Combined AHP-VIKOR method is an effective decision making tool which has been used recently. The reasons for using these two MCDM methods are: AHP is a very efficient method of calculating the weight of criterion and VIKOR method obtains productive results at having the right choice among other alternatives (Buyukozkan & Gorener, 2015). Furthermore, the structure of this proposed method, which is dividing the problem into sub-problems, makes it convenient for the decision-makers. Nonetheless, SWOT based AHP-VIKOR method has never been studied in the literature up until today.

The literature survey of combined SWOT-AHP, combined SWOT-VIKOR and combined AHP-VIKOR methods are given in the Tables 3.1.a – 3.1.i.

Table 3.1.a: Combined SWOT - AHP: Literature Survey (the years between 2000 and 2016)

Author(s)	Application area	Aim of the study	MCDM techniques	Uncertainty Level
Kangas et al., 2003	Forest management	To support strategic decision-making processes with the help of combined SWOT AHP approach	AHP	Crisp
Shrestha et al., 2003	Silvoposture adaption	To examine the prospects and challenges for pasture adoption	AHP	Crisp
Kajanus et al., 2004	Rual tourism	To provide more comprehensive decision support	AHP	Crisp
Masozera et al., 2004	Community development	To investigate the sensations of representatives from three stakeholder groups	AHP	Crisp
Feglar et al., 2006	Large scale enterprises	To improve the effectiveness of business decision-making	AHP ANP	Crisp
Lee, 2007	Logistics	To suggest a suitable competitive strategy for location on particular competitive conditions	AHP	Fuzzy
Yuksel et al., 2007	Textile	To demonstrates a process for quantitative SWOT analysis when there is dependence among strategic factors	AHP ANP	Crisp
Arslan et al., 2008	Carriage of bulk liquid chemicals in maritime tankers	To use of SWOT analysis as a management tool to formulate strategic action plans for ship management companies	AHP	Crisp
Ho, 2008	Literature survey	To review the literature of the applications of the integrated AHPs	AHP	Crisp

Table 3.1.b: Combined SWOT - AHP: Literature Survey (the years between 2000 and 2016)

Zaerpour et al., 2008	Production	To present a strategic decision-making structure to determine whether a particular product should be produced under make-to-order (MTO) or make-to-stock (MTS) strategy	AHP	Fuzzy
Arslan, 2009	Transportation	To increase the level of safety for chemical tankers	AHP	Crisp
Dwivedi et al., 2009	Bioenergy	To analyses perceptions of four stakeholder groups regarding forest biomass- based bioenergy development	AHP	Crisp
Kandakoglu et al., 2009	Shipping registry selection	To propose an originally structured multi-methodological approach to support the critical decision process on shipping registry selection under multiple criteria	AHP TOPSIS	Crisp
Lee et al., 2009	Logistics	To assess the competitive relation for locations, develop different types' global logistics hub	AHP	Fuzzy
Taleai et al., 2009	Geometric information system	To investigate the challenges and prospects of adopting geographic information systems in developing countries	AHP	Crisp
Monavari et al., 2010	Environmental management	To determine priorities of the factors and their contribution to strategy formulation	AHP	Crisp

Table 3.1.c: Combined SWOT - AHP: Literature Survey (the years between 2000 and 2016)

Ekmekcioglu et al., 2011	Nuclear Power Plant Site Selection	To develop fuzzy multi-criteria SWOT analysis in order to overcome energy policy shortcomings	AHP TOPSIS	Fuzzy
Fouladgar et al., 2011	Mining sector	To determine and prioritise the mining strategies	AHP TOPSIS	Fuzzy
Gallego-Ayala et al., 2011	Water resources management	To identify and establish a priority ranking of the fundamental factors likely to affect the outcome of the integrated water resources management reforms	AHP	Crisp
Groselj et al., 2011	Private forest management	To examine the current state of forest owners' cooperatives	AHP	Fuzzy
Lee et al., 2011	Outsourcing marketing	To examine sports marketing outsourcing decision-making factors	AHP	Crisp
Zavadskas et al., 2011	Construction Management	To propose a methodology for determining management strategies in construction enterprises	AHP	Crisp
Wasike et al., 2011	Animal recording system	To evaluates factors influencing efficiency of beef	AHP	Crisp
Celik et al., 2012	Maritime industry	To propose a fuzzy quantified SWOT analysis on the case of the flagging out problem in the Turkish maritime industry	AHP	Fuzzy

Table 3.1.d: Combined SWOT - AHP: Literature Survey (the years between 2000 and 2016)

Duchelle et al., 2012	Forest management	To consider multiple-use forest management, which includes timber, non-timber forest products, and environmental services for promising tropical conservation and development strategy	AHP	Crisp
Kajanus et al., 2012	Natural resources management	To review the evolution of the A'WOT method with AHP	AHP	Crisp
Malovrh et al., 2012	Cooperation based on the use of machinery	To analyse the challenges and prospects of private forest owner's cooperation based on the use of machinery in Slovenia	AHP	Crisp
Ramirez et al., 2012	Nontraditional cookstove	To measure perceptions of four stakeholder groups: employees, local promoters, community leaders and end-users, about a nontraditional cookstove (NTCS) in Honduras	AHP	Crisp
Sevкли et al., 2012	Airline industry	To provide a quantitative basis to analytically determine the ranking of the factors in SWOT analysis	AHP ANP	Fuzzy
Srdjevic et al., 2012	Water intake structure	To propose an approach for defining the criteria set required for multi-criteria decision making	AHP	Crisp
Stainback et al., 2012	Agroforestry	To investigate a strategy for smallholder farmers	AHP	Crisp

Table 3.1.e: Combined SWOT - AHP: Literature Survey (the years between 2000 and 2016)

Bas, 2013	Electricity supply chain	To propose an integrated framework for analysis of an electricity supply chain	AHP TOPSIS	Fuzzy
Darshini et al., 2013	Palm-oil bioenergy	To capture synergetic and conflicting interests of key stakeholders who play an important role in shaping the regulatory and business environment	AHP	Crisp
Gerasimov et al., 2013	Wood transport	To analyse the situation with forest roads in Russia in the context of harvesting, transportation, forest management and forest fire prevention	AHP	Crisp
Kukrety et al., 2013	Sustainable wood trade	To evaluate the existing restricted wood trade and provides insights for developing a sustainable trade policy by involving private landowners as a strategy for improving its conservation	AHP	Crisp
Menga et al., 2013	Strategy analysis	To deal with the AHP to find weights of SWOT groups and weights of sub-factors within each group	AHP TOPSIS	Fuzzy
Monavari et al., 2013	Tourism	To minimise the bias through weighing criteria and finalise the potential offered strategies for tourism	AHP	Crisp
Tahernejad et al., 2013	Dimensional stone mines	To analyse Iran's dimensional stone mines using SWOT analysis in combination with AHP	AHP	Crisp

Table 3.1.f: Combined SWOT - AHP: Literature Survey (the years between 2000 and 2016)

Esmaeili et al., 2014	Oil industry	To take a quantitative approach to analytically determine the best strategies for the oil industry	AHP	Fuzzy
Okello et al., 2014	Energy technology	To develop SWOT and AHP methodology for effective decision-making	AHP	Crisp
Shahabi et al., 2014	Steel scrap industry	To identify and perform the efficient strategies to utilise the substantial amount of steel scrap	AHP ANP	Crisp
Banihabib et al., 2015	Sustainable development	To develop a strategic plan to stabilise the shrinking lake, based on sustainable development criteria	AHP TOPSIS	Crisp
Brudermann et al., 2015	Energy	To discuss the prospects of agricultural biogas plants	AHP	Crisp
Kibria et al., 2015	Environmental sustainability	To analyse four major land uses, agroforestry, fruit orchards, shifting cultivation and village common forest by correlating them with local perceptions	AHP	Crisp
Pamucar et al., 2015	Transportation	To present modification of the Saaty-s scale to determine weight values of criteria and alternatives	AHP	Fuzzy
Canto-Perello et al., 2016	Urban planning	To study utility tunnel planning in urban areas	AHP	Crisp
Cebi et al., 2016	Shipyard	To find out the most appropriate cutting technique for shipyard industry	AHP TOPSIS	Fuzzy

Table 3.1.g: Combined SWOT - AHP: Literature Survey (the years between 2000 and 2016)

Chanthawong et al., 2016	Biofuel development	To analyse and prioritise policy development for biofuels	AHP	Crisp
Guerrero-Liquet et al., 2016	Renewable Energy	To discuss risk management tools in solar photovoltaic facilities	AHP	Crisp
Padash et al., 2016	Ecosystem	To implement a comprehensive strategic environmental management plan	AHP	Crisp
Tavana et al., 2016	Reverse logistics	To identify and classify best third-party Reverse Logistics providers	AHP	Fuzzy
Xu et al., 2016	Rural drinking water supply	To present an effective tool for the development of rural drinking water supply	AHP TOPSIS	Crisp

Table 3.1.h: Combined SWOT - VIKOR: Literature Survey (the years between 2000 and 2016)

Author(s)	Application area	Aim of the study	MCDM techniques	Uncertainty level
Balin et al., 2009	Ship machine systems	To examine expert failure detection of marine diesel engine and auxiliary systems	VIKOR AHP	Fuzzy
Sun., 2010	Performance evaluation	To build a conceptual framework for measuring the business performance of notebook computer	VIKOR AHP	Fuzzy
Feng et al., 2013	Product design	To acquire the optimum one among different product design schemes	VIKOR PROMETHEE II	Crisp
Shakeri et al., 2015	Supplier selection	To introduce a hybrid model to evaluate and choose the private sector as one of the parties in public-private partnership (PPP)	VIKOR TOPSIS ELECTRE	Fuzzy

Table 3.1.i: Combined AHP – VIKOR: Literature Survey (the years between 2000 and 2016)

Author(s)	Application area	Aim of the study	MCDM techniques	Uncertainty level
Balin et al., 2009	Ship machine systems	To examine expert failure detection of marine diesel engine and auxiliary systems	AHP VIKOR	Fuzzy
Sun., 2010	Performance evaluation	To build a conceptual framework for measuring the business performance of notebook computer	AHP VIKOR	Fuzzy
Curiel-Esparza et al., 2014	Wastewater reuse	To select the best sustainable disinfection technique for wastewater reuse projects	AHP VIKOR	Crisp
Rostamzadeh et al., 2014	Small and medium-sized enterprises	To evaluate and prioritise the entrepreneurial intensity among the small and medium-sized enterprises	AHP VIKOR TOPSIS	Fuzzy
Buyukozkan et al., 2015	Partner selection	To evaluate product development partners	AHP VIKOR	Crisp
Canto-Perello et al., 2015	Roof assembly	To execute sustainability criteria in the choice of a rooftop get together in medium span structures	AHP VIKOR	Crisp

3.2 Fuzzy AHP

Studies indicate that the MCDM technique is a well-suited and accurate methodology to solve multi-criteria problems such as the evaluation and selection and construct optimum strategies (Hwang & Yoon, 1981). MCDM techniques are used in a large variety of fields.

A great part of the decision-making in this present reality happens in a situation in which the objectives, the constraints, and the results of possible activities are not known precisely (Bellman & Zadeh, 1970).

MCDM system comprises of creating choices, setting up criteria, evaluation of alternatives and criteria weights, and use of a ranking method (Vincke, 1992). The alternatives are evaluated as per distinctive criteria relying upon the targets of the issue. The evaluation of alternatives ought to be performed as indicated by every rule from the arrangement of built up criteria.

AHP method was developed in the 1980s by Thomas L. Saaty. AHP assumes that evaluation criteria can be completely expressed in a hierarchical structure. The data obtained from the decision-makers are pairwise comparisons related to the relative importance of each of the criterion or the degree of superiority of one factor to another with respect to each criterion. In the conventional AHP, a ratio scale must be used to create pairwise comparison matrix.

The conventional AHP is inadequate for dealing with the imprecise or vague nature of linguistic assessment. In fuzzy AHP, common sense linguistic statements have been used in the pair-wise comparison which can be represented by the triangular fuzzy numbers.

The used approach (Ayağ, 2005) can be explained with five steps. In the first step, the performance scores are compared. Linguistic terms are used to indicate the relative strength of each pair of elements in the same hierarchy. Then in the second step, the

fuzzy comparison matrices are constructed. By using triangular fuzzy numbers, via pairwise comparison, the fuzzy judgment matrix \tilde{A} is constructed as given below:

$$\tilde{A} = \begin{bmatrix} 1 & \tilde{a}_{12} & \cdots & \tilde{a}_{1n} \\ \tilde{a}_{21} & 1 & \cdots & \tilde{a}_{2n} \\ \cdots & \cdots & \cdots & \cdots \\ \tilde{a}_{n1} & \tilde{a}_{n2} & \cdots & 1 \end{bmatrix} \quad (3.1)$$

where $\tilde{a}_{ij}^\alpha = 1$, if i is equal to j , and $\tilde{a}_{ij}^\alpha = \tilde{1}, \tilde{3}, \tilde{5}, \tilde{7}, \tilde{9}$ or $\tilde{2}^{-1}, \tilde{4}^{-1}, \tilde{5}^{-1}, \tilde{7}^{-1}, \tilde{9}^{-1}$ if i is not equal to j . In the third step, the fuzzy eigenvalues are solved. A fuzzy eigenvalue, $\tilde{\lambda}$, is a fuzzy number solution to:

$$\tilde{A}\tilde{x} = \tilde{\lambda}\tilde{x} \quad (3.2)$$

where $\tilde{\lambda}_{\max}$ is the largest eigenvalue of \tilde{A} and \tilde{x} is a non-zero $n \times 1$ fuzzy vector containing fuzzy number \tilde{x}_i . To perform fuzzy multiplications and additions by using the interval arithmetic and α -cut, the equation 3.2 is equivalent to:

$$\left[a_{il}^\alpha x_l^\alpha, a_{iu}^\alpha x_l^\alpha \right] \oplus \dots \oplus \left[a_{inl}^\alpha x_{nl}^\alpha, a_{inu}^\alpha x_{nu}^\alpha \right] = \left[\lambda_{il}^\alpha, \lambda_{iu}^\alpha \right] \quad (3.3)$$

where,

$$\tilde{A} = \left[\tilde{a}_{ij}^\alpha \right], \tilde{x}^t = (\tilde{x}_1, \dots, \tilde{x}_n),$$

$$\tilde{a}_{ij}^\alpha = \left[a_{ijl}^\alpha, a_{iju}^\alpha \right], \tilde{x}_{ij}^\alpha = \left[x_{ijl}^\alpha, x_{iju}^\alpha \right], \tilde{\lambda}^\alpha = \left[\lambda_l^\alpha, \lambda_u^\alpha \right] \quad (3.4)$$

for $0 < \alpha \leq 1$ and all i, j , where $i = 1, 2, \dots, n, j = 1, 2, \dots, n$.

The α -cut is known to incorporate the experts or decision makers confidence over preferences. The degree of satisfaction for the judgment matrix \tilde{A} is estimated by the index of optimism μ . A larger value of the index μ indicates more optimism. The index of optimism is a linear convex combination defined as (Lee, 1999):

$$\tilde{a}_{ij}^{\alpha} = \mu a_{ijl}^{\alpha} + (1 - \mu) a_{ijr}^{\alpha}, \quad \forall \alpha \in [0,1] \quad (3.5)$$

when α is fixed, the following matrix can be obtained after setting the index of optimism, μ , in order to estimate the degree of satisfaction:

$$\tilde{A} = \begin{bmatrix} \tilde{a}_{11}^{\alpha} & \tilde{a}_{12}^{\alpha} & \cdots & \tilde{a}_{1n}^{\alpha} \\ \tilde{a}_{21}^{\alpha} & \tilde{a}_{22}^{\alpha} & \cdots & \tilde{a}_{2n}^{\alpha} \\ \vdots & \vdots & \ddots & \vdots \\ \tilde{a}_{n1}^{\alpha} & \tilde{a}_{n2}^{\alpha} & \cdots & \tilde{a}_{nm}^{\alpha} \end{bmatrix} \quad (3.6)$$

The eigenvector is calculated by fixing the μ value and identifying the maximal eigenvalue. In the fourth step, in order to control the result of the method, the consistency ratio for each of the matrices and the overall inconsistency for the hierarchy are calculated. The Consistency Ratio (CR) is used to directly estimate the consistency of the pairwise comparisons as:

$$CR = CI/RI, \text{ where } CI = \frac{\lambda_{\max} - n}{n - 1} \quad (3.7)$$

and CR should be less than 0.10. Then it can be said the comparisons are acceptable. Otherwise they are not acceptable and should be revised. In the fifth and the last step, the priority weight of each alternative can be obtained by multiplying the matrix of evaluation ratings by the vector of attribute weights and summing overall attributes.

3.3 Fuzzy VIKOR

The VIKOR technique has been developed as an MCDM strategy to solve a discrete multi-criteria problem with non-commensurable and conflicting criteria (Opricovic, 1998). It concentrates on ranking and selecting from a set of alternatives and decides compromise solutions for a problem with conflicting criteria, which can assist the decision makers with reaching a final decision. For the method of VIKOR, decision-making process begins with defining the problem of the decision as it is same in all MCDM methods. By the issue of method, which is defined by the decision maker, the aim of the problem will also be determined. After identifying the problem of the decision and determining the aim, alternatives to be assessed in the problem of decision and criterion, which allow alternatives to be selected, ordered and compared, are determined. Criterion differ according to the problem of the decision. Criterion might be determined intuitively by the decision maker to reflect the expectations of the alternative or in the light of the opinions of an expert of the subject. Each value of the alternative according to each criterion is stated as score or performance. In other words, the values of the alternatives according to the assessment that is based on a relevant criterion, show the scores of the alternatives according to the relevant criterion. In the process of determining criterion which belong to the problem of the decision, it is important to be cautious about the characteristic of the criterion. In a problem of the decision, criterion have the characteristic of cost or benefit. As with other MCDM methods, in VIKOR method characteristics of the criterion are evaluated in different ways through the steps of calculations. For instance, in a problem of a car purchase, the price of the car is a characteristic of a cost. In this situation, the lowest sale price will be preferred among the other alternative scores. In the same problem of the decision, a trunk of the car has a characteristic of the benefit, and among the alternative scores the largest one will be chosen, since it contributes to the purpose more than others.

In the wake of determining the characteristics of criterion, weights (the relative degree of importance) of the criterion, which will be used to assess the alternatives by the decision maker, should be identified.

The assigned weight of the criterion is a measurement to show at what rate the criterion score of alternative is effective to the evaluation.

In VIKOR method, weights of the criterion are stated as a ratio, and they equal to 1 in total. After determining alternatives, criterion, and criterion based scores of alternatives which belong to the problem of the decision, scores are turned into a decision matrix.

In this section, a modified fuzzy approach (Liu et al., 2015) to the normal VIKOR method is presented to process uncertain data and to solve fuzzy multi-criteria problems with conflicting and no commensurable criteria (Chang et al., 2014).

Denote m alternatives under consideration as a_1, a_2, \dots, a_m the n evaluation criteria as c_1, c_2, \dots, c_n and the rating of each alternative a_j , $j = 1, \dots, m$ versus criteria c_i $i = 1, \dots, n$ as f_{ij} . Then, the compromise ranking algorithm VIKOR consists of the following steps:

Step 1: Determine the best rating f_j^+ and the worst rating f_j^- for all the criteria

For instance, if the criterion i represents a benefit, then:

$$f_i^+ = \max_j f_{ij}, \quad f_i^- = \min_j f_{ij} \quad (3.8)$$

Naturally, a candidate having scores $(f_1^+, f_2^+, \dots, f_n^+)$ would be ideal whereas a candidate having scores $(f_1^-, f_2^-, \dots, f_n^-)$ would be an anti-ideal candidate. It is assumed that such an ideal candidate does not exist; otherwise, the decision would be trivial.

Step 2: Compute the S_j and R_j values for $j = 1, \dots, m$

Represent the average and the worst group scores for the alternative a_j respectively, with the relations

$$S_j = \sum_{i=1}^n w_i \frac{(f_i^+ - f_{ij})}{(f_i^+ - f_i^-)}, \quad S_j \in [0,1] \quad (3.9)$$

$$R_j = \max_i \left[w_i \frac{(f_i^+ - f_{ij})}{(f_i^+ - f_i^-)} \right], \quad R_j \in [0,1] \quad (3.10)$$

Here, w_i 's $\left(\sum_{i=1}^m w_i = 1 \right)$, $w_i \in [0,1]$ ($i=1, \dots, n$) are the relative importance weights of the criteria set by the decision maker. The smaller values of S_j and R_j correspond to the better average and the worse group scores for the alternative a_j respectively.

Step 3: Compute the Q_j values for $j = 1, \dots, m$ with the relation

$$Q_j = \frac{v(S_j - S^+)}{(S^- - S^+)} + \frac{(1-v)(R_j - R^+)}{(R^- - R^+)} \quad (3.11)$$

where

$$S^+ = \min_j S_j, \quad S^- = \max_j S_j, \quad (3.12)$$

$$R^+ = \min_j R_j, \quad R^- = \max_j R_j, \quad (3.13)$$

and v is the weight of the decision-making strategy “the majority of criteria”. The compromise can be selected with “voting by majority” ($v = 0.5$).

Step 4: Rank the alternatives by sorting each S , R and Q values in an increasing order

The result is a set of three ranking lists denoted as $S_{[.]}$, $R_{[.]}$, $Q_{[.]}$.

Step 5: Propose the alternative j_i corresponding to $Q_{[1]}$

The smallest among Q_j values as a compromise solution if

Condition 1: Acceptable advantage: $Q_{[2]} - Q_{[1]} \geq DQ$ where $DQ = 1/(m-1)$ and m is the number of alternatives.

Condition 2: Acceptable stability in decision-making: it is additionally the best ranked in $S_{[.]}$ or $R_{[.]}$.

In the event that one of the accompanying conditions is not fulfilled, then an arrangement of bargain arrangements is proposed, which comprises of:

- Alternatives j_1 and j_2 where $Q_{j_2} = Q_{[2]}$ if only the condition 2 is not satisfied, or
- Alternatives j_1, j_2, \dots, j_k if the condition 1 is not fulfilled; and j_k is obtained by the connection $Q_{[k]} - Q_{[1]} < DQ$ for the maximum k where $Q_{j_k} = Q_{[k]}$ (the pieces of those alternatives are in closeness).

A fuzzy number is a special fuzzy set $F = \{x \in \mathbb{R} \mid \mu_{F(x)}\}$, where x values takes its values on the real line $\mathfrak{R}^1 : -\infty < x < +\infty$ and $\mu_F(x)$ is a continuous mapping from \mathfrak{R}^1 to close interval $[0,1]$. A triangular fuzzy number can be denoted as $\tilde{M} = (a, b, c)$ and its membership function $Q_{(M)}(x) : \mathfrak{R}^1 \rightarrow [0,1]$ can be given as:

$$\mu_M(x) = \left\{ \begin{array}{l} 0, \quad x < a \quad \text{or} \quad x > c \\ \frac{(x-a)}{(b-a)}, \quad a \leq x \leq b \\ \frac{(c-x)}{(c-b)}, \quad b \leq x \leq c \end{array} \right\} \quad (3.14)$$

where $a \leq b \leq c$, a and c stand for the lower and upper value of the support of \tilde{M} . The main operational laws for two triangular fuzzy numbers $\tilde{M}_1 = (a_1, b_1, c_1)$ and $\tilde{M}_2 = (a_2, b_2, c_2)$ are as follows (Kaufmann & Gupta, 1991):

$$\tilde{M}_1 \oplus \tilde{M}_2 = (a_1 + a_2, b_1 + b_2, c_1 + c_2), \quad (3.15)$$

$$\tilde{M}_1 \otimes \tilde{M}_2 \approx (a_1 a_2, b_1 b_2, c_1 c_2), \quad (3.16)$$

$$\lambda \otimes \tilde{M}_1 = (\lambda a_1, \lambda b_1, \lambda c_1), \quad \lambda > 0, \quad \lambda > \Re, \quad (3.17)$$

$$\tilde{M}_1^{-1} \approx \left(\frac{1}{c_1}, \frac{1}{b_1}, \frac{1}{a_1} \right) \quad (3.18)$$

As described above, the fuzzy VIKOR seeks the closeness to the ideal alternative.

4. APPLICATION OF PROPOSED FRAMEWORK

In this study, the steps of the proposed approach (see figure 3.1) are applied for sustainable tourism strategy selection problem for Turkey.

4.1 SWOT Analysis of Sustainable Tourism for Turkey

SWOT matrix can be build up and used as the basis for defining goal, strategy formulation. Based on detailed literature survey which contains last ten years studies, research report of Republic of Turkey Ministry of Culture and Tourism and consultation of tourism experts, SWOT factors are identified.

In this study, four main factors, Strengths (S), Weaknesses (W), Opportunities (O), Threats (T) are used and divided into their sub-criteria

Strengths

The six main strengths are determined as follows:

S1: Turkey has a lot of historical and archaeological places which are internationally known (Sustainable Tourism Report, 2012).

Since Turkey is such a geopolitical position that connects Asia and Europe, many civilisations have lived on it. Moreover, there have many empires have been to Anatolia such as Hittite, Roman, Ottoman that they left behind so many important histories. Due to these factors, there are various important museums in Turkey. Turkey's largest city, Istanbul, has a number of important attractions since it was the capital of the Byzantine and Ottoman Empires. Besides these historical attractions, there are other events such as sporting events, museums, and cultural events.

S2: Has some important seas and Bosphorus such as Aegean Sea, Mediterranean, Black Sea, Dardanelles, Bosphorus (Research Report, 2007).

The Anatolian Peninsula brings the advantage of having different styles coasts and seas to Turkey which they have been used for various purposes. It can be seen many beach resorts along the southern coast called the Turkish Riviera, especially near Antalya. In this coast, mountains are parallel to the sea which blocks the wind most of the time and the sea is warmer than any place in Turkey. Because of this, sea tourism always begins earlier and ends later than any other places in Turkey. Dardanelles has become known after the World War I that people from different nations visit monuments. Istanbul Bosphorus is widely popular due to its position between the two continents Asia and Europe. Even there is no beach tourism many people prefer Bosphorus tours.

S3: Located near the roads which have a high level of accessibility (Sustainable Tourism Report, 2012).

This is an important strength because in this age comfort and easiness have been held in the foreground. Transportation to important tourism destinations in Turkey has been taken care beforehand and still in the process of improving. Beside the transportation inside of the country, Turkey`s geographic position makes it easy to access in a different way of transportation which is quite important in tourism.

S4: Has several places which are included in the World Cultural Heritage List by UNESCO (UNESCO, 1965).

Because of the richness in Anatolian history in terms of lived civilisations, there are many historical sites in Turkey which are important to not only Turkey but the rest of the world. For example, in the archaeological investigations in Gobeklitepe, Sanliurfa a sanctuary, that is believed the oldest religious site, has been discovered. Another example is, in Hacilar, Burdur it can be seen the first domestication examples in the world. Currently, there are fifteen world heritage sites in Turkey which are defined by the UNESCO, and there are sixty more in the tentative list of UNESCO World Heritage Sites in Turkey.



Figure 4.1: Location of world heritage sites within Turkey (UNESCO, 1965)

S5: Has several parks which have National Park status and does not restrict economic activities of the local community (Açıksöz et al., 2010).

Regarding high historical importance, there are officially 40 national parks in Turkey which hold beautiful flora and fauna unique to Anatolia. Because of the variety of climate of Turkey, visitors have the chance of seeing different national parks in different times of the year according to their preferences.

S6: Turkey has tourism market which aims middle class (Research Report, 2007).

Although travel had always seen as a luxury of the well-off crowd, there has been many opportunities all around the world for the middle class. Turkey is one of the countries that has a middle class aimed tourism market. It has many to offer such as mass or packaged travels which are a good option for the people who have a low budget.

Weaknesses

The four main weaknesses are determined as follows:

W1: Lack of national awareness of the importance of historical advantages (Kuvan, 2005).

This is an important weakness since the lack of awareness of the advantages of a country has a huge negative impact on the improvement, marketing, and sustainability of tourism. In this case, the education for the next generation will be insufficient as well as uninformative which is a damaging effect for the future of tourism in the country.

W2: Lack of national awareness of the importance of sustainability.

Sustainability is one of the main factors in tourism issue to keep the improvement and development on a high level. Unfortunately, individuals and business corporations have little knowledge about sustainability and its methods. Thus, there is a minor usage of sustainability in the tourism field.

W3: The benefit from tourism revenue cannot be used by the local community (Gülcan et al., 2009).

In most important touristic areas there are business cooperations which provide accommodation, transportation and other cultural events in its facilities which left little things to the local community in the area. For example, south-west coast of the country called Turkish Riviera where is a full of luxury hotels that belong to international companies.

W4: Archaeological and environmental areas cannot be exhibited in a touristic way (Tanrivermis, 2002).

Although there are many opportunities in Turkey for the archaeological investigations there are little financial support for this area. Because of this, the whole attention is mainly focused academic investigations or discovery of the goods in lands works. Therefore, there is little time and effort to pay extra attention to the exhibition of the archaeological areas.

Opportunities

The four main opportunities are determined as follows:

O1: There exist several villages and buildings for hostel tourism (Kahveci et al., 2003).

There is good chance in Turkey to find many convenient places to use for the hostel tourism. It is an excellent opportunity not only for this reason but also for the local community, too. With this way, local people could be included in the process which is a good investment both financially and educationally.

O2: Increase of interest in nature, history and culture tourism (European Commission Publication, 2002).

With the increase of the attention to technology which makes communication easy and fast globally, people have become more aware of their environment, and they begin to go towards nature more and more to escape the city life. Seeking different lifestyles create more attention for different kinds of tourism such as culture, nature, sport, and history.

O3: The Positive attitude of the local community concerning ecotourism activities (Research Report, 2007).

This is a great opportunity because local community is an important element to sustain the tourism in the area. When the local people start to pay attention their environment, it will have a positive impact for the next generations which will take the tourism further than its current situation.

O4: There is a significant potential for tour routes that provides easy access to other historical places in Turkey (Sustainable Tourism Report, 2012).

With an organised plan there could be created many tour routes in Turkey. There are many tourism destinations which are different from each other in terms of tourism activities. It would make a big difference when there are different tourism packages

according to visitors' interests which include two or three different tourism activities. Also making them with an easy route would make a positive impact on the issue.

Threats

The six main threats are determined as follows:

T1: As a result of increasing visitor rates, there might be environmental damage (Atik, 2010).

This is a threat because it is difficult to observe every tourism area to fully protect from the visitors. Turkey has many tourism sites which are mainly natural parks, beaches, and ancient ruins. With the rise of the visitors, if there is not enough precaution there might be unrecoverable or recoverable damages which are bad both financially and environmentally.

T2: Turkey is located in a high-level risk earthquake zone (Research Report, 2007).

This threat is nature related, and precautions about the earthquake in Turkey are not enough at the moment. There is a lack of education about protection from the earthquake and the previous result about the issue may create a trust issue for the visitors.

T3: Weak government support for sustainable tourism.

Lack of government support about the sustainable tourism is a big thread since it has a huge effect on the improvement and development of tourism which effects convenient usage of natural resources in the long term. When there is such an issue, the real potential of the tourism will not be used fully, and the benefits of the resources will begin to decrease.

T4: There is an economic recession all around the world (Research Report, 2007).

The financial situation in the countries that citizens of them visit Turkey is critical for the tourism. The uncertainty of the time of the economic recession will have a negative effect on the tourism plan of the year in the country, and this will automatically effect the economy of the country and the local community in the tourism area.

T5: The war and confusion in the neighbouring countries of Turkey and Turkey's current situation (Research Report, 2007).

Since people consider tourism activities for relaxing and having a rest, it is important to provide a calm and safe environment to the visitors who choose you. Turkey is in such a geographic position that many countries have problems within or with each other. Thus, this creates an inconvenient environment for the tourism destinations which is a negative effect for the visitors.

T6: The intra-union travels are supported by the European Union policies (Sustainable Tourism Report, 2012).

Either for the trust issues or financial situations, there is more support for the travels that take part within the union. It is a thread for the countries that majority of the visitors come from Europe.

Moreover, the research has been supported by TOWS matrix and has been used for the first time by Heinz Wehrich in 1982 which is a verification of SWOT analysis. If the need arises to examine the relevant relations (Research Report of Turkey, 2007; Wehrich, 1982):

- S-O strategies determine the opportunities which support the strengths of the system (Maxi-Maxi Strategy).
- W-O strategies are used to reduce the weaknesses with the help of opportunities (Mini-Maxi Strategy).

- S-T strategies show how the strengths of the system should be used to minimise the sensitivity of the system against external threats (Maxi-Mini Strategy).
- W-T strategies prepare the plan of defence which prevent the weaknesses of the system being affected by external threats (Mini-Mini Strategy).

After the SWOT analysis, a number of strategies can be deduced such as:

STR1: Legal regulations should be enacted about sustainability.

Required law regulations should be enforced to raise the awareness of the subject related to sustainable tourism. The lack of legislation to protect the environment should not encourage the damaging behaviour of individuals. There might be unwanted situations because of the individuals who take granted the nature for their benefits and sometimes for being uneducated and not knowing adverse impacts on everything mainly environment itself which automatically effects tourism in this area. Thus, relates laws should be enacted, and the individuals should be informed well about the issue.

STR2: Projects about social responsibilities and sustainability should be promoted.

Since there are many different tourism destinations in Turkey, there are a lot of opportunities to include individuals, organisation, and cooperation which will help the improvements on tourism and at the same time raise the awareness about the issue. With the social responsibility projects, people will be able to join actively in the process and learn the benefits of being part of it which they will transmit the experience to the next generations. Therefore, organisations and cooperation who take part voluntarily in the process should be awarded to make the others join, too. There should be more projects developed to include local community to the process will have a positive impact on them to protect their environment and to make benefit for them as well.

STR3: Related people should be informed about the sustainable tourism issues such as agritourism, green tourism, eco-tourism.

In the recent years, different kind of tourism in demand because of the increase in the number of people who spend their most of time in tiring city life. Main tourism types are green tourism, eco – tourism, and agritourism. To be able to sustain those tourism types it is vital to protect nature. One of the most convenient ways to do is educate the people about it and make them understand the importance of it. The wrong usage of nature and damaging should be decreased as much as possible with the systematic educational courses. The local community should be included in the protection process, and they should also be encouraged to join actively tourism activities such as providing accommodation or garden for the visitors who came for the agritourism.

STR4: Political leaders should cooperate with non-governmental organisations to obtain effective results about the development of sustainable tourism.

Political leaders are always in sight and have a great power to send messages to the masses. They should direct their powers to make people understand the importance of sustainability in tourism by making collaborations with the non-governmental organisations. This would take the attention of individuals and make it easy to understand the importance of the improvements about the tourism. With this way, everyone may consider to join such organisations and help the process individually. Moreover, political leaders could use their power to find sponsors to support social responsibility projects that non-governmental organisations take part in.

STR5: The educational program should be rearranged to bring up conscious individuals who are aware of the importance of natural resources and have a willingness to protect them.

Education is one of the important strategies since it will have a long-term effect which is a crucial factor for the sustainability. Turkey is a rich country in terms of natural resources, historical places and unique cultures specific to each city that has been shaped with the past civilisations in Anatolia. Those values should be narrated cleverly and systematically to the people, young people especially. A well-made education plan can be easily reached to the students through schools which is a very effective method. In the

community centres, there should be free courses for adults to increase their awareness to the matter. With this way, locals would protect more willingly their environment and help to the improvements on sustainable tourism.

Tourism development should be more sustainable with the help of (European Commission Publication, 2002):

- Creating an image of Turkey in international and national markets,
- Creating an image in tourism as locally and regionally; with taking actions as a whole in marketing operations and giving regional resources prominence, branding of destinations could be achieved.

STR6: R&D (Research-Development) management should be improved.

Sustainability of R&D: Along with central, local public and private sector organisations, following and evaluating of statistical studies will be pursued with the aim of continued improvement and development on the basis of business. Statistical data will be rearranged in the way to help new development and research by world standards. It will be maintained the access of statistical data for researchers and business enterprises. The cooperation and coordination between public and private sectors will be ensured. Related data should be provided to the business enterprises for them to be able to move according to the national strategy.

The institutions that will serve to R&D of the tourism sector in the process of Strategy of Turkey.

- State Planning Organization
- The Ministry of Culture and Tourism
- Council of National Tourism
- Tourism Council of Cities
- National Tourism Accreditation Unit

- Research Unit of Domestic Tourism
- Orientation Unit of Tourism Education
- Databank Unit of National Tourism
- Universities

The steps of the strategy, which are based on TÜSİAD (Turkish Industry & Business Association) report have been classified under six titles according to their range such as short, medium and long-term (Sustainable Tourism Report, 2012).

These titles are;

- system management,
- participation and local administrations,
- education,
- communication and marketing,
- financing.

Short term strategies are defined when there is a need for planning an action which should be implemented as soon as possible. Moreover, those strategies should be taken into consideration in the case of regulation change.

Medium term strategies are most likely to be used in the category of setting up the system and development of it.

Long term goals include strategies to create a base and an awareness of sustainable tourism and maintain effective usage of sustainability.

Furthermore, those can be suggested for sustainable tourism:

- Defining the minimum standards and basic performance indicators of sustainability and improving them, action planning, and giving the enterprise license according to those measures.

- The efficiency of sustainability standards on implementations should be followed and examined with the cooperation of public-private sectors.
- Business enterprises who have the sense of sustainable tourism should be supported to encourage others and get the benefits of strategic investments.
- The necessary regulations should be implemented to reduce the bureaucracy.
- The correct indicators for the sustainable cities should be determined and to be able to create a brand for those sustainable cities necessary goals should be set by the public, academic, non-governmental organisation (NGO) and private sectors.
- Within the urban planning, arrangements should be made against natural disasters.
- Employment policies in tourism should be improved, and problems that are caused by seasonality and informality should be decreased to a minimum.
- Local values and differences in tourism should be handle to make sure to include local people to the chain and to be able to maintain this chain seasons should be made longer, alternative tourism types should be supported to extend them (Health tourism, eco-tourism...).
- Educated managers about sustainable tourism should be assigned in private sectors, or managers should be educated about it.
- Regular education towards sustainable tourism should be maintained for employees, and qualified employee policy should be encouraged in related enterprises.

S1: Turkey has a lot of historical and archaeological places which are internationally known
S2: Has some important seas and Bosphorus such as Aegean Sea, Mediterranean, Black Sea, Dardanelles, Bosphorus
S2: Located near the roads which have a high level of accessibility
S4: Has several places which are included in the World Cultural Heritage List by UNESCO
S5: Has several parks which have National Park status and does not restrict economic activities of the local community
S6: Turkey has tourism market which aims middle class
W1: Lack of national awareness of the importance of historical advantages
W2: Lack of national awareness of importance of sustainability
W3: The benefit from tourism revenue cannot be used by local community
W4: Archaeological and environment areas cannot be exhibited in a touristic way
O1: There exist several villages and buildings for hostel tourism
O2: Increase of interest in nature, history and culture tourism
O3: Positive attitude of the local community concerning ecotourism activities
O4: There is a significant potential for tour routes that provides easy access to other historical places in Turkey
T1: As a result of increasing visitor rates, there might be environmental damage
T2: Turkey is located in a high-level risk earthquake zone
T3: Weak government support for sustainable tourism
T4: Nowadays, there is an economic recession all around the world
T5: The war and confusion in the neighboring countries of Turkey and Turkey's current situation
T6: The intra-union travels are supported by the European Union policies
STR1: Legal regulations should be enacted about sustainability
STR2: Projects about social responsibilities and sustainability should be promoted
STR3: Related people should be informed about sustainable tourism issues such as agritourism, green tourism, eco-tourism
STR4: Political leaders should cooperate with non-governmental organizations to obtain effective results about the development of sustainable tourism
STR5: The educational program should be rearranged to bring up conscious individuals who are aware of the importance of natural resources and have a willingness to protect them
STR6: R&D management should be improved

Figure 4.2: Final SWOT analysis and possible strategies of sustainable tourism for Turkey

When the subfactors and strategies of SWOT analysis are settled in a SWOT matrix, the pair-wise comparison matrices among SWOT factors and the subfactors of SWOT factors are shown (Tables 4.2-4.7).

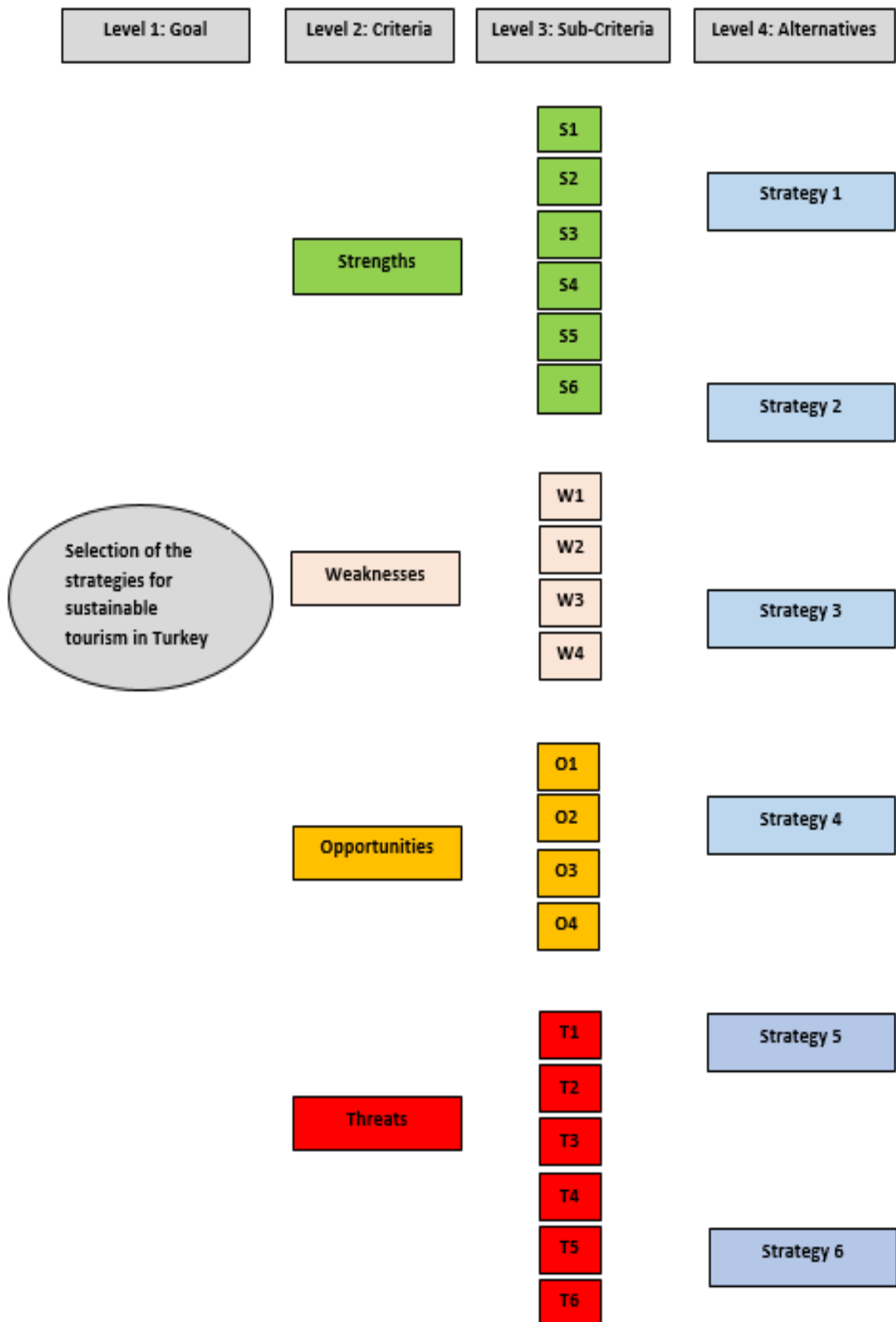


Figure 4.3: Hierarchy of sustainable tourism strategy model

4.2 Evaluation of SWOT Factors with Fuzzy AHP

After SWOT analysis, evaluating the type of the problem, fuzzy MCDM technique is used in this study to achieve objectivity and accurate results.

Triangular fuzzy numbers for pairwise comparison matrix calculated with the help of equation (3.1) to equation (3.4) by using fuzzy AHP.

Table 4.1: Definition and membership function of fuzzy scale

Intensity of importance	Fuzzy number	Definition	Membership function
9	$\tilde{9}$	Extremely more importance (EMI)	(8,9,10)
7	$\tilde{7}$	Very strong importance (VSI)	(6,7,8)
5	$\tilde{5}$	Strong importance (SI)	(4,5,6)
3	$\tilde{3}$	Moderate importance (MI)	(2,3,4)
1	$\tilde{1}$	Equal importance (EI)	(1,1,2)

Table 4.2: Evaluation matrix with respect to the goal

Matrix in linguistic terms					Matrix in fuzzy terms			
	S	W	O	T	S	W	O	T
S	-	MI	EI		1	(2, 3, 4)	(1, 1, 2)	(1/2, 1, 1)
W		-			(1/4, 1/3, 1/2)	1	(1/2, 1, 1)	(1/4, 1/3, 1/2)
O		EI	-		(1/2, 1, 1)	(1, 1, 2)	1	(1/4, 1/3, 1/2)
T	EI	MI	MI	-	(1, 1, 2)	(2, 3, 4)	(2, 3, 4)	1

Table 4.3: α -Cut fuzzy comparison matrix for the relative importance of the criteria with respect to goal ($\alpha = 0.5$, $\mu = 0.5$)

	S	W	O	T
S	1	[2, 4]	[1, 2]	[1/2, 1]
W	[1/4, 1/2]	1	[1/2, 1]	[1/4, 1/2]
O	[1/2, 1]	[1, 2]	1	[1/4, 1/2]
T	[1, 2]	[2, 4]	[2, 4]	1

The weight vector is calculated as $WG = (0.29, 0.12, 0.17, 0.41)$.

According to results, threat factor is the most important SWOT factor for sustainable tourism in Turkey.

Table 4.4: Evaluation of the sub-dimensions with respect to strengths

	S1	S2	S3	S4	S5	S6
S1	1	[2, 4]	[6, 8]	[2, 4]	[4, 6]	[1, 2]
S2	[1/4, 1/2]	1	[2, 4]	[1/2, 1]	[1, 2]	[1/4, 1/2]
S3	[1/8, 1/6]	[1/4, 1/2]	1	[1/6, 1/4]	[1/4, 1/2]	[1/6, 1/4]
S4	[1/4, 1/2]	[1, 2]	[4, 6]	1	[2, 4]	[1/2, 1]
S5	[1/6, 1/4]	[1/2, 1]	[2, 4]	[1/4, 1/2]	1	[1/4, 1/2]
S6	[1/2, 1]	[2, 4]	[4, 6]	[1, 2]	[2, 4]	1

The weight vector is calculated as $W_s = (0.34, 0.11, 0.04, 0.18, 0.08, 0.25)$. S1, "Turkey has a lot of historical and archaeological places which are internationally known", has more importance than other strength factors for sustainable tourism in Turkey.

Table 4.5: Evaluation of the sub-dimensions with respect to weaknesses

	W1	W2	W3	W4
W1	1	[1, 2]	[6, 8]	[2, 4]
W2	[1/2, 1]	1	[4, 6]	[1, 2]
W3	[1/8, 1/6]	[1/6, 1/4]	1	[1/6, 1/4]
W4	[1/4, 1/2]	[1/2, 1]	[4, 6]	1

The weight vector is calculated as $W_w = (0.45, 0.29, 0.05, 0.21)$.

W1, “Lack of national awareness of the importance of historical advantages”, has more importance than other weaknesses factors for sustainable tourism in Turkey.

Table 4.6: Evaluation of the sub-dimensions with respect to opportunities

	O1	O2	O3	O4
O1	1	[1/4, 1/2]	[1/2, 1]	[2, 4]
O2	[2, 4]	1	[2, 4]	[1, 2]
O3	[1, 2]	[1/4, 1/2]	1	[1/2, 1]
O4	[1/4, 1/2]	[1/2, 1]	[1, 2]	1

The weight vector is calculated as $W_O = (0.11, 0.46, 0.27, 0.16)$.

O2, “Increase of interest in nature, history and culture tourism”, has more importance than other opportunity factors for sustainable tourism in Turkey.

Table 4.7: Evaluation of the sub-dimensions with respect to threats

	T1	T2	T3	T4	T5	T6
T1	1	[1/2, 1, 1]	[1/4, 1/2]	[2, 4]	[1/4, 1/2]	[4, 6]
T2	[1, 2]	1	[1/4, 1/2]	[1, 2]	[1/6, 1/4]	[2, 4]
T3	[2, 4]	[2, 4]	1	[4, 6]	[1/2, 1]	[4, 6]
T4	[1/4, 1/2]	[1/4, 1/2]	[1/6, 1/4]	1	[1/6, 1/4]	[2, 4]
T5	[2, 4]	[4, 6]	[1, 2]	[4, 6]	1	[6, 8]
T6	[1/6, 1/4]	[1/4, 1/2]	[1/6, 1/4]	[1/4, 1/2]	[1/8, 1/6]	1

The weight vector is calculated as $W_T = (0.13, 0.11, 0.28, 0.06, 0.37, 0.04)$.

T5, “The war and confusion in the neighboring countries of Turkey and Turkey’s current situation”, has more importance than other threats factors for sustainable tourism in Turkey.

Table 4.8: Summary of the evaluation criteria weights

Criteria		Local importance	Sub-criteria	Local importance	Global importance
Strengths	(S)	0.29	S1	0.34	0.099
			S2	0.11	0.032
			S3	0.04	0.012
			S4	0.18	0.052
			S5	0.08	0.023
			S6	0.25	0.073
Weaknesses	(W)	0.12	W1	0.45	0.054
			W2	0.29	0.035
			W3	0.05	0.006
			W4	0.21	0.025
Opportunities	(O)	0.17	O1	0.11	0.019
			O2	0.46	0.078
			O3	0.27	0.046
			O4	0.16	0.027
Threats	(T)	0.42	T1	0.13	0.025
			T2	0.11	0.059
			T3	0.28	0.120
			T4	0.06	0.038
			T5	0.37	0.159
			T6	0.04	0.018

4.3 Selection of Strategies with Fuzzy VIKOR

In this part of the study comparison results of the fuzzy AHP with other MCDM technique Fuzzy VIKOR are presented. Table 4.9 gives the linguistic evaluation data of alternatives. The best rating and the worst rating values for all the criteria is given in Table 4.10 and Table 4.11 give S , R , and Q values for $\nu=0.5$.

Table 4.9: Linguistic evaluation data of alternatives

	S1	S2	S3	S4	S5	S6	W1	W2	W3	W4	O1	O2	O3	O4	T1	T2	T3	T4	T5	T6
STR1	EMI	MI	EI	VSI	SI	MI	SI	MI	EMI	VSI	EI	VSI	SI	VSI	EMI	VSI	EMI	EI	EI	SI
STR2	EMI	MI	EI	EMI	VSI	SI	EMI	EMI	VSI	SI	SI	VSI	EMI	EMI	VSI	MI	EMI	MI	EI	EI
STR3	EMI	SI	MI	EMI	MI	VSI	EMI	EMI	MI	VSI	SI	VSI	EMI	EMI	EMI	MI	EMI	EI	EI	SI
STR4	VSI	MI	SI	EMI	VSI	EMI	EMI	EMI	VSI	SI	SI	EMI	VSI	SI	VSI	SI	EMI	VSI	MI	SI
STR5	EMI	VSI	MI	VSI	EMI	SI	EMI	EMI	SI	VSI	SI	VSI	EMI	MI	EMI	SI	EMI	EI	EI	MI
STR6	EMI	VSI	MI	EMI	VSI	SI	EMI	EMI	SI	EMI	SI	VSI	SI	VSI	EMI	SI	EMI	MI	MI	VSI

Table 4.10: The best rating and the worst rating values for all the criteria

WEIGHTS	0,099	0,032	0,012	0,052	0,023	0,073	0,054	0,035	0,006	0,025	0,019	0,078	0,046	0,027	0,022	0,045	0,115	0,025	0,152	0,016
CRITERIA	S1	S2	S3	S4	S5	S6	W1	W2	W3	W4	O1	O2	O3	O4	T1	T2	T3	T4	T5	T6
fi+	9	7	5	9	9	9	9	9	9	9	5	9	9	9	9	7	9	7	3	7
fi-	7	3	1	7	3	3	5	3	3	5	1	7	5	3	7	3	9	1	1	1

Table 4.11: S , R and Q values for $\nu = 0.5$

S	R	Q
0.62	0.15	0.00
0.46	0.15	0.18
0.39	0.15	0.25
0.16	0.10	0.86
0.44	0.15	0.20
0.25	0.08	0.90

The alternatives are ranked sorting by the values Q in increasing order. Consequently, the most important three strategies are STR1, STR2 and STR5. These are: “Legal regulations should be enacted about sustainability”, “Projects about social responsibilities and sustainability should be promoted” and “The educational program should be rearranged to bring up conscious individuals who are aware of the importance of natural resources and have a willingness to protect them”, respectively.

5. CONCLUSION AND PERSPECTIVE

Sustainable tourism management practices are viable to all forms of tourism in all types of destinations, including mass tourism and the several niche tourism segments. Sustainability principles refer to the environmental, economic, and socio-cultural states of tourism development, and a suitable balance must be established between these three dimensions to guarantee its long-term sustainability.

In this study, SWOT based integrated fuzzy AHP and fuzzy VIKOR has been proposed to identify sustainable tourism strategies for Turkey. The main contribution of the study was the new evaluation approach for selecting most significant strategy or strategies to help the decision makers in sustainable tourism. In the literature, SWOT based fuzzy AHP and fuzzy VIKOR methodology is not applied on sustainable tourism in Turkey. Hence in the light of this aim, data have been collected from a comprehensive literature survey and sustainable tourism experts and used in the model to select significant strategies for sustainable tourism in Turkey. From the literature review, four main criteria have been formed and 20 sub-criteria have been created for making a hierarchical structure. The importance weights of criteria and the evaluation of alternatives has been assessed in linguistic terms by triangular fuzzy numbers. By using this approach, the ambiguities involved in the assessment data could be effectively represented and processed to assure a more convincing and effective evaluation process.

All the criteria were evaluated by fuzzy AHP, and then most significant strategies for sustainable tourism in Turkey were selected by fuzzy VIKOR method that helps decision makers to achieve an acceptable compromise of maximum ‘group utility’ of the “majority” and the minimum of the individual regret of the “opponent”.

According to the results of the used integrated method the most preferable strategies for sustainable tourism in Turkey are identified as “Legal regulations should be enacted about sustainability” and “Projects about social responsibilities and sustainability should be

promoted”. This is to say, required law controls ought to be authorised to raise the familiarity with the subject identified with sustainable tourism and there ought to be more tasks created to incorporate local community to the procedure will positively affect them to ensure their surroundings and to make a profit for them too.

The ordinary fuzzy sets have been recently extended to Type 2 fuzzy sets, hesitant fuzzy sets, intuitionistic fuzzy sets, non-stationary fuzzy sets and fuzzy multisets. Hesitant fuzzy sets allow more than one value for defining the membership value of an element, enabling an expert better express his/her assessment. Both classical AHP and VIKOR methodologies will be performed with hesitant fuzzy sets as the perspective for future work.

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BIOGRAPHICAL SKETCH

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