

Article

Sustainable Development of Ethno-Villages in Bosnia and Herzegovina—A Multi Criteria Assessment



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Abstract: This paper explores ethno-villages in Bosnia and Herzegovina as an important element of rural and cultural tourism. The attractiveness of natural and cultural heritage is very important for sustainable rural tourism development. In order to improve the process of decision making to enable the sustainable development of ethno-villages, a multi-criteria assessment model has been developed. The methodology is based on qualitative modeling using a multi-criteria analysis via the DEXi software. The model is based on hierarchical relations consisting of three main criteria that are the basis of sustainable tourism development: economic, social, and environmental criteria. The ultimate goal of the model in this study was to evaluate ethno-villages, namely six ethno-villages in Bosnia and Herzegovina. The results of the study show how ethno-villages contribute to sustainable development.

Keywords: sustainable development; tourism; ethno-villages; DEXi; decision support; multi-criteria model; assessment

1. Introduction

Tourism represents one of the most important contributions to economic development in the world [1]. This trend has been particularly noticeable in recent years. A special advantage of tourism is its ability to provide additional employment for the population through various types of tourist offers. Tourism contributes to the creation of income, new employment, and allows the local economy to expand [2]. Tourism, in today's age of globalization, is a powerful tool for developing the economy at the local and national level, allowing the increase of international tourism receipts by international inbound visitors. The process of globalization, followed by the information revolution, has imposed a new global culture. In these circumstances, we must ask how to preserve the national and local culture by using local characteristics for the development of tourism. According to the European Commission, alternative forms of tourism are growing almost three times (8%) faster than the conventional tourism market. People are also placing greater emphasis on quality products and more environmentally conscious forms of tourism [3]. One of the alternative forms of tourism, especially in rural areas, is ethno-tourism, which is a significant part of sustainable tourism [4].

According to the work in [5], ethno-tourism is a promising opportunity for tourism development because of its unique and diverse content and, in particular, because of the chance for tourists to participate actively in authentic cultural life. Moreover, using ethno-tourism as a base feature for local tourism development in the region is makes tourism more attractive for investors, thereby



supporting and promoting interest in the unique culture of the local people. A particularly noteworthy element of this is the immense importance that has been attached in recent years to the development of ethno-tourism within the framework of sustainable development issues, including the preservation of natural and historical cultural heritage and the improvement of quality of life [6].

The offers of ethno-tourism in Bosnia and Herzegovina are mostly based on the development and promotion of ethno-villages. This paper is focused on increasing of the quality of ethno-tourism through the development and implementation of an appropriate development strategy based on several key factors, such as: (a) preserving local traditions and culture; (b) using and preserving natural resources; (c) establishing infrastructure through the improvement of the local community; (d) involving the local population and strengthening local entrepreneurship; (e) providing additional employment for the population; (f) increasing the satisfaction of tourists; and (g) creating sustainable business.

Tourism development should be based on sustainable tourism [7]. Sustainability in tourism includes three different dimensions: economic, environmental, and social [8]. To improve the tourist offers in Bosnia and Herzegovina, it is essential to evaluate the dimensions of sustainability. In order to obtain an overall assessment of the sustainability of the tourist offers in Bosnia and Herzegovina, additional sub-criteria should be included. The evaluation of alternatives is affected by using a number of criteria, and this problem can be solved by using multiple criteria analysis (MCDA) to evaluate ethno-villages as an alternative and assessing their current situation. Examining the current situation is a prerequisite for making recommendations to improve tourist offers. It is possible to use qualitative and quantitative values when evaluating the established criteria [9]. Due to the specificities of service activities, including tourism, the most proper method involves a qualitative evaluation of the criteria within a multi-criteria problem. Therefore, the DEX method presented in [10] is the most logical choice for assessing the present state of the tourist offers in ethno-villages.

The goal of this paper is to present a tool for the assessment of ethno-tourist offers with respect to sustainable development. This approach is based on a multi attribute DEX methodology containing parameters for assessing the sustainable development of ethno-tourism through economic, social, and ecological criteria. On the basis of sustainability criteria and their sub-criteria, the decision support model for assessing the state of ethno-villages in Bosnia and Herzegovina was developed and applied to six selected ethno-villages in Bosnia and Herzegovina.

This paper is composed as follows. First, we present a detailed literature review on the ethno-tourism phenomenon and sustainability assessment models in tourism. This is followed by model description and model development. The article concludes with a summary of the main findings and suggestions for further study.

1.1. Ethno-Tourism Phenomenon

The term ethno-tourism represents a new synergy that does not originate from ethnological professions or science. However, it represents a trend of increased interest in the domestic cultural tradition [11]. Ethno-tourism refers to tourist offer based on a people's cultural heritage. This offer is intended not only for foreign but also for domestic tourists, who may then acquire knowledge about the area's domestic culture and the impacts of globalization on that culture. Ethno-tourism is a type of cultural tourism referring to the culture of a particular ethnic group [12]. The ethnic and cultural features of the local population and the sustainable use of local resources are the core of ethno-tourism [5]. Ethnic territory is a place that produces sustainable improvement in the living conditions of individuals and increases the income generation capacity of rural indigenous communities [13]. Ethnic tourism represents an offer of the strange authentic customs of exotic nations [14]. Ethno-tourism offers, besides showcasing authentic customs, comprises the cultural offers of one nation to tourists and, as such, also represents cultural tourism. Cultural tourism represents an instrument of tourism through the preservation of cultural heritage and the development of tourist offers based on this heritage [15]. According to these definitions, it can be concluded that ethno-tourism includes cultural tourism seem to

represent one of the pillars in the cultural–economic nexus for ethno-development [16]. Ethno-villages represent a horizontal hotel located in the historical part of town or village and can be organized as an integral place or more dislocated accommodation units (rooms or houses) that are organized as a hotel with a central reception and offered together with other services (museums, restaurants, children's playgrounds, etc.) [17].

Like every tourist offer, ethno-tourism is often combined with other forms of tourism, such as rural and ecological tourism. On these grounds, ethno-villages have been created as a form of ethno-tourism. Ethno-villages offer advantages for the local population; they give support for the preservation of the traditions of some nations, develop the local community, increase the number of visits to the area, and improve the education of tourists [18]. Ethno-villages are thus an important factor in the development of rural areas and help preserve local identity, traditions, and customs.

The development of tourist offers on the basis of ethno-villages began to intensify at the beginning of the 21st century in the Balkans. The reason for this intensification is possibly the fact that, with the disintegration of Yugoslavia, the newly created states have tried to intensify the cultural identity of the people in that country. In this regard, ethno-tourist offers based on ethno-villages began to appear. Many ethno-villages have been opened in Bosnia and Herzegovina. In this study, we focus our interest on six ethno-villages to analyze the sustainable supply of these villages.

Some studies have tackled the issue of ethno-tourism in Bosnia and Herzegovina. Malinić and Stevanović [19] highlight the importance of the ethno-village "Babina greda" for the development of the tourist valorization of anthropogenic tourist values in the municipality of Lazarevac. Demonja and Gredičak [20] note that it is important that ethno-villages be specifically defined thematically and provide a rural mountain resort, wellness village tourism, and old crafts to tourists, as well as offering authentic wines and various other drinks and dishes. Medojević et al. [21] argued that it is possible to preserve rural identity and traditions by using ethno-villages while adopting the idea of European ethnic villages. Čiča and Mlinar [11] indicate that ethno-villages represent the private initiative of enthusiasts or entrepreneurs, including both the local community and the tourist community.

1.2. Sustainability Assessment Models in Tourism

Sustainability assessment is a device that helps decision-makers and policy-makers decide what actions they should take and should not take in an attempt to improve society [22]. The concepts of sustainability assessment have been applied by some studies, such as those in [23–26], while the concept of a sustainable development model was designed by Hunter [27]. The multi-criteria approach to sustainability assessment has been used by other authors, such as Kluczek [28,29].

Sustainability assessment can be conducted with different techniques. A complete overview of these methods is provided by Schianetz et al. [30]. Multi-criteria methods often emerge as the possible solution for sustainability assessment problems [31], although they are most well-known for being used as a part of decision support systems [9]. Multi-Criteria Decision Analysis (MCDA) methods are included among the examination and evaluation techniques and are considered useful. Such analyses and techniques are performed through the use of methods aimed at achieving a synthesis of the various forms of input data needed to define decision-making problems of a similar complexity [32]. All decision support systems (DSSs) are interactive systems that assist decision makers in using data and models to solve a problem and make a decision [33]. A decision based approach allows model manipulation using statistical tools, simulation, and optimization [34]. When applying these models to assessment problems, this process is done by presenting problems using hierarchy and decision rules, evaluating criteria and alternatives in decision making, and analyzing the obtained data from the model by sensing the analysis or discussing the results obtained. The decision support model has a wide application in tourism. In this regard, various methods have been used, such as Analytic Hierarchy Process (AHP), Analytic Network Process (ANP), The Technique for Order of Preference by Similarity to Ideal Solution (TOPSIS), Decision EXpert (DEX), and other several-attribute methods. The use of multi-criteria methods is widely accepted in tourism management. Do and Chen [35]

used the AHP method to calculate the weight of the criteria for allocating scarce resources in tourism. Chen and Bau [36] identified factors for the sustainable development of tourist beaches by performing a factor analysis and using the AHP method. Lin et al. [37] analyzed the role of tourist mediators in improving the performance and quality of services in tourism through expert judgment and ANP methods. Zhang [38] applied the ANP and goal programming methods for applying a sustainable tourism development model in the Xizang region. García-Melón et al. [39] carried out an evaluation of sustainable tourism strategies for the promotion of national parks using the ANP and Delphi methods. Mohamad and Jamil [40] assessed the key factors that influence the selection of local tourist sites using the Fuzzy Hierarchical TOPSIS method. Huang and Peng [41] applied the Fuzzy TOPSIS method to analyze the Destination Competitiveness (TDC) of nine Asian countries. Morteza et al. [42] selected the tourist area for potential tourist offers on the evaluation model using a combination of the ANP and TOPSIS methods. Yu et al. [43] used the extended VIKOR method to select appropriate hotels. Rozman et al. [44] demonstrated the methodology for ranking tourist farms using a multi-criteria model based on the qualitative methodology of multi-attribute model, DEX, in order to evaluate the quality of the service. Ars and Bohanec [34] developed a model based on a qualitative multi-deprecating model using the DEXi program in order to design a tool for reducing the environmental footprint of tourists in sensitive and underdeveloped mountainous areas, thus contributing to mountain eco-tourism. Golob et al. [45] supported decision-making based on the DEX method for the sustainability of sports events in Slovenia.

Based on this review of multi-attribute decision-making methods used as a support for decision making and assessment in tourism, we decided to use the DEX model to build a model for evaluating the sustainable development of ethno-touristic offers in Bosnia and Herzegovina.

2. Methodology

Sustainable tourism management requires an interdisciplinary approach because a simple qualitative assessment of the state of ethno-villages in Bosnia and Herzegovina does not provide enough information for objective decision-making. It is therefore necessary to apply quantitative and qualitative multi-attributive modeling by including criteria from different segments of tourism, such as environment protection, socioeconomic factors, and other criteria. This model of decision-making offers a wide range of decision-making methods to develop tourist offers in a sustainable manner. We established our research goal to examine the sustainable development of the tourist offers using the example of an ethno-village. For this purpose, we developed a model that enables the assessment and analysis of ethno-villages in Bosnia and Herzegovina. This model is used to analyze positive and negative characteristics of the infrastructure and management of these ethno-villages. This model has been designed to assess the current state and to elucidate proposals for improving the sustainability of this type of tourist offer. The six ethno-villages in the sample represent six alternatives.

For the evaluation and analysis of ethno-villages within the model, the DEX method was used [46], which provides a method for qualitative multi-attributive modeling. The DEX model consists of attributes that are hierarchically structured and enables a description of the attributes of the hierarchy in the conceptual model and an aggregation of rules between the attributes applicable to problems of the real decision making process [10,47]. The DEX method combines traditional methods for multi-criteria decision-making (MCDM) with elements of the experimental system [48]. In order to evaluate the attributes, we used expert judgement. The methods of expert judgements represent the methodologically organized use of the knowledge of experts in order to predict future states and phenomena [9]. The most important feature of the DEX method is its ability to use qualitative variables given by descriptive courts with values of low, high, acceptable, unacceptable, etc. [49]. Using the "if-then" decision-making rules, it is then possible to transform quantitative variables into qualitative ones and use them in the DEX method. The DEX method is applied using the DEXi program. In most cases, DEXi models have been developed through the cooperation of experts in particular fields of

research that have knowledge of the relevant decision-making problems, while analysts develop the composition of the model [34].

A DEX model is usually built using the following stages [50]:

- 1. The hierarchical model is divided into less complex problems. The decision problem is represented by an attribute tree that represents a skeleton of the model. The tree nodes of the model represent the input, while the root node is the main output, which is the rating of an alternative.
- 2. Each sub-problem is represented by qualitative attributes with a certain scale of values. The scale of values compares certain criteria and assigns them a qualitative value.
- 3. The utility functions are defined for each attribute, and these functions establish the aggregate sub-criterion.

2.1. Model Structure

The model for managing the sustainable development of ethno-villages in Bosnia and Herzegovina consists of 36 hierarchical structured attributes (Figure 1). We used the basic model proposed by Gibson [8]. The basis of this model is represented by three basic attributes of sustainability: economic, social, and ecological criteria. A similar approach to those three basic criteria was used by other researchers [28,51,52]. The expert group used those three criteria as the basis for model development and adapted it to the observed case. These three criteria are divided into sub-criteria and those, in turn, are divided into leaves. Each of these main attributes is divided into additional attributes that are presented as follows:

- 1. The economic criterion consists of data describing:
 - (a) Strengthening local entrepreneurship: aims to use domestic products, and, through the development of this type of tourism, to create new jobs using the local workforce.
 - (b) Increase in the income of the population: aims towards constant employment, which will increase the income of the population through permanent benefits that will come from this type of tourism.
 - (c) Marketing criterion: evaluates how promoting this type of tourism is executed, whether additional promotion is needed, and what the possibilities of selling primarily domestic products are.
- 2. The social criterion consists of data describing:
 - (a) The social dimension, which aims to improve conditions in the local community through strengthening the infrastructure in that community and developing content for additional tourist offers, as well as interaction with the social community reflected in the employment of the population, promotion of that local community, and improvement of the living standards of the population through the development of tourist offers.
 - (b) The cultural dimension, which is reflected in preservation of the traditions of the local region and promoting traditions through the provision of various content to tourists and enabling the active participation of tourists in the tourist offer.
- 3. The ecological criterion consists of data describing:
 - (a) Use of resources: The goal of this attribute is to apply sustainability to water and land management and to use as many renewable resources as possible.
 - (b) Environmental quality: The goal is to utilize the natural resources of the region where individual ethno-villages are located, to provide quality water to tourists, and, in addition, to facilitate high quality land and air.

(c) Waste management, which is reflected in the conservation of energy, water, and other natural resources, as well as the recycling of waste and preserving the natural environments in which ethno-villages are located.



Figure 1. Structure of the sustainable development of ethno-villages in Bosnia and Hercegovina.

2.2. Value Scales

All attributes used in this paper are described by discrete and symbolic value scales. These scales have acquired discrete values that are represented by words. The maximum scale was used for the main evaluation of the model and consists of five levels of value, from unacceptable to very good. The first two values were considered bad, while the last two were good. The main criteria were evaluated by a scale of four levels of value, where the last two were considered good. Other attributes were evaluated according to their characteristics. All the scales used are shown in Table 1. In total, there are 11 valuable scales used in this model. It should be noted that there are also "counter" values, which are "no use" and "using" for the "Required promotion" attribute, where the "use" attribute is a negative value, and "no use" is a positive value, meaning that if promotion is needed, tourists are not familiar with this ethno-village and its needs promotion, which will cause the outflow of funds for promotion purposes, whereas "no use" means that no promotion is needed; this attribute is good because it is not necessary to invest in promotion, as tourists are already familiar enough with this ethno-village. The "Using Renewable Resources" attribute is usually positive. However,

when no renewable resources are used, this attribute is not good and represents a negative value. Other measurement scales were similarly used for other attributes, as shown in Figure 2.

	Value Scale
1	unacceptable; bad; middle; good; very good
2	bad; middle; good; very good
3	influence; partial influence; no influence
4	bad; middle; good
5	small; medium; big
6	small; middle; high
7	not using; using
8	using; not using
9	does not exist; exists
10	in need; no need
11	bad; good

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Scales				
Attribute	Scale			
Sustainable development of ethno-tourism in BiH	unacceptable; bad; middle; good; very good			
-Economic Criteria	bad; middle; good; very good			
-Strengthening Local Entrepreneurship	bad; middle; good; very good			
-Using domestic products	no using; using			
-Opening jobs	bad; middle; good			
Local workforce	does not exist; exists			
-Increase in population incomes	bad; middle; good; very good			
-Income and fixed income	bad; middle; good			
Employment	bad; middle; good			
-Marketing Criteria	bad; middle; good; very good			
-Required promotion	using; not using			
Sales opportunity	bad; middle; good			
–Social Criteria	bad; middle; good; very good			
-Social Dimension	bad; middle; very good			
Improving local community conditions	bad; middle; good			
Strengthening infrastructure	in need; no need			
Development of tourist content	in need; no need			
Interaction with the community	bad; middle; good			
Employment	small; medium; big			
Promotion local community	bad; middle; good			
-Standard of living	small; medium; <i>big</i>			
Cultural dimension	bad; middle; good; very good			
-Preserving tradition	small; middle; high			
Promotion of tradition	bad; middle; good			
Participation of tourists	small; middle; <i>high</i>			
-Ecological criteria	bad; middle; good; very good			
-Using resources	bad; middle; good			
	influence; partial influence; no influence			
Land	influence; partial influence; no influence			
Using renewable resources	not using; using			
Quality of the environment	bad; middle; good			
-water quality	bad; middle; good			
Quality land	bad; good			
-Air quality	bau; gooa			
-waste management	bad ; middle; <i>good</i>			
Concention of an and	badi madie; very good			
-conservation of energy	bau, gooa			

Figure 2. Value scale for attributes.

2.3. Utility Functions

In the DEXi model, decision rules are defined using the aggregation of values for basic attributes. For example, ecological criteria will define the attributes Use resources, Quality of the environment, and Waste management. Therefore, it is necessary to define the correct decisions for each attribute. The decision rules are defined based on the values of the previous attributes for all possible combinations. In this model, the goal was to ensure that the sustainable development of the ethno-villages in Bosnia and Herzegovina were taken into account; therefore, all aspects of sustainability, with an emphasis on environmental and economic criteria, were taken into account. To illustrate these decision-making rules, the final node of this model will be "Sustainable development of ethno-tourism". For this node, there are five scales of values that give 81 different combinations of decision-making for the displayed functions in the aggregate form (Table 2). These weights were evaluated by the DEXi rules using the linear regression method [9]. In this function, the following rules were used:

- The value of the attribute will be "unacceptable" if two of three criteria are "bad" and if one criterion is "bad" and two "middle" remain.
- The value of the attribute will be "bad" if the two criteria are "bad", and one of the criteria is "very good", if one criterion is "bad", while the other two criteria are "good" and if one criterion is "bad" one "middle" while the rest are "good".
- The value of the attribute will be "middle" if one criterion is "bad" while the remaining criteria are "good" or "very good", or if the two criteria are "middle", while one criterion is "good".
- The value of the attribute will be "good" if one or two criteria are "middle", while the remaining criteria are "good" or "very good", and if all the three criteria are "good".
- The value of the attribute will be "very good" if one criterion is "middle" while the other two are "very good", if one or two criteria are "good", and the remainder are "very good", and if all the criteria are "very good".

	Economic Criteria Social Ci		Ecological Criteria	Sustainable Development of Ethno-Tourism		
	35%	30%	35%			
1	bad	bad	<=good	unacceptable		
2	bad	<=middle	<=middle	unacceptable		
3	bad	*	bad	unacceptable		
4	<=middle	<=middle	bad	unacceptable		
5	bad	bad	very good	bad		
6	bad	middle:good	good	bad		
7	bad	good	middle:good	bad		
8	middle	bad	middle:good	bad		
15	bad	middle:good	very good	middle		
16	bad	very good	middle:good	middle		
17	<=middle	very good	middle	middle		
18	>=middle	bad	very good	middle		
19	middle	middle:good	good	middle		
37	<=middle	very good	very good	good		
38	middle	>=middle	very good	good		
39	middle:good	middle:good	very good	good		
40	middle	very good	>=good	good		
41	middle:good	very good	good	good		
48	>=good	very good	very good	very good		
49	very good	>=middle	very good	very good		
50	very good	very good	>=middle	very good		

Table 2. Example of determining the weights of the attributes.

* Any value.

It should be noted that the value of the attribute cannot be "good" or "very good" if one of the criteria is "bad". The values for the other attributes are similarly formed, with the most decisive

decision-making functions presented, while the other functions are more simple, making it easier to determine the values of their attributes.

2.4. Ethno-Villages in the Case Study

The multi-criteria model assesses the current situation and gives guidelines for improving sustainable development using the example of six ethno-villages in Bosnia and Herzegovina. Ethno-tourism based on ethno-villages is becoming more and more popular in Bosnia and Herzegovina. Therefore, the offers of this type of tourism are constantly increasing, and the preservation of the traditions and customs of certain areas have become an integral part of the occupations for an increasing number of local inhabitants of different profiles. The tourist offers of ethno-villages aim to share traditions, customs, and the preserved beauty of local communities with as many visitors as possible and to contribute to the development of rural tourism in Bosnia and Herzegovina. Bosnia and Herzegovina are situated at an optimal altitude, with dense forests, meadows, watercourses with lakes and sinks, caves, rock massifs, and high quality air in the villages, providing excellent conditions for excursions, hunting, fishing, mountaineering, alpinism, speleology, skiing, reading, and collecting mushrooms and medicinal herbs. In this way, ethno-villages provide tourists with natural beauty, clean air, and pleasant ethno-culture. There are dozens of ethno-villages in Bosnia and Herzegovina. For the purpose of this study, we selected six ethno-villages, which are presented below.

The ethno-village Stanišić is located at the exit from Bijeljina towards the Pavlović Bridge. There are two units in the village. In one unit of the village, there are wooden houses containing traditional furniture. These houses are connected by paved stone paths, and in the center of the village, there are two lakes. The second unit has a more spiritual character and is represented by medieval architecture built in stone, which is in fact a replica of the Kumanica monastery, which has historical and religious significance. Within the ethno-village, there are festive lounges, a stadium, a sports fields and a spa [53].

The Begovo village is located in the protected zone of the Bijambara natural reserve. The altitude is 1040 m above sea level and it is 500 m away from the national road of Sarajevo—Tuzla. The village was built from original materials, some of which are hundreds of years old, using techniques that were also used in that period. There is a bazaar here, with many small houses and small mosques within the village. The ethno-village Begovo, besides traditional cuisine, offers horseback riding, bicycle rentals, photo safaris, rafting on the curve, yoga, massages, and the possibility to visit the Bijambar Caves [53].

The ethno-village Herceg is located in a rocky area of Herzegovina. It covers an area of four hectares and consists of 50 stone objects and a trading section, with about a dozen stores with traditional products. The complex of stone houses, typical for the past periods of this region, is completed with a restaurant, amphitheater, congress hall, and souvenir shop. Within the village, there is a vineyard with autochthonous varieties from Herzegovina, Zilavka, and Blatina. There are stables with domestic animals from this area, and in front of the terrace, there is a playground for the youngest visitors [54].

The ethno-village Babici is located at Rostov in the heart of Bosnia at 1160 m above sea level, not far from Bugojno. The village consists of a cottage, a water mill, a foray house, a dairy shop, etc. In the village, it is possible to see many sights from ancient times, including utensils and tools used in the past, as well as all domestic animals from the region. Near this ethno-village is situated the Ski Center "ROSTOVO", which has two ski lifts with a capacity of 1500 skiers per day [55].

The ethno-courtyard Mačkovac is located in the popular resort Zlaća, in the municipality of Banovići. In the ethno-hall complex, there is the Homeland Museum, with all the accompanying facilities from former times, including old furniture and various objects and tools that were used to work in and around the house. There are also two watermills on the river Oskovi. Old crafts have been revived here (potter, cheesemaker, blacksmith, carpenter, "sepetar", tailor, etc.), and the best masters show their art [56].

The ethno-village Kotromanjić is located in the Doboj region, on the bank of the Veliček River, and offers houses to stay in, with modern furniture built in an antique style from natural materials, such as wooden logs. In addition to walking around intact nature, the Royal Village Kotromanićevo

organizes knight tournaments, medieval evenings, hunting, fishing, paragliding, and mountain biking. In addition to bungalows in the shape of old medieval cottages, camps, waterfalls, wooden bridges, and playgrounds, there is also a hippodrome for horses, an ethno-market, a miniature golf terrene, terrain for boating, and other activities to participate in [53].

2.5. Data Sources for Analysis

We collected the data for analysis from two sources. The first source is the study "A Study of Rural Tourism in Bosnia and Herzegovina" from 2009, prepared by the Alterural Association for the Development of Rural Tourism, as well as by the personal visits of experts in the field of tourism to these ethno-villages. This study provided relevant information on the level of development of rural tourism in Bosnia and Herzegovina, where guidelines for development of this type of tourism were established. In this study, the expert assessment is used. The experts were understood to have more than 10 years of experience in the field of rural tourism. In total, nine experts were used, out of whom five were tourism experts, while four were experts in the area of sustainable rural development. For the engagement of experts, the following steps were adopted. First, they were given materials and data related to the research. Second, the experts visited these ethno-villages to determine the current situation in these villages in order to provide guidelines for their sustainable development. Experts living in ethno-villages collected data on each of the ethno-villages in accordance with the guidelines set out in the study. Third, for research, the experts presented their estimates and, thus, provided data on ethno-villages. On the basis of those estimates for each ethno-village discussed in this study, the relevant values were selected based on the aforementioned scale; in this way, the input data for the DEX analysis were obtained. Each expert assessed the values of the criteria at the lowest levels of the multi-criteria hierarchy (Figure 1) using the defined scale sets (Figure 2). Each assessment was given a corresponding ordinal number. For instance, for a set of values for Water quality of (bad, middle, good), the value "bad" is assigned the ordinal number 1, the value "middle" is assigned the number 2, and the value "good" is assigned the number 3. Then, the average of all assessments was calculated for each criterion. The average was then rounded and transferred back to its corresponding scale, which was ultimately used as input into the multi-criteria assessment model.

These data have been used to evaluate the current situation in these ethno-villages, as shown in the results in Figure 3.

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Evaluation results							
Attribute	Stanisic	Begovo selo	Herceg	Babici	Mackovac	Kotromanjic	
Sustainable development of ethno-tourism in BiH	middle	bad	middle	bad	middle	bad	
-Economic Criteria	very good	middle	very good	middle	good	middle	
Strengthening Local Entrepreneurship	very good	good	very good	very good	very good	very good	
Using domestic products	using	using	using	using	using	using	
-Opening jobs	good	bad	good	middle	middle	middle	
Local workforce	exists	exists	exists	exists	exists	exists	
-Increase in population incomes	good	bad	middle	bad	bad	bad	
-Income and fixed income	good	bad	middle	middle	middle	bad	
Employment	middle	bad	middle	bad	bad	bad	
-Marketing Criteria	very good	bad	good	bad	good	bad	
-Required promotion	not using	using	not using	using	not using	using	
Sales opportunity	good	middle	middle	middle	middle	middle	
-Social Criteria	very good	middle	very good	bad	good	bad	
-Social Dimension	very good	bad	very good	bad	middle	bad	
-Improving local community conditions	good	bad	good	bad	middle	bad	
-Strengthening infrastructure	no need	in need	no need	in need	in need	in need	
Development of tourist content	no need	in need	no need	in need	no need	in need	
Interaction with the community	good	middle	good	middle	middle	middle	
Employment	big	small	medium	small	small	medium	
-Promotion local community	good	middle	good	middle	good	middle	
Standard of living	medium	medium	medium	medium	medium	medium	
-Cultural dimension	middle	very good	middle	middle	very good	middle	
 Preserving tradition 	middle	high	middle	middle	high	middle	
-Promotion of tradition	middle	good	middle	middle	good	middle	
Participation of tourists	middle	middle	middle	middle	middle	middle	
Ecological criteria	bad	middle	bad	middle	middle	good	
Using resources	bad	middle	bad	middle	middle	good	
Water	partial influence	no influence	partial influence	no influence	no influence	no influence	
-Land	influence	partial influence	influence	no influence	partial influence	no influence	
Using renewable resources	not using	not using	not using	not using	not using	using	
Quality of the environment	middle	good	middle	good	good	good	
-Water quality	middle	good	middle	good	good	good	
-Quality land	good	good	good	good	good	good	
└─Air quality	bad	good	bad	good	good	good	
Waste management	bad	bad	bad	bad	bad	bad	
Recycling	bad	bad	bad	bad	bad	bad	
Conservation of energy	bad	bad	bad	bad	bad	bad	

Figure 3. Ratings of the six ethno-villages.

3. Results

The values of the assessment model for the six ethno-villages in this study are presented in Figure 3. As can be seen from these results, the ethno-villages Stanišić, Herceg, and Mačkovac are rated as "middle", while the ethno-villages Begovo selo, Babići, and Kotromanjić are rated as "bad". This suggests there is no "best" village in terms of sustainable development, since every presented ethno-village has both advantages and disadvantages in relation to the other villages.

Figure 3 shows the results of the assessment of the attributes used in the model. It presents a detailed assessment of the selected ethno-villages. Keeping in mind that this image represents a collective assessment of the model for all attributes, it is possible to execute it for certain criteria and thus compare the ethno-villages in more detail. Let us examine, for example, the ethno-villages that are rated as "middle". The ethno-village Stanišić has 20 out of 37 (54.05%) good attributes, while 8 attributes are rated as "bad" (21.62%), the Herceg ethno-village has 15 (40.54%) good attributes, while 8 attributes are rated as "bad" (21.62%), and the ethno-village Mačkovac has 17 (45.95%) good attributes, while 8 attributes are perceived as "bad". These ethno-villages have a different number of good attributes and the same number of bad attributes. Mostly, these ethno-villages have bad indicators for environmental criteria, so none of them are rated "good" or "very good".

In order to achieve a more detailed assessment, we performed a more detailed analysis of individual criteria, for which only the main sub-attributes will be presented. The results are shown with radar charts created by the DEXi software tool. The charts created by this software tool allow three, four, or more selected attributes to be graphically compared. In this respect, the results are represented by triangles, rectangles, pentagon, etc. Their borders represent the best values of the corresponding attributes, while the centers of these geometric bodies represent the worst attribute values. The results closer to the end of the geometric body are better, and vice versa.

Firstly, we will give an overview of the results for the economic criterion, which are shown in Figure 4. The economic criterion has three main sub-attributes: Strengthening local entrepreneurship, Increasing population incomes, and Marketing criteria. For the attribute Strengthening local entrepreneurship, all of the selected ethno-villages are rated as "very good", except for the ethno-village Begovo selo, which is rated as "good". For the attribute Increase in population incomes, we found that the ethno-village Stanišić is "good", the Herceg ethno-village is rated as "middle", and the other ethno-villages are rated as "bad". By using the marketing criteria, few ethno-villages among Stanišić, Herceg, Babići, Mačkovac, and Kotromanjić are rated as "very good", while Begovo selo is rated as "good". Based on the economic criterion, the ethno-village Stanišić is the best rated, followed by the ethno-villages Herceg and Mačkovac, followed by the ethno-villages Babići and Kotromanjić, while Begovo selo was rated as the worst for the economic criterion.

Since the social criterion had only two sub-attributes, this criterion was presented together with the ecological criterion in Figure 5. The social criterion is represented by the Social and Cultural dimension, while the ecological criterion is represented by the following criteria: Use of resources, Quality of the environment, and Waste management. Evaluating the social dimension within the social criteria, the ethno-villages Stanišić and Herceg are evaluated as "very good", Mačkovac has a "good" score, and the ethno-villages Begovo selo, Babići, and Kotromanjić have a "bad" score. Regarding the cultural dimension, the best rated ethno-villages are Begovo selo and Mačkovac, with a rating of "very good", while the other ethno-villages are rated as "middle".

By evaluating the ecological criterion with the sub-attribute "Using resources", we found that the ethno-village Kotromanjić is rated "good", followed by the ethno-villages Begovo selo, Babići, and Mačkovac with a score of "middle", while the ethno-villages Stanišić and Hercegare are rated with a "bad" score. Using the "Quality of the environment" sub-attribute, the results showed that best rated ethno-villages are Begovo selo, Babići, Mačkovac, and Kotomanjić, with a "good" rating, while the ethno-villages Stanišić and Herceg are rated as "middle". The specific result refers to the sub-attribute "Waste Management", for which we found that all the ethno-villages to be rated as "bad" because they did not apply this attribute. The summary results are presented in Figure 5 using the three main criteria: economic, social, and ecological.

The collective evaluations of the ethno-villages in Bosnia and Herzegovina are presented in Figure 6. The results obtained for the economic criterion, using the above sub-attributes, indicate that the ethno-villages Stanišić and Herceg are the best rated, with scores of "very good", followed by the ethno-village Mačkovac with a "good" rating, and ethno-villages Begovo selo, Babići, and Kotromanjić are rated as "middle". Using the social criterion, these results show that the best rated ethno-villages are Stanišić and Herceg, with ratings of "very good", followed by the ethno-village Mačkovac with a "good" rating, followed by the ethno-villages Babici and Kotromanjić are rated as "bad". Observing the ecological criterion, the results indicate that the best rated is the ethno-village Kotromanjić, with a "good" standing, followed by the ethno-villages Begovo selo, Babići, and Mačkovac with "middle" scores, while the ethno-villages Begovo selo, Babići, and Herceg are rated is the ethno-village Kotromanjić, with a "good" standing, followed by the ethno-villages Begovo selo, Babići, and Mačkovac with "middle" scores, while the ethno-villages Begovo selo, Babići, and Herceg are rated "bad".

The main influential criterion in this study seems to be the ecological criterion. Smaller ethno-villages have less of an environmental impact and use natural resources much better, but they make less of a contribution to the development of the local community. Larger ethno-villages exert a greater negative impact on the environment, but have a much stronger influence on the development of the local community.



Figure 4. Evaluation of the ethno-villages based on the economic criterion.



Figure 5. Evaluation of the ethno-village according to social and ecological criteria.



Figure 6. Collective evaluations of the ethno-villages in Bosnia and Herzegovina.

4. Discussion

For this study, we developed a multi-attributive model to assess the sustainable development of ethno-tourism using a sample of six selected ethno-villages in Bosnia and Herzegovina. During the assessment of the ethno-villages, it was necessary to carefully evaluate the model before its use. It was necessary to evaluate the alternatives in each model on the basis of previously detailed research [34]. This enabled us to draw certain conclusions that should contribute to the improvement of this type of tourism, with a special emphasis on an environmental impact analysis. In this model, the ratings were established more critically in order to identify some criteria that could be improved. To achieve sustainable development, it will be necessary to make a certain compromise, where all criteria set in this model can be respected. Keeping in mind the economic criterion, it is necessary to improve local entrepreneurship and increase income for the population, but this is not possible without proper marketing activities. For social criterion, it is necessary to reconcile the sociological dimension by improving the conditions of local communities and interacting with them. For the cultural dimension, it is important to preserve and promote traditions through the active participation of tourists. Of course, all these results should be accompanied by the smart usage of resources through waste management while offering tourists the natural beauty of certain areas. Considering the current state of ethno-villages, there is an absence of sustainable development approaches.

The obtained results indicate that the present model was successfully used in the assessment of the sustainable development of ethno-tourism. This model allowed us to identify the differences between ethno-villages at different levels of the model structure. The results from this model indicate that the best results were achieved by the ethno-villages Stanišić and Herceg in terms of the economic and social criteria. This result can be explained by the fact that these ethno-villages were created entirely within a special tourist offer. The ethno-village Babići is, in fact, only one of the tourist offers within the Ski Center Rostov, which consists of several hotels, ski resorts, and other attractions. Furthermore, the ethno-village Mačkovac is located within the Zlace resort and has no status as a specific ethno-village. The ethno-villages Begovo selo and Kotromanjić are smaller ethno-villages that show tourists the natural beauty of these regions. Furthermore, the ethno-villages Stanišić and Herceg positively influence the local community by increasing their employment through exploiting local products, thus strengthening the local community. It was found that the ethno-village Stanišić is not oriented enough toward the environment. Notably, this ethno-village does not offer pure air and natural resources to tourists; because of its position near the highway, its surroundings do not offer many natural attractions for tourists. A similar result applies to the ethno-villages Herceg and Babići. The ethno-village Herceg is located in an industrial zone, and tourists are not offered natural resources. Moreover, there is no attention placed on waste management. Opposite these examples, the ethno-village Kotromanjić seeks to exploit natural sources for energy more so than other villages. The common characteristics for all ethno-villages are their attempts to preserve the tradition and identity of a particular area, as shown in Gavrilović's study [57].

The findings indicate that ethno-villages with high tourist capacities more strongly influence the local community but do not provide tourists with authentic experiences compared to ethno-villages located in rural areas. There is increasing focus on making profit and commercializing ethno-tourism, which has led to neglecting the ecological aspects of tourist offers. Smaller ethno-villages offer tourists a more enjoyable atmosphere based on the natural resources offered by these regions, but because of their capacities, they do not contribute to the strengthening of the local community. These ethno-villages provide tourists with the atmosphere of a traditional village located in nature, where tourists can experience local customs and traditions. The tourist offers in ethno-villages should be oriented according to the above criteria used in the model as best as possible. Ethno-villages need to be independent units located in natural environments that provide certain regions, while also strengthening other forms of tourism, thereby strengthening the entire local community. In this sense, ethno-villages could be a driving force of development for the community. It is also necessary to try to

preserve the identity and entrepreneurial trends of development through ethno-villages, which is in line with the conclusions of Čiča and Mlinar [11].

The results have shown that that currently it is not possible to reconcile the three basic criteria of sustainability (economic, sociological, and ecological criteria), which is contravenes the argument expressed by Miljak et al. [58], who argued that the sustainable development of tourism should be applied. We found the uneven development of ethno-villages in relation to the key parameters. Some ethno-villages are primarily focused on the economic criterion, whereas tourist offers are oriented in the direction of commercialization. Others are focused on strengthening the social criterion together with the economic criterion, while certain ethno-villages are more oriented toward the ecological criterion. To strengthen this type of tourism, it is necessary to reconcile all the criteria to apply sustainable development approaches to ethno-villages.

It is also necessary to increase the education of entrepreneurs regarding eco-tourist offers. It can be concluded that entrepreneurs are poorly informed about what an ethno-tourist offer really means. With the elimination of these problems, local authorities, professional departments, and local tourist organizations would benefit. A full implementation of this model would result if different stakeholders became involved in increasing local ethno-tourist offers In that case, the DEXi model would have a multifaceted role, as it could serve as a basis for action, as well as a corrective factor.

5. Conclusions

The model used in this study is flexible in the sense that it can be adapted for other studies in order to sustain the development of other branches of tourism. Thus, this model contributes to the integration of the sustainable development of tourism infrastructure, representing a new tool for improving sustainability in tourism. Moreover, this model minimizes environmental impacts and improves tourist offers.

In this study, we used a model for assessing the sustainable development of ethno-tourism through the development of ethno-villages. Based on this, a model for evaluating the sustainable development of tourist offers in ethno-villages was built using the DEX method. Using the decision-making model, an expert assessment of the sustainability of six ethno-villages in Bosnia and Herzegovina was carried out. Based on the decision criteria, the experts evaluated these villages. From this study, we found that none of the selected ethno-villages received an aggregate score of "very good" or "good", and no single village was distinguished from the others. Thus, we did not find an example of sustainable tourist offers from the selected sample.

The model used in the case study shows the current shortcomings of certain ethno-villages and their advantages. Ethno-villages should try to solve their shortcomings and improve their advantages in order to improve the satisfaction of tourists. This model could be used to improve a balance of three criteria for sustainable development. Using this model, the local authorities could further improve the development of ethno-tourism according to the given criteria.

We suggest, as a guideline for future research, to use this decision-making model in other segments of tourism in order to conduct a more detailed analysis using a larger case study or sample. Moreover, ethno-villages from Bosnia and Herzegovina and the region should be compared to analyze the current state of tourist offers compared to world tourist offers. This model could be developed in combination with other multi-criteria methods in order to obtain a more precise result.

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