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# The Transformation of Medical Spas into Modern Spa Centers in Bosnia and Herzegovina: An Investigation Using a Decision-Making Support Model

## Abstract

Globalization and lifestyle changes have led to health becoming a major social preoccupation of the population. Spas are no longer just centers for disease treatment, but a means of preventing diseases and protecting human health. An increasing number of young people are trying to improve their health through spa treatments. This is why there is a growing tourist offer of spa centers. Bosnia and Herzegovina (B&H) has rich natural resources that are conducive to the creation of spas. Therefore, this study looked into spa offers and evaluated the transformation of medical spas into modern spa centers in order to improve competitiveness. Spa transformation survey was conducted on the example of spas in B&H. Six, out of a total of fifteen registered spas in B&H, have been chosen randomly. The spa offer was evaluated by applying the decision-making model and expert decision-making. The obtained results showed that the spas of Ilidža - Gradačac and Ilidža - Sarajevo have "good" transformation; the spas Dvorovi and Mlječanica have "middle" transformation, while the spas of Gata and Sanska Ilidža have "bad" transformation in the process of creating modern spas. Based on the results of this study, spa managers can obtain the necessary information on how to adjust the offer to make those spas more competitive. In addition, the spas will also generate higher revenues. The decision-making model used has shown good results and can be applied to future studies and research.

**Keywords:** spas, DEX method, expert evaluation, decision support system, Bosnia and Herzegovina

## 1. Introduction

Health has become a major social preoccupation, and popularity of health tourism in the world is growing each year (Vetitnev & Dzubina, 2013). The media warns citizens about too sedentary a life, the dangers of being overweight, cholesterol, stress, tension, etc. (Joppe, 2010). More and more people are turning to healthy lifestyles and medical tourism is gaining in importance (Kiss, 2015). Spa tourism is a representative form of medical tourism, and a major choice for people who want to cope with the stress of daily life or the treatment of certain diseases (Giritlioglu et al., 2014). Spa tourism is a narrower term than health tourism and implies a type of health tourism that is carried out in spa centers for the treatment of certain diseases, improvement of psycho-physical health or relaxation of organism (Jahić & Selimović, 2015). Therefore, spa tourism is an integral part of health tourism, which refers to the provision of specific services that include mineral and thermal waters, but also to be used for holidays, as accommodation is also offered (Hall, 2011).

The environmental amenities and natural resources is a primary factor in spa tourism (Marušić et al., 2018). Spas can be defined as offers of spa treatments based on authentic water, air and other therapies performed by qualified staff in a professional and relaxing environment (Chen, Chang, & Wu, 2013). Spas offer health

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care that aims to stabilize health, regenerate or prevent disease using natural therapeutic waters or climatic conditions suitable for different treatments (Derco & Pavlisinova, 2017). Various treatments are performed at the spas providing different physical, social and psychological health benefits to the beneficiary of these treatments (Adongo et al., 2017). Spas are not only used by people seeking treatment for various ailments but also by guests who want relaxation, beauty treatments and longevity (Hall, 2011).

The tradition of using thermal-mineral waters dates to the distant past. The healing properties of geothermal springs have been noted ever since the ancient times of the Greeks and the Romans. Bosnia and Herzegovina has many natural, thermal and thermo-mineral springs and peloids, among which there are very rare mineral springs, which are known in expert circles all over the world (Puška et al., 2017). Spa treatment in B&H has a long and rich tradition. The main activity of spas is the health function of treatment, which is the most important and the oldest function of the spa (Derco, 2017). In addition, spas are increasingly providing tourist offers. Therefore, the priority for the development of health tourism in B&H should be spa tourism, as the development of spas and resorts favor's the development of the local tourism industry (Kucukusta & Denizci Guillet, 2014).

Changes in trends in the tourism market have influenced the spa to go beyond the traditional framework of medical tourism and include preventive medicine services or elements of wellness, which have even become the most important part of the offer of these spas (Miličević & Jovanović, 2015). Therefore, many spas change their offer and include tourist, recreational and wellness facilities (Miličević et al., 2012). By changing the offer, the transformation of classic medical spas into modern spa centers is performed, which, in addition to medical treatments, also include tourist, recreational and wellness facilities.

An increasing number of people are choosing to visit the spa in order to improve their health based on prevention. Educating people increases awareness of personal health as a priority (Koncul, 2012), so spas and wellness centers are becoming increasingly popular tourist destinations. The demand for spa tourism has increased in the last 20 years and this type of tourism is currently one of the fastest growing sub-sections of health tourism (Giritlioglu et al., 2014).

In the early 1990s, together with the forms of classical medical tourism in spas, there was a growing need for new services, including wellness and fitness services through a holistic approach to health (Csapó & Marton, 2017). These trends have been influenced by the changing awareness of citizens about health and a healthy lifestyle, and the trend in recent years is emerging in new services in spas (Jónás-Berki et al., 2015). Recent research on spa tourism has shown that the motives of spa visitors have changed, and the offer of spas is becoming complete and oriented to all age groups (Koskinen & Wilska, 2019; Koskinen, 2019). Guests seek a comprehensive package of services that includes care for physical fitness and beauty, healthy eating, relaxation, mental activity and education, and very often luxury (Konu & Laukkanen, 2010). Many spas face a serious challenge trying to keep up with these changes and meet all the requirements of guests without losing their traditional medical clients (Dimitrovski & Todorović, 2015).

In order to adapt to tourists demands, and to maintain the competitive advantages, traditional medical spas are transformed into modern wellness and spa centers where integrated services are offered to potential guests. An assessment should be made of how the spas have transformed their services in order to attract potential guests and retain existing ones without compromising traditional services. Spas need to provide basic services for which they have comparative advantages, but they also need to increase the range of offers to attract tourists. Therefore, under the influence of an increasing concern for health, the transformation of spas is taking place and there has been an increase in offer of a variety of services to tourists. The spas are turning to attracting tourists who make their health priority. They offer a variety of services based on the health function. In addition to disease treatment, the spa also offers wellness packages that include relaxation, recreation and improvement of physical condition.

The aim of this study is to look at the spa offer in B&H in terms of adjusting to market demands, tourists' needs and desires. Previous studies have not addressed the problem of evaluating the transformation of medical spas into modern spa centers. To address this gap, this study aims to address two basic questions regarding the evaluation of medical spa transformation, namely: a) What is the situation regarding the transformation of medical spas into modern spa centers? b) What impact will the transformation of the spa offers have on improving competitiveness? Therefore, it is expected that the results of this study will allow managers to look at the current state in today's market conditions, learn about the shortcomings they need to address, and the benefits of spa offer on which to build competitiveness. In this way, the spa offer in B&H will be strengthened and this type of tourism will be more attractive to potential tourists. The contribution of this study is to obtain information on the current state of the spa offer in B&H, in order to provide guidelines to improve the competitiveness of spas in B&H.

Due to the conditions prevailing in the market, this study will evaluate the spa offer and consider the current adaptation of medical spas to contemporary spa centers in accordance with the market demands. To this end, a decision-making model will be created that will identify the advantages and disadvantages of medical spas using expert evaluation. The following criteria will be used in evaluating the supply of medical spa services: economic, medical, social and natural-ecological. Due to the existence of multiple criteria and sub-criteria by which medical spas will be evaluated, a holistic evaluation approach should be applied using the DEX (Decision EXpert) method. The DEX method uses linguistic values to evaluate alternatives by individual criteria, and the result is in the form of linguistic values (Rozman et al., 2016). However, in order to evaluate the criteria, it is also possible to apply quantitative criteria that need to be transformed into attribute values by certain rules. This transformation is done by applying the "if-then" decision-making rules (Maksimović et al., 2018).

In order to apply this method, it is necessary to develop a decision-making model that includes: presenting the decision-making problem through a hierarchy, defining decision-making rules, evaluating criteria and alternatives in decision-making, analyzing the obtained results, and analyzing the sensitivity of the obtained results. An innovative decision-making model will help experts evaluate medical spas in B&H in order to determine the degree of adaptation to contemporary market conditions, which is the contribution of this study. The decision-making model will look at good and bad sides of spas in B&H in terms of adapting to contemporary tourism trends. The model will provide guidance on what spas need to change to be more attractive to potential tourists and users of medical services and improve competitiveness.

## 2. Literature review

In this chapter, the concept of spas, types of spas and an overview of spa tourism in B&H will be presented using relevant literature.

### 2.1. Spa tourism

With the beginning of the 21st century, health tourism and related health practices, recreation and relaxation have become increasingly popular (Gustavo, 2010). The population is increasingly attracting interest in a healthy lifestyle. Therefore, spas have become a significant factor in people's lives (Nikoli & Lazakidou, 2019). The spas aim at enhancing the overall well-being of man through the restoration of mind, body and spirit by conducting various spa treatments (Loureiro et al., 2012). Two phenomena have contributed to the growing importance of spa tourism: baby boomers do not want to age, so they are more concerned with various treatments and the realization that health systems care more about human diseases and their treatment than ways to improve people's health and appearance (Joppe, 2010). On this basis, the spa offer is also changing.

Spas have an increasing importance in health tourism, primarily because of the increased longevity of the population, the great imbalance in people's lives and the crisis of civilization reaching the most developed countries (Loureiro et al., 2012). The development of spa offerings is a natural response to the human desire for wellness in the context of the evolution of consciousness, globalization and various global crises (Chen, Chang, & Wu, 2013). Tourists visit the spa as they strive to escape the hectic everyday life and stress.

In addition, the need for treatment, relaxation and recreation in spas is increasing because the life expectancy of citizens and attention to health is increasing (Jakovljevic & Laaser, 2015). The change in the spa offer has been driven by demographic and life trends and the growing health awareness of the guests of these spas (Cohen et al., 2017). Spas and all other economic entities must distance themselves from the competition with their offer (Tomašević, 2019). Based on that, the basic spa offer has changed and various other treatments are offered. Only with continuous adaptations, spas can maintain competitiveness and achieve growth in the market (Roy et al., 2018).

The services offered by spas are very diverse and include therapies with water, climate, mud, glycerin, etc. Spa treatments include complementary and alternative therapies such as: homeopathy, osteopathy, acupuncture, yoga, counselling, fitness, aromatherapy, beauty treatments, aesthetic treatments, cosmetic surgery, liposuction and chiropractic care (Adongo et al., 2017). The spa is not only used by those seeking a cure for diseases such as arthritis, back pain, obesity, trauma, asthma, sterility and surgical rehabilitation, but also by those seeking relaxation, beauty treatments and longevity (Hall, 2011). The spas provide unique customer services and the customers select specific spas that meet their needs (Suttikun et al., 2018). Based on the variety of services, the spa offer can be realized in different ways. The spas are classified into eight main categories (Joppe, 2010):

- Day spa – includes face and body treatment where overnight accommodation is not provided.
- Resort/Hotel Spa – offers spa, fitness and wellness services and cuisine services with the possibility of overnight accommodation
- Spa Destination – not within the scope of other resorts or hotels. The basic goal is to direct visitors to an individual healthy lifestyle. This service can be achieved through a comprehensive program that includes spa services, fitness activities, wellness education, healthy cuisine and programs of particular interest to customers.
- Medical Spas – represent health centers where on-site professional medical workers provide comprehensive medical and wellness services that integrate all types of therapies and treatments.
- Spa Club – a fitness facility that offers daily professional spa services. It should be noted that hotels, gyms and fitness clubs are not spas unless they explicitly offer spa products and services as an added offer.
- Mineral Spa – offers natural mineral, thermal or sea water used in hydrotherapy treatments.
- Spa Centre for Cruises – provides professional spa services, fitness and wellness components and a selection of spa menus that are realized on cruises.
- Beauty Parlor – spa services that deal primarily with aesthetic and cosmetic treatments that do not require medical supervision.

Based on this spa categorization, one can see the complexity of the offer related to spa tourism. This complexity is conditioned on the importance of spa tourism for customers. There is an increasing concern about health and disease prevention leads to increase in demand for various spa treatments. It can be concluded that the spa treatment services have become more accessible to the client; they have a greater choice of where to use these services and there is an increasing competition in the market.

In the new millennium, spas are no longer a luxury commodity, but they offer services that are available to everyone (Okech, 2014). The diversity of these services is a condition for the competitiveness of spas on the

market. Spas no longer offer exclusively medical services, but also develop other types of tourism. Among them, the most important are cultural-manifestation, sports-manifestation, concrete, excursion, transit, etc. forms of tourism (Perić et al., 2018). The selective and complex tourist offer of spas requires a more comprehensive and versatile approach, which essentially makes the orientation of modern European spas (Gligorijević & Novović, 2014). Without this approach, it is not possible to meet all the needs of spa guests. Therefore, it is necessary to understand how spas adapt to changes in the market.

The specificity of the territory of B&H is that, until the beginning of the 21st century, spa treatment services were provided only in medical spa centers. However, there is now an increasing competition in B&H and medical spas need to be transformed according to client requirements. Therefore, it is necessary to investigate how medical spas in B&H are being transformed into modern spa centers in accordance with the requirements of clients and the market, and how competitiveness should be built on this.

## 2.2. Spa tourism in Bosnia and Herzegovina

The wealth and tradition of the use of thermos - mineral waters in B&H represents the main potential for the development of health tourism. The history of the use of thermo-mineral springs goes back to the time of the ancient Greeks and Romans, who used and gave primary importance to the healing and therapeutic properties of water, building accompanying facilities, which have been maintained, in some places, to this day (Puška et al., 2017).

In addition to tourist significance, spas in B&H play a health role as mineral and thermal waters are used for medical purposes and are classified as health institutions (Spahić & Temimović, 2014). In B&H, there are fifteen active and registered spas which operate as health institutions. A random number generator has created a sample of six spas that will be presented in brief.

Spa Dvorovi is located 6 kilometers from Bijeljina and is located between the rivers Sava and Drina. Spa Dvorovi has thermo-mineral waters rich in sodium, calcium and hydrocarbons. In this spa, all kinds of rheumatic diseases, chronic, gynecological diseases, diabetes, mild neuroses and rehabilitation post-traumatic conditions are treated. All kinds of massages, inhalations and acupuncture are also provided. Recreational and sports teams have sports courts and a sauna at their disposal.

Banja Gata is located near Grmeč and Plješivica mountains. The thermal water of spa Gata is mineral water rich in calcium, sodium, sulphate, zinc, hydrocarbons and chlorides, it is homoeothermic (36° C), Ph neutral (pH 7.1) and slightly radioactive. It combines water healing and therapy to treat rheumatism, neurological and neuromuscular diseases, diseases and injuries of the extremities, skin diseases, diseases of the digestive system and gynecological diseases. To date, a health resort has been built, while other supporting facilities are planned.

Spa Ilidža - Gradačac is located in the northern part of Gradačac. It uses mineral water that is alkaline (pH 7.5), carbonate, sulphate and slightly muriatic, with a constant temperature of 28.5°C, and it is radioactive. This spa offers therapies for the treatment of rheumatic and neurological diseases, injuries and post-surgery conditions, metabolic diseases and gynecological diseases. It offers wellness and spa arrangements and various types of massages. It is also equipped with an indoor swimming pool.

Banja Ilidža - Sarajevo, is located near Sarajevo and the source of the river Bosna. The water used in the treatments at this spa is sulphur thermo-mineral with a temperature of 57.5 °C with an abundance of minerals. It has hydrotherapy centers and physical therapy centers. It offers therapies for the treatment of the following diseases: rheumatic, myopathy and neuropathic diseases, spondylosis, osteoporosis, skin diseases, chronic diseases, etc. It also offers an active vacation, weight loss program and wellness services. It has two indoor swimming pools, saunas, massage parlors and more.

Spa Mlječanica is a health resort located in a natural setting on the north-western slopes of mountain Kozara. The activity of spa Mlječanica is the prevention, treatment and rehabilitation for the diseases and conditions after injuries. Spa Mlječanica offers complete physical-chemical therapies with the help of thermo-mineral and table mineral waters.

Spa Sanska Ilidža has a large and well-maintained picnic and recreational area, two indoor swimming pools open for treatment. In addition, it has a therapeutic area, a catering area and trails. This spa has been privatized and awaits the realization of further investments in order to modernize the spa.

### 3. Methodology and model

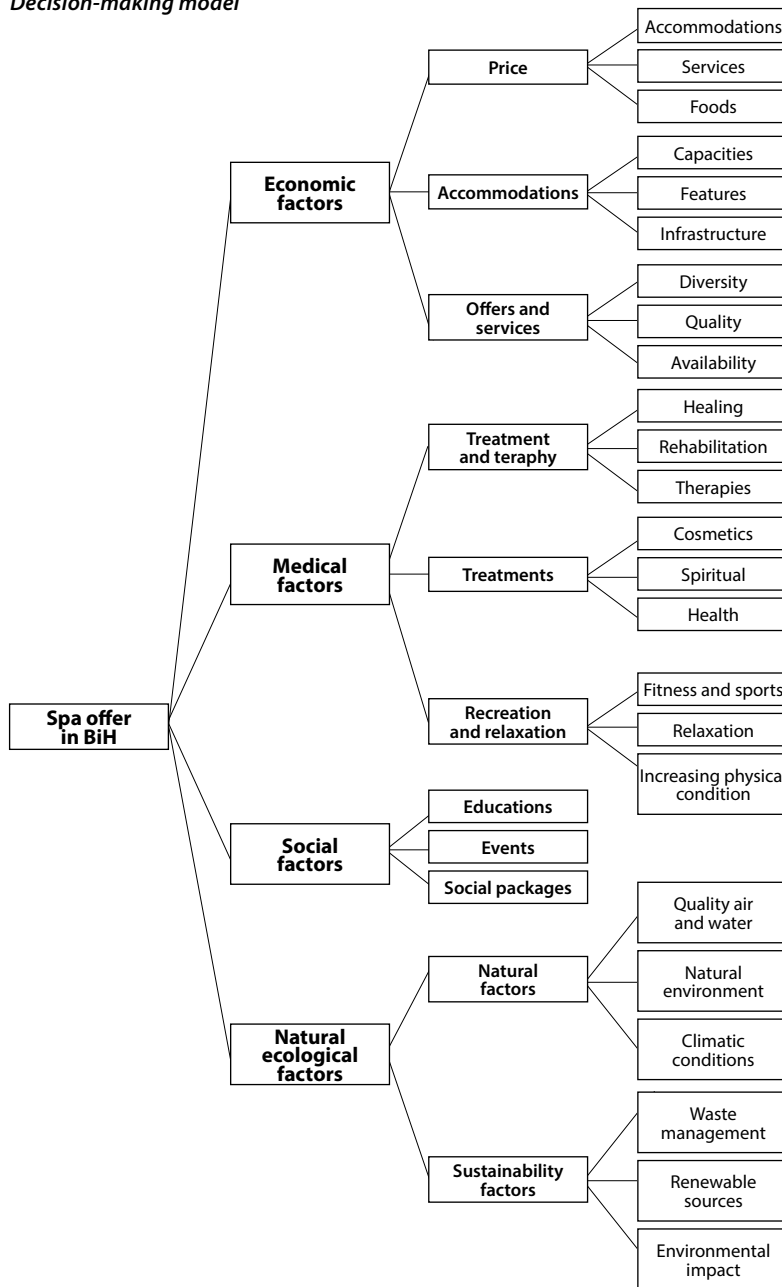
Examining the transformation of medical spas into modern spas requires a multidisciplinary approach to make objective decision-making. Qualitative multi-criteria modelling should be applied that includes environmental, medical, social and natural-ecological factors. These factors represent the main criteria in this study. These were then broken down into auxiliary factors to cover a larger range of tests. Based on these criteria, a decision-making model was made. The aim of the used decision-making model is to look at all the good and bad sides of the selected spas. The decision-making model will evaluate the transformation of traditional medical spas into modern spa centers.

The evaluation of the transformation of medical spas into modern spa centers in this study was as follows. First, a list of all spas existing in the territory of B&H has been established. Secondly, all spas in B&H are lined up alphabetically. Third, six spas were selected using a random number generator for the purposes of this study, which represent alternatives to the model used for evaluating spa transformation in B&H. Fourth, expert opinion was used to evaluate the transformation of these spas into modern spa centers. Fifth, results were obtained for each individual spa using the DEX method.

The DEX method is a tool for qualitative multi-criteria modelling that is based on a description of the criteria hierarchy and defining of decision-making rules. This method was developed by a research team led by Bohanec et al. (1983). The DEX method combines elements of traditional multi-criteria analysis methods with an expert system (Puška et al., 2020). Expert evaluation represents the methodologically organized knowledge of experts in order to predict future states (Rozman et al., 2017). The DEX method is adapted to human thinking because it uses descriptive judgments in the form of linguistic values, which are in the form of different scales: low, high, acceptable, unacceptable, bad, good, etc. (Prevolšek et al., 2020), and on this basis different scales of values can be applied (Maksimović et al., 2018) in order to evaluate alternatives against specific criteria. It is possible to use value scales in the DEX method, but first they must be transformed into descriptive scales. The result of applying this method, in comparison to other methods, is in the form of linguistic value which is adapted to human thinking. This is an advantage of this method. The DEX method is implemented using DEX method as follows:

- The evaluation model breaks down into less complex problems that represent the model criteria. A hierarchical model is formed based on the criteria. The goal of the evaluation is broken down into the main criteria, the main one into auxiliary ones and so on, all depending on the complexity of the problem.
- When evaluating alternatives, only the last-level sub-criteria are evaluated using the value scale. The sub-criteria are evaluated using expert judgment. Experts then evaluate the criterion using a scale of values.
- The criterion value is obtained using the affiliation function. This step is the most complex because a function for all criteria based on the values of the sub criteria needs to be defined. In doing so, the impact of each sub-criterion on the value of the criteria needs to be defined. The results for alternatives are obtained based on the affiliation function.

**Figure 1**  
*Decision-making model*



Various studies have been used in the design of the spa model. Mak et al. (2009) examined the experiences of tourists with spas in Asia and identified the most significant factors in this type of tourism which were relaxation and relief, escape, self-reward and indulgence, and health and beauty. Kucukusta et al. (2013) point out in their study that price is a factor influencing the choice of tourist product of the spa. Kucukusta and Denizci Guillet (2014) found that the price is related to the quality of services in spa tourism, and the prices in spas should be in accordance with the quality of the offer and services. Booi and van den Berg (2012) found that tourists seek the need for silence, peace and tranquility and visit spas to meet their needs for these factors. Studies conducted by Smith and Puczko (2009) highlight the importance of the environment for

the development of spa tourism. Erfurt-Cooper and Cooper (2009) emphasize the importance of the natural resources on which spa tourism rests and the most significant of these are thermo-mineral springs. Chen, Liu, and Chang (2013) cited seven factors in spa tourism in their study: health promotion treatments, mental learning, experience of unique tourism resources, complementary therapies, relaxation, healthy diets, and social activities. Voigt et al. (2011) grouped the benefits of spas using factor analysis, forming the following factors: transcendence, physical health and appearance, escape and relaxation, novelty, re-establish self-esteem and indulgence. Koh, et al. (2010) identified the following four benefits of spa tourism for tourists using factor analysis: social, relaxing, health and rejuvenating. Chen et al. (2012) used the AHP method and observed the spa centers through the following criteria: hospitality, relaxation, refinement and distinctive. Chen, Chang, and Wu (2013) identified the following factors in spa tourism: personnel services, environments, healthy diets, relaxation, health promotion treatments, experience of unique tourism resources, social activities and mental learning. Based on these studies, criteria were selected, and a decision-making model was formed, which is presented in Figure 1.

In order to evaluate the transformation of medical spas into modern spa centers, all criteria and sub-criteria are described by value scales (Table 1). The value scales were formed in cooperation with experts (Puška et al., 2019). The maximum value scale consists of three levels of values from 'unacceptable' to 'good'. The value "unacceptable" is considered the worst rating and the value "good" the best rating that an individual spa can get. Other criteria are presented on scales of three and two levels.

**Table 1**  
*Criterion for value scale*

Attribute	Scale
<b>Spa offer in BiH</b>	unacceptable; middle; good
<b>Economic factors</b>	bad; middle; good
<b>Price</b>	bad; middle; good
Accommodations	high; medium; low
Services	high; medium; low
Foods	high; medium; low
<b>Accommodation</b>	bad; middle; good
Capacities	bad; middle; good
Features	bad; middle; good
Infrastructure	bad; middle; good
<b>Offers and Services</b>	bad; middle; good
Diversity	bad; good; very good
Quality	bad; good; very good
Availability	bad; good; very good
<b>Medical factors</b>	bad; middle; good
<b>Treatment and therapy</b>	bad; good; very good
Healing	bad; good; very good
Rehabilitation	bad; good; very good
Therapies	bad; good; very good
<b>Treatments</b>	bad; middle; good
Cosmetics	bad; good; very good
Spiritual	bad; good; very good
Health	bad; good; very good
<b>Recreation and relaxation</b>	bad; middle; good
Fitness and Sports	bad; good; very good
Relaxation	bad; good; very good
Increasing physical condition	bad; good; very good
<b>Social factors</b>	bad; middle; good
Educations	does not exist; partially exists; exist
Events	does not exist; partially exists; exist
Social packages	bad; middle; good
<b>Natural-ecological factors</b>	bad; middle; good
<b>Natural factors</b>	bad; middle; good
Quality air and water	bad; good; very good
Natural environment	bad; good; very good
Climatic conditions	bad; good; very good
<b>Sustainability factors</b>	bad; middle; good
Waste management	bad; middle; good
Renewable sources	not available; available
Environmental impact	bad; middle; good



The decision-making function was used to formulate criteria values. The example of the main model evaluation will explain the formation of the decision-making function (Table 2). The following rules were used to determine the decision-making function:

- The value of the main criterion will be "unacceptable" if the value of two or more criteria is "bad", i.e., if the value of three criteria is "middle" and the value of the fourth criterion is "bad".
- The value of the main criterion will be "middle" if the value of one criterion is "bad", the other criteria "middle" and the third criterion "good", i.e. if the value of all criteria is "middle".
- The value of the main criterion will be "good" if the value of one criterion is "good" while the value of the other criteria is "middle". The value cannot be "good" if an individual value of any of the criteria is "bad".

In this way, each individual criterion is assigned the same importance and each of these criteria participates with 25% in the decision-making. Decision-making functions are defined in the same way for all the criteria, and each sub-criterion was given equal importance.

**Table 2**  
**Decision-making function**

Tables

Economic factors	Medical factors	Social factors	Natural-ecological factors	Spa offer in BiH
25%	25%	25%	25%	
1 bad	bad	*	*	unacceptable
2 bad	<=middle	<=middle	<=middle	unacceptable
3 bad	*	bad	*	unacceptable
4 bad	*	*	bad	unacceptable
5 <=middle	bad	<=middle	<=middle	unacceptable
6 <=middle	<=middle	bad	<=middle	unacceptable
7 <=middle	<=middle	<=middle	bad	unacceptable
8 *	bad	*	*	unacceptable
9 *	bad	*	bad	unacceptable
10 *	*	bad	bad	unacceptable
11 bad	>=middle	>=middle	good	middle
12 bad	>=middle	good	>=middle	middle
13 bad	good	>=middle	>=middle	middle
14 >=middle	bad	>=middle	good	middle
15 >=middle	bad	good	>=middle	middle
16 >=middle	>=middle	bad	good	middle
17 middle	middle	middle	middle	middle
18 >=middle	>=middle	good	bad	middle
19 >=middle	good	bad	>=middle	middle
20 >=middle	good	>=middle	bad	middle
21 good	bad	>=middle	>=middle	middle
22 good	>=middle	bad	>=middle	middle
23 good	>=middle	>=middle	bad	middle
24 >=middle	>=middle	>=middle	good	good
25 >=middle	>=middle	good	>=middle	good
26 >=middle	good	>=middle	>=middle	good
27 good	>=middle	>=middle	>=middle	good

Expert decision-making was used to evaluate the transformation of the spa offer in B&H. The research for the purpose of this paper was realized through the project Development and Promotion of Health Spa Tourism in the Cross-Border Area Bosnia and Herzegovina - Serbia (Cross-Spa), which was realized as a part of the cross-border cooperation between the two countries. The realization of this study was as follows. First, a basic group was formed that numbered a total of 15 spa facilities in B&H. These spas were arranged alphabetically, and a list of spas was formed. Secondly, based on the random number generator, six spas were selected from the list. Third, five experts were selected from the realized project to evaluate these spas. In doing so, a panel survey was used where the experts first collected the data, agreed on their views, and evaluated these objects based on the decision-making model set.

## 4. Results

The results on the evaluation of the transformation of medical spas into modern spa centers in B&H were obtained using expert decision-making (Table 3). The results of this study show that the spas of Ilidža - Gradačac and Ilidža - Sarajevo received a rating of "good", the spas Dvorovi and Mlječanica received a rating of "middle" and the spas of Gata and Sanska Ilidža received a rating of "unacceptable". Based on these results, it can be concluded that some spas have transformed into modern spa centers, while others have primary retained medical services and they function as medical spas.

From the total of 39 criteria, spa Dvorovi has 8 criteria rated as "good", 5 criteria rated as "bad", while other criteria are rated as "middle". Spa Gata has 6 criteria rated as "good", 16 criteria rated as "bad", and 17 criteria rated as "middle". Spa Ilidža - Gradačac has 9 criteria which were rated as "good", one criterion was rated as "bad", while other criteria were rated as "middle". Spa Ilidža - Sarajevo has 26 criteria which were rated as "good", one criterion was rated as "bad", while 12 criteria were rated as "middle". Spa Mlječanica has 10 criteria rated as "good", 5 criteria rated as "bad", and 24 criteria rated as "middle". Spa Sanska Ilidža has 6 criteria that were rated as "good", 9 criteria that were rated as "bad" and 24 criteria that were rated as "middle". Based on these ratings, the best rating was given to the spa Ilidža - Sarajevo. This spa has the highest number of "good" criteria and has only one "bad" criteria rating. Other spas have a lower number of "good" criteria ratings and a higher number of "bad" criteria ratings. What is specific about the evaluation of all spas is that the food price is very favorable, that they do not use renewable energy sources and that they have little environmental impact. The difference in results between these spas is in the facilities, services and treatments available. Some spas are smaller, while others are larger, and it was not expected that all spas would provide the same services. The spas need to specialize in some services and use modern spa treatments to transform themselves into modern spas better.

**Table 3**  
*Evaluation of spa transformation in B&H*

DEXi		Spa offer in BiH.dxi 27.11.2019.					Page 17
Evaluation results							
Attribute	Spa Dvorovi	Spa Gata	Spa Ilidža - Gradačac	Spa Ilidža - Sarajevo	Spa Mlječanica	Spa Sanska Ilidža	
<b>Spa offer in BiH</b>	middle	unacceptable	good	good	middle	unacceptable	
<b>Economic factors</b>	good	bad	good	good	good	middle	
<b>Price</b>	good	good	good	good	good	good	
Accommodations	low	medium	medium	medium	low	medium	
Services	low	medium	medium	medium	medium	medium	
Foods	low	low	low	low	low	low	
<b>Accommodation</b>	middle	bad	middle	good	middle	bad	
Capacities	middle	middle	middle	middle	middle	middle	
Features	middle	middle	middle	good	middle	middle	
Infrastructure	middle	bad	middle	good	middle	bad	
<b>Offers and Services</b>	middle	bad	good	good	middle	middle	
Diversity	good	good	very good	very good	good	good	
Quality	good	good	good	very good	good	good	
Availability	good	good	good	very good	good	good	
<b>Medical factors</b>	middle	bad	good	good	bad	bad	
<b>Treatment and therapy</b>	very good	good	good	very good	good	good	
Healing	good	good	good	good	good	good	
Rehabilitation	good	good	good	very good	good	good	
Therapies	very good	good	good	very good	good	good	
<b>Treatments</b>	bad	bad	good	good	middle	bad	
Cosmetics	bad	bad	very good	very good	good	bad	
Spiritual	good	bad	good	good	good	bad	
Health	good	good	good	very good	good	good	
<b>Recreation and relaxation</b>	middle	bad	middle	good	bad	middle	
Fitness and Sports	good	bad	good	very good	bad	good	
Relaxation	good	bad	good	very good	good	good	
Increasing physical condition	good	good	good	very good	good	good	
<b>Social factors</b>	bad	bad	middle	good	middle	bad	
Educations	partially exists	does not exist	partially exists	exist	does not exist	partially exists	
Events	partially exists	partially exists	partially exists	exist	partially exists	partially exists	
Social packages	bad	bad	middle	good	good	bad	
<b>Natural-ecological factors</b>	middle	good	middle	middle	good	good	
<b>Natural factors</b>	middle	good	middle	middle	good	good	
Quality air and water	good	good	good	good	very good	good	
Natural environment	good	very good	good	good	very good	very good	
Climatic conditions	good	good	good	good	good	good	
<b>Sustainability factors</b>	middle	middle	middle	middle	middle	middle	
Waste management	middle	middle	middle	middle	middle	middle	
Renewable sources	not available	not available	not available	not available	not available	not available	
Environmental impact	good	good	good	good	good	good	

For the individual evaluation of the main criteria, a radar chart will be used (Figure 2). Depending on how many criteria are observed, the type of chart is determined. If there are three criteria, these criteria are represented in the form of a triangle, if four, in the form of a diamond, etc. The outer boundaries of the chart determine the best value of the criteria, while the worst values are in the center of the chart. When evaluating the transformation of medical spas into modern spa centers in B&H, four main criteria were used, and the results of the study were presented in the form of a diamond (Figure 2).

The results for the spa Dvorovi show that this spa has "good" rating of economic factors, medical and natural-ecological factors have "middle" rating, and social factors have "bad" rating. The main disadvantage of medical

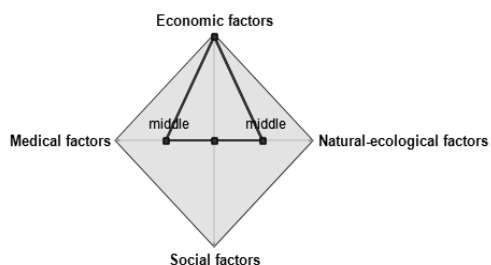
criteria is that this spa does not offer cosmetic and spiritual treatments, which is why this criterion is rated "middle". In order to improve the medical and social factors, spa Dvorovi needs to introduce new services that will include cosmetic and social packages for individuals and groups, since these packages were the reason why social factors were rated as "bad". Considering the natural-ecological factors, spa Dvorovi must use renewable resources, which was the reason why this rating was obtained for this factor.

Spa Gata has natural-ecological factors rated as "good", while other factors have been rated as "bad". The reason is that this spa has less accommodation and has limited offer. This spa does not offer beauty treatments or social packages. It should improve capacity and introduce new treatments and improve offer, it also needs to use sustainable energy sources. In this way the offer of this spa would be improved, and it would slowly grow into a modern spa.

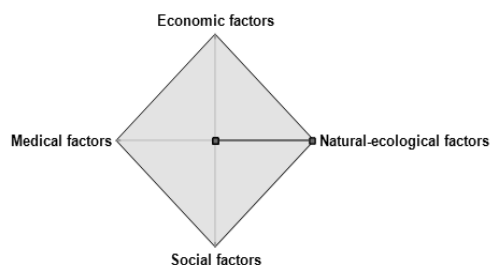
Spa Ilidža - Gradačac has economic and medical factors rated as "good", while it has social and natural-ecological criteria rated as "middle". Spa Ilidža - Gradačac should improve social factors through organizing education and events. The disadvantage of this spa is its proximity to the center of Gradačac, which is why it has higher air pollution on winter days. Therefore, the value of natural-ecological factors is "middle". To improve the value of this factor, it is necessary for this spa to use sustainable energy sources.

**Figure 2**  
**Evaluation of spa transformation in B&H**

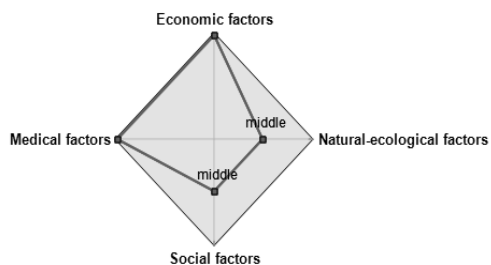
Spa Dvorovi



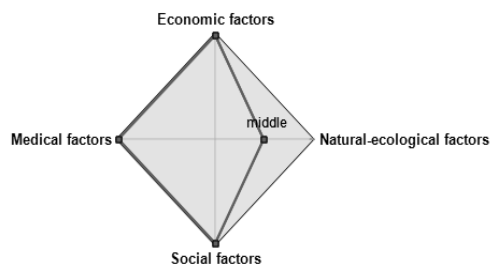
Spa Gata



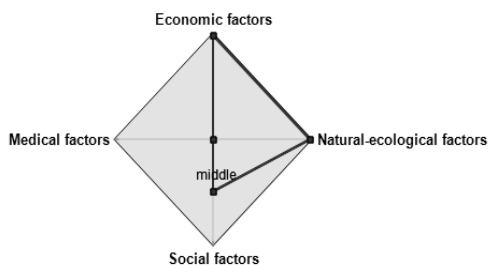
Spa Ilidža - Gradacac



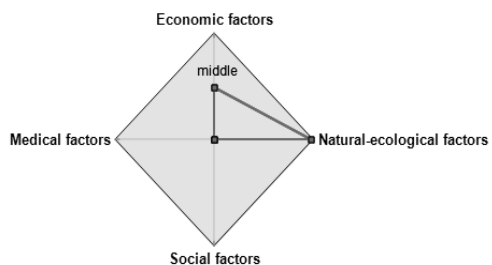
Spa Ilidža - Sarajevo



Spa Mlječenica



Spa Sanska Ilidža



Spa Ilidža - Sarajevo has the natural-ecological factors rated as "middle", while the ratings of other factors are "good". This spa has the best ratings of all spas. The reason for this is that, of all the observed spas, this spa has transformed into the modern spa center the most. The biggest disadvantage of this spa is that it does not use renewable energy sources due to its proximity to Ilidža. Therefore, the value of this criterion was also "medium". Spa Ilidža - Sarajevo provides a good example to other spas on how to improve their offer and become modern centers.

Spa Mlječanica has economic and natural-ecological factors rated as "good", social factors are rated as "middle", while medical factors are rated as "bad". Although this is a classic medical spa, it does not pay attention to cosmetic treatments and recreation and relaxation offers. What is crucial about this spa is that it does not offer modern spa services in the form of large indoor pools, sports fields, etc., which is required in the modern way of living. This spa needs to invest efforts and resources in commercializing the offer to make it accessible to all age structures.

Spa Sanska Ilidža has medical and social factors rated as "bad", economic factors rated as "middle", while natural-ecological factors are rated as "good". This spa must improve medical factors by including an offer on beauty treatments as well as social packages. Recreation development is based solely on the use of outdoor swimming pools, which is the basic offer of this spa along with certain medical treatments. In order to improve the economic factors, it is necessary to improve the accommodation capacities and the offer of services. Like other spas, this spa also does not use renewable energy sources.

## 5. Sensitivity analysis and discussion

Sensitivity analysis was performed in order to confirm the results of the study. This analysis looks at the impact of changes of individual values on the final rating of that alternative. Sensitivity analysis is done in the DEX method so that the values of individual criteria are changed and decreased by one value (-1) and increased by one value (+1). Decreasing and increasing in values determines how sensitive an alternative is changing an individual criterion. Table 4 shows the results of the sensitivity analysis.

The results of the sensitivity analysis of spa Dvorovi show that the decrease of 17 individual criteria changed the final rating of this alternative to "unacceptable", while the increase of three individual criteria increased the rating of the alternative to "good" (these were social factors). Based on these results, it can be concluded that spa Dvorovi is very sensitive to the decrease in value of certain criteria and must consider these criteria in order to maintain the rating "middle". In order to get the rating "good", it needs to improve social criteria. The conducted sensitivity analysis of spa Gata showed that the application of individual criteria does not affect the change in the final rating of the spa. These results indicate that more criteria need to be applied to this spa in order to improve the final rating.

Spa Ilidža - Gradačac has shown sensitivity to the decrease of 8 individual criteria concerning social and natural-ecological factors. In this way it has been proven that this spa must maintain its existing offer with a tendency to improve these two factors in order to obtain a higher final rating. Spa Ilidža - Sarajevo has shown sensitivity to the change of 5 individual criteria related to natural-ecological factors. Therefore, this spa must strive to improve these factors in order to improve its offer.

The results of the sensitivity analysis for spa Mlječanica show that this spa lacked a little to make the final rating "good". With the decrease of two individual criteria, the final rating of this alternative is "unacceptable" (these were social factor sub-criteria). However, in order for this spa to have a final rating "good", it must improve the medical factors, because after increasing all the medical sub-criteria for one up, the final rating of this alternative was "good". These results provide guidelines on how spa Mlječanica could improve its offer to be regarded as a modern spa. Spa Sanska Ilidža needs to improve its offer on treatments and therapies,

recreation and relaxation and social sub-criteria for the final rating of this alternative to be "middle". This has shown that, with the increase of 9 criteria, the final rating of the criteria was changed.

After comparing the results of the sensitivity analysis for all the spas, it can be concluded that spa Dvorovi is the most sensitive of all the spas, while spa Ilidža - Sarajevo is the least sensitive to the change in the final rating, without taking into account spa Gata. Spa Gata has proved to be insensitive to changing individual sub-criteria. In contrast, spa Sanska Ilidža showed greater potential than spa Gata. Spa Mlječanica is the closest to getting a higher final rating.

**Table 4**  
**Sensitivity analysis**

SPA	Dvorovi		Gata		Ilidža – G.		Ilidža – S.		Mlječanica		Sanskailidža	
	-1	+1	-1	+1	-1	+1	-1	+1	-1	+1	-1	+1
<b>Spa offer in B&amp;H</b>	<b>middle</b>		<b>unacceptable</b>		<b>good</b>		<b>good</b>		<b>middle</b>		<b>unacceptable</b>	
Accommodations												
Services												
Foods												
Capacities	<b>unac.</b>											
Features	<b>unac.</b>											
Infrastructure	<b>unac.</b>											
Diversity	<b>unac.</b>											
Quality	<b>unac.</b>											
Availability	<b>unac.</b>											
Healing	<b>unac.</b>								<b>good</b>		<b>mid.</b>	
Rehabilitation	<b>unac.</b>								<b>good</b>		<b>mid.</b>	
Therapies	<b>unac.</b>								<b>good</b>		<b>mid.</b>	
Cosmetics									<b>good</b>			
Spiritual									<b>good</b>			
Health									<b>good</b>			
Fitness and sports	<b>unac.</b>								<b>good</b>		<b>mid.</b>	
Relaxation	<b>unac.</b>								<b>good</b>		<b>mid.</b>	
Increasing physical condition	<b>unac.</b>								<b>good</b>		<b>mid.</b>	
Educations		<b>good</b>			<b>mid.</b>						<b>mid.</b>	
Events		<b>good</b>			<b>mid.</b>				<b>unac.</b>		<b>mid.</b>	
Social packages		<b>good</b>			<b>mid.</b>				<b>unac.</b>		<b>mid.</b>	
Quality air and water	<b>unac.</b>				<b>mid.</b>		<b>mid.</b>					
Natural environment	<b>unac.</b>				<b>mid.</b>		<b>mid.</b>					
Climatic conditions	<b>unac.</b>				<b>mid.</b>		<b>mid.</b>					
Waste management	<b>unac.</b>				<b>mid.</b>		<b>mid.</b>					
Renewable sources												
Environmental impact	<b>unac.</b>				<b>mid.</b>		<b>mid.</b>					

Legend: unac. –unacceptable; mid. - middle

## 6. Conclusion and limitations

This study proposes a new form of evaluation of tourist facilities of spas in B&H using a decision-making support model based on the DEX method. The new decision-making model seeks to understand the importance of the impact of factors on the final rating of alternatives. In order to apply this decision-making model, first it was necessary to select the criteria and sub-criteria and to determine the decision-making function. The advantage of this approach and the DEX method is that it uses linguistic values that are closer to human thinking. In addition, a new model has been offered to solve the problem of transforming medical spas into modern spa centers.

This methodology and the new approach have been tested on spas in B&H. Six, out of a total of fifteen registered spas in B&H, have been chosen randomly and the transformation was evaluated by using expert decision-making. The results were obtained by using expert evaluation, which showed that the spas Ilidža - Sarajevo and Ilidža - Gradačac best transformed the offer and built modern spa centers, while the spas Gata and Sanska Ilidža did the least transformation and there is still much work to be done. The results of the sensitivity analysis showed that spa Gata is the least sensitive to the change in the individual sub-criteria, which is negative, as these results indicate that this spa must improve multiple individual criteria to improve the final rating.

Based on the conducted study and the results obtained, it can be concluded that out of the 6 spas that were taken as a sample, two can be called spa centers, while, for the other spas, this adjustment of offer and services is still ongoing. The spas need to change their offer in order to be more competitive and achieve better financial results. Therefore, it was necessary to create a decision-making model that would help evaluate the transformation of spas into spa centers and answer the main questions in this study. This study provided answers on the state of transformation of medical spas in B&H into spa centers and showed how the implementation of transformation can improve competitiveness.

The disadvantage of this study is that not all spas from B&H were taken, so it is necessary to make a complete study in future studies and look at the overall spa offer in B&H. In addition, the model used should also be used in future studies, as it showed great flexibility and ease of use. Also, it is necessary to compare the state of the spa offer in B&H with the spa offer in other countries in the future studies and use these results to improve the global competitiveness of spa tourism in B&H. This study represents the first step in analyzing the spa offer in B&H and, as such, needs to be upgraded for B&H to exploit the available natural-ecological factors, and to further develop spa tourism on these grounds.

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