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Integrated Multi-Criteria Decision-Making Methods for the Sustainability of Historical–Cultural Structures on the Trabzon Coastline

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Abstract: Unsustainable urban growth has put pressure on urban coastal areas and historical–cultural structures. As such, the important role of coastline sustainability has been revealed, and planners must protect historical–cultural coast characteristics in order to increase the quality of life of citizens. For this reason, this present study investigated the effects of existing coast characteristics and historical–cultural structure changes in recreation and tourism with respect to the Trabzon coastline in Turkey. Through literature and site survey, these effects were classified using specific coastal criteria which increase and decrease coastal use, and these were grouped by factor analysis. For the main criteria, the analytic hierarchy process (AHP) method was used, and for sub-criteria, the Elimination and Choice Expressing Reality (ELECTRE) method was employed, combining multi-criteria decision-making methods to generate a priority ranking for all criteria. Consequently, "socialization", "city promotion" and "service quality" were revealed as the most effective criteria with respect to coastal use. The methods and the findings may significantly contribute to sustainable tourism planning for other urban coastal areas.

Keywords: historical–cultural structure; multi-criteria decision-making methods; factor analysis; recreation–tourism; Trabzon-Turkey

1. Introduction

Cities can be a reflection of the lifestyle and culture of a society. Different lifestyles, ways of thinking, and perceptions with respect to society can influence the formation of cities [1,2]. Cities are artificial environments where people are shaped by their own cultures [3,4] as well as distinct ones, and these changes are reproduced in this process [5,6]. On an examination of the urban environment with respect the historical process, it has been noted that cities seek a particular aesthetic look with respect to the physical environment [7–10]. This aesthetic look that people seek in the physical environment can affect their lifestyle [10–12] and can also influence the process of shaping coastal cities. It is thus necessary to assess the different factors that shaping coastal cities. In this respect, ecological factors [13,14], morphological structures [15], geographical location and structures [16], cultural and social values [17,18], economical structures [19], and demographical properties [20] are the main factors likely to affect the settlement of the coast. Coasts connect water and land, and they first places that are reached after the sea, and as such coastal cities are of great importance [21,22]. Throughout history, coasts have been preferred areas both economically and culturally, and have played an important role in the development of the countries as they facilitate the economic and social development of society [17].

Historical and cultural structures which promote historical and cultural identity introduce a symbolic quality and identity to the area in which they exist by means of their own features. These

structures, therefore, bring tourism and recreation potential to study area [23,24]. Coastal cities have high cultural value in terms of identity, and they are preferred in terms of use [23]. As they tend to be points with cultural diversity, socialization is increased, provoking a sense of creativity in individuals and enabling group work [24,25]. Additionally, creative activities enable cultural transformation and consequently there are benefits in line with the developments in industrial and cultural tourism. These activities constitute the main part of urban development and competitive strategies while serving to strengthen the image and cultural development of urban areas [25,26].

Coasts are natural environments where tourist and recreational activities take place, and the natural topography and human community are reflected in social interactions [17]. Furthermore, due to their location, they are in general areas where intensive recreation and tourism activities can be undertaken [27]. The size and length of the coastal area are important factors determining the size of architectural structures in the planning of recreational areas [11]. Coastal regions are widely utilized for navigation, waterfront development, fishing, and recreation. These regions are exposed to high population pressure [27,28]. Thus, it is necessary to determine recreational demand with respect to the coast, and potential recreational capacity in order to protect the coasts and undertake solid planning when assessing coastal areas in recreational terms [29]. Urban coasts can be used in different ways for recreational purposes. However, it should be taken into consideration that the physical and ecological structure, land plastics, geological, geo-morphological and soil conditions, socio-economic status of the society and special tourism demands are the main factors affecting the planning and design of the area [30]. While preparing recreational planning standards, it should be taken into account that different people have different needs, and these differences are of great importance for the life cycle [31].

In line with this, coasts are attractive areas for national and international tourism development, and as a result generate profits [32]. In this regard, it is essential to balance the needs of society with natural potential demands, and to make decisions that bring the coastal identity and culture to the fore while ensuring integrity in the settlement [33]. Coastal regions with poor economic resources have been able to develop through tourism. Tourism can also make use of different natural and cultural landscape resources by turning them to their advantage and creating better living conditions for local people. This role of tourism can contribute to the economic and cultural development of a particular region or in contrast cause it to become mutated in its own evolution [34]. Economic events deeply bound up with working waterfronts play a critical role in the development and sustainability of different coastal economies [34,35].

While various recreational activities could be carried on the shore in terms of tourism, the sea is also used considerably. Shore-based accommodation services can be provided [35]. Despite the fact that there are no statistics on relative proportion of recreational, cultural and other types of tourism, it is clear that seaside vacations have today gained a worldwide popularity. This may be caused by general social and behavioral changes. These changes are based on a common belief that coasts present the best alternatives for leisure, physical activities, and pleasure of all age and social groups [36]. The range of social and economic issues that coastal local authorities have handled is analyzed thoroughly upon the recent request by the Communities and Local Government Select Committee, including their geographic isolation and problems associated with changes to demographic profiles [37].

In this context, the wishes of the society should not be disregarded when determining coastal areas as areas of mutual use [21]. According to related literature, tourism brings about sustainability to the study area, as long as it fulfills economic, social, and ecological purposes [36,37]. Thus, when preparing coastal planning decisions, the local city administration and planners should be respectful to the historical–cultural and natural environment for sustainability of the characteristics of the coastal area, and also contemplate the demands and behaviors of locals and tourists [38–40]. Significant increases in sports, recreation, free time, and tourism activities occurred by the end of the 20th century, especially in the West and industrialized countries [41]. Activities that carried out for tourism purposes are important for development and marketing by experts, and it has been determined that they are attractive elements for tourism planning [42]. Coastal tourism in Turkey started to emerge after 1955

and entered a process of quick acceleration after the 1960s, especially with the increase in governmental incentives [39]. It was determined that cultural monuments, museums, galleries, and other cultural institutions are important structures with touristic potential, as are cultural activities [43–46]. It has been detected that the opening of new cultural and tourist destinations in East and Middle Europe will contribute to the development of cultural tourism in Europe in the future [47].

Multi-criteria methods help to solve problems objectively for decision-makers, in a hierarchical way. The most-used multi-criteria methods, namely the analytic hierarchy process (AHP) and elimination and choice expressing reality (ELECTRE), are simple and flexible methods to prioritize appropriate decisions for study area. The factor analysis enables grouping of the variables evaluated under the associated headings. In this research study, factor analysis and two multi-criteria decision-making methods (ELECTRE and AHP) were used. These methods were conducted with domestic tourists and locals who were familiar with and lived in the Trabzon coast and surrounding areas. A landfill area measuring 930 ha caused the destruction of historical and cultural structures close to the Trabzon coast and a decrease in their values between 1975 and 2013 [48]. There are many buildings and ruins explaining the history of the city area.

With a particular focus on the historical and cultural patterns of the city within the coastal area borders, the aim of this research is to determine the effects of increasing and decreasing coastal use criteria in Trabzon city. For this purpose, a framework of priority criteria was made in order to highlight the historical and cultural patterns of the coast in terms of recreational and tourism potential that can contribute sustainable development of coastal uses through integrated multi-criteria decision-making methods.

2. Materials and Methods

2.1. Material

Trabzon is a coastal city located on the north-east Black Sea coastline of Turkey. It is known from old written sources in the Trabzon coastline that the coast went through change over the years and at one point the historical structure partially broke down [49]. Théophile Deyrolle visited Trabzon in 1869 and wrote a book named "The Journey from Trabzon to Erzurum". He depicted the coastal city as having traditional and brightly colored settlements above the sea on steep slopes. They looked like amphitheatres and they hid among the orange and olive trees and green nature [49]. The coastline and sea have been an important part of the identity of Trabzon city since ancient times [50] (Figure 1).

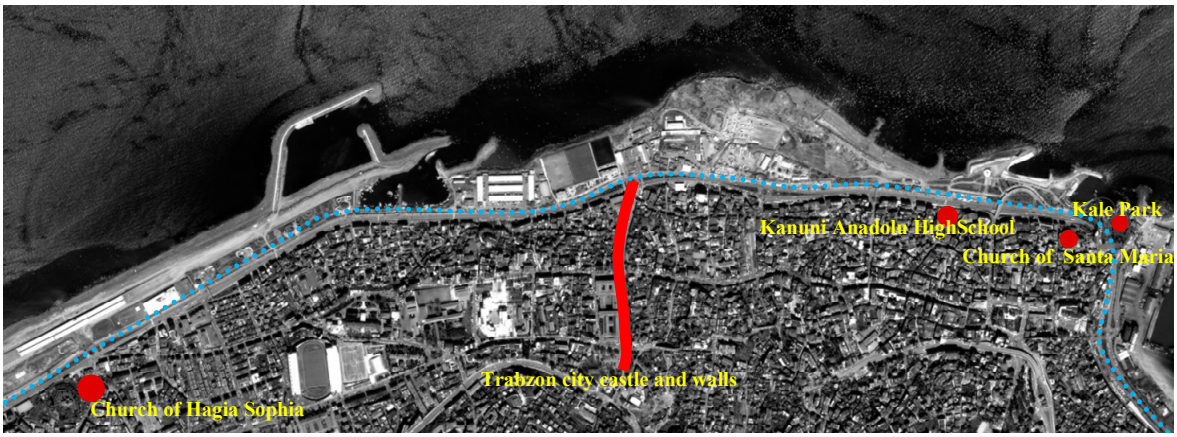


Figure 1. Study area.

It is also possible to encounter countless historical monument ruins within the borders of the city. The city has 482 registered monuments [50,51] and approximately 214 monuments in the

neighborhoods near the coast and in the coastal area. Figure 2 demonstrates the historical and cultural structures of coastline in the Ganita–Moloz districts of Trabzon city.

Studies on recreation and tourism [52–54] and scientific works that reveal the effects of historical–cultural values of coastal area on tourism planning [55,56] were used in this research, and survey questions were also prepared based on them. This study on the characteristics increasing historical usage of the coastal area also revealed the importance of historical, cultural, ecological, and economic factors. In addition, the importance of each of these factors was investigated with respect to one other and none of them were considered insignificant.

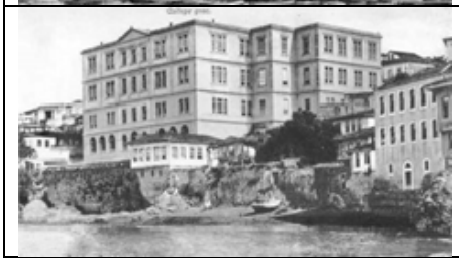
	**Trabzon City Castle and Walls (4th century BC)** The Trabzon city castle and walls extend from the coast up to the hills of Trabzon city, and construction dates back to the 4th century BC.
	**Church of Santa Maria (1869–1874)** The Church of Santa Maria was constructed by the Vatican administration between 1869 and 1974 for foreigners coming to Trabzon by order of Sultan Abdulmecit.
	**Church of Hagia Sophia (1238–1263)** The Hagia Sophia Museum was accepted for construction at the time of Manuel I, one of the kings of the Commenos State.
	**Castle Park (1297–1330)** Bello Kastro "Güzelhisar Cape" was situated upon Ganita rocks and was constructed on the back of these rocks on commercial agreement with the Genoese in 1306 at the time of Alexios II.
	**Kanuni Anatolian High School (1889)** The Greek building was constructed by the engineer Kakudilis (Phrontisterion of Trapezous—Trapezous College).

Figure 2. Historical and cultural structures on the coastline of Trabzon.

2.2. Method

The main analytical research process included preparation of the survey, factor analysis to group the criteria, and two multi-criteria decision-making methods: the Elimination and Choice Expressing Reality (ELECTRE), and the analytic hierarchy process (AHP). These multi-criteria decision making methods can provide the opportunity to prioritize criteria in terms of importance. These four major analytical steps consist of seven sub-steps (Figure 3).

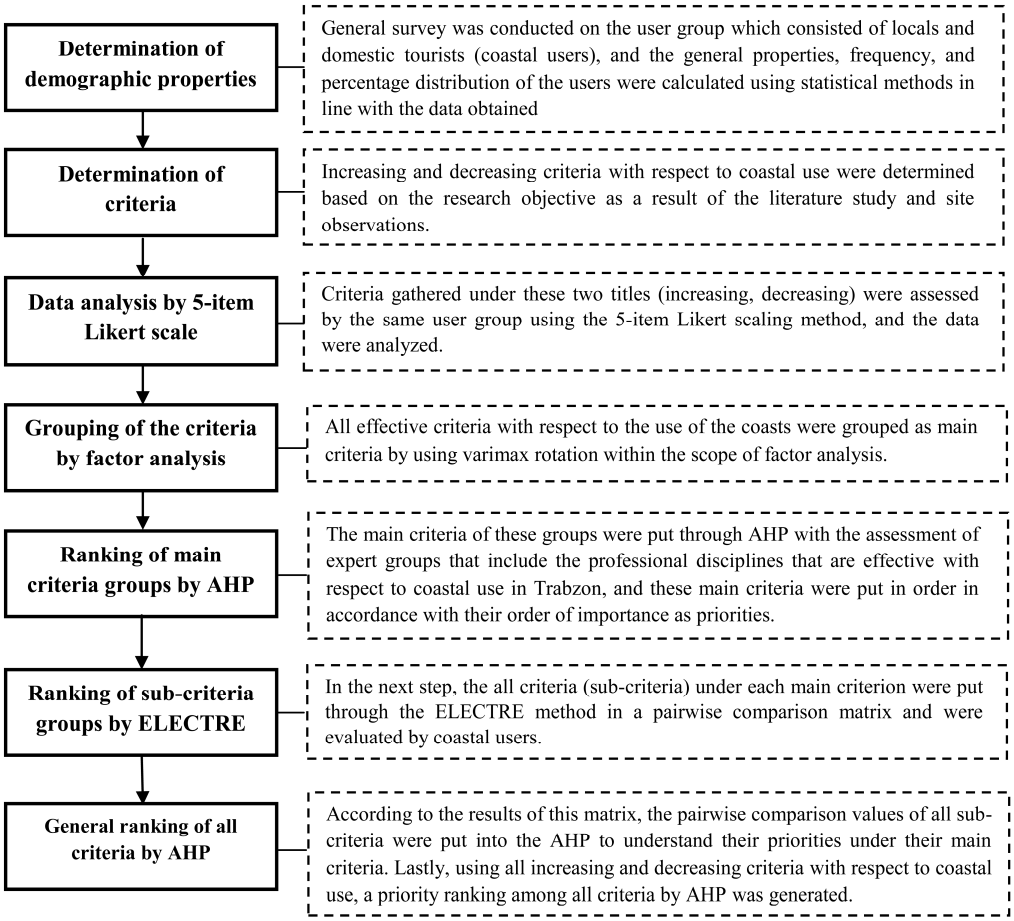


Figure 3. The analytical steps of the research process; AHP: analytic hierarchy process; ELECTRE elimination and choice expressing reality.

2.2.1. Preparation of the Survey

The population of the neighborhoods in the coastal area was selected to determine the number of questionnaires. Thus, a total population of 243,735 was obtained for the Trabzon city center according to the Trabzon 2015 census. The survey was to be carried out with at least 384 people for a confidence interval of 95%, and it was finally carried out with 397 individuals face-to-face. Those who participated in the survey were divided into 3 groups including locals, domestic tourists and foreign tourists. In the questionnaire surveys which were conducted in one on one interview, the participants were chosen randomly from the fields of the study in the coastal area and asked to allocate 10 min for the survey. The survey questions were prepared as a result of the negotiations with those chosen among the specialists who had done academic studies concerning coastal cities and were interested in coastal regions.

$$n = \frac{N \times \mathrm{P} \times \mathrm{Q} \times t^2}{(N-1) \times \mathrm{d}^2}$$

$$n = \frac{228.826 \times 0.5 \times 0.5 \times (1.96)^2}{(228.826 - 1) \times (0.05)^2} = 384 \text{ people}$$

n = Sample size (2), N = Size of universe (228.826), t = Table value (1.96)

P = Percentage picking a choice (0.5),
Q = (1 − P) Percentage unpicking a choice (0.5),
d = Error margin (0.05)

The coastal lines are used mostly in summer months and during the days which have less solar heat [57]. In this study, the questionnaire was distributed in the spring and summer months, often at the weekend between 15:00 h and 21:00 h, when there is less sunlight.

2.2.2. Factor Analysis

Factor analysis ensures the emergence of variable clusters that are outnumbered but independent by combining variables that are moderately or highly associated in order to determine the most effective main criteria [58]. In factor analysis, the principal component analysis (PCA) technique analyzes data by using the varimax rotation method [59]. This method allows the grouping of all variables (criteria) by their similarities [60,61].

2.2.3. Elimination and Choice Expressing Reality (ELECTRE)

One well-known multi-criteria decision-making method, ELECTRE, was first introduced by Roy in 1968 [62]. This method was later developed by Nijkamp et al. [63]. It is based on making a preference by comparing the alternatives in a systematic analysis [64,65]. The objective of the method is to determine the priorities of the preferred and non-preferred alternatives by making pairwise comparisons between two potential options and producing optimal results for the problems [64]. The pairwise comparison matrices are calculated while comparing the options, and the stages in which the priorities between the options are determined are created by this method [66,67]. In this study, this method turned verbal (qualitative) data into the numeric (quantitative) data for evaluating them in the analytic hierarchy process.

2.2.4. Analytic Hierarchy Process (AHP)

The AHP is a process that allows inclusion of the preferences and intuitions in the decision making process [68–70]. This method, which was developed by Saaty in the 1970s, is based on the hierarchic order in the analysis of multi-criteria complex problems [71]. The advantage of the method is that it creates a multi-criteria decision-making process and can be analyzed by many decision-makers at a time while choosing a preference among many alternatives [72,73]. This method can also rank the alternatives. A consistency ratio (CR) has to be smaller than 0.10 for acceptability of research using AHP [74,75]. It was applied to convert qualitative data to quantitative data for this research by the expert groups (landscape architects, architects, urban and regional planners, civil engineers, and geomatics engineers) through pairwise comparative survey.

3. Results

The participants consist of locals (72.8%) and domestic tourists (27.2%) in Trabzon city. Within the period in which the survey was conducted, no foreign tourists were surveyed, which indicates that foreign tourists do not know and are not curious about the coastal area of Trabzon. According to the level of income, there was a homogenous distribution between the participants of the survey. The general survey is shown in percentages separately through frequency values.

As one part of the study, the participants were surveyed to know how much information they have about Trabzon coast and how often (which days and months) they use the coast. It was found in general that coastal users are either knowledgeable about the historical and cultural structures in the coast

(43.7%) or they have little information (35.7%). The option "I am very knowledgeable" was marked by 1% of the respondents. This indicates that almost no one has in-depth knowledge about historical and cultural structures. Additionally, the greatest usage of coast was detected in the summer (73.8%) and in the spring (16.5%). In contrast, the usage of coast in autumn and winter was much less. Upon examining the weekly and monthly usage of the coast, it was also found that it is used more frequently at the weekend (85.4%) and at a frequency of once every three months (26.2%). As for the usage hours, it was found that there is a greater preference to use the coast in the evening hours (from 15.00 h to 18.00 h (35.9%) and from 18.00 h to 21.00 h (30.1%)). According to the results of this research conducted on coastal users, historical–cultural structures contribute more to Trabzon city in terms of socio-cultural effects (57.3%). This result demonstrates the socio-cultural importance of these structures for the coast. These structures do not affect the coastal uses (31.1%) and the coast does not have sufficient integration with the historical–cultural structures to increase recreation and tourism potential (11.7%) (Table 1).

Table 1. Use frequency of the Trabzon coast and the effect of the historical–cultural structures on coastal use.

Questions		Frequency Percentage (%)
Are you knowledgeable about the historical structures on the coast?	I have very little knowledge	16.5
	I have little knowledge	35
	I have no idea	3.9
	I am knowledgeable	43.7
	I am very knowledgeable	1
During which months do you most often go to the areas of Trabzon coast that are the closest to historical structures?	Autumn	10.7
	Winter	-
	Spring	16.5
	Summer	72.8
How often do you go to the areas of Trabzon coast that are close to historical structures?	Once a week	18.4
	More than once a week	11.7
	Once every fifteen days	7.8
	Once a month	10.7
	Once every three months	26.2
	Once a year	16.5
	Quite rarely	6.8
	Never	1.9
During which periods do you most often go to areas of the Trabzon coast that are close to historical structures?	On weekdays	14.6
	At the weekend	85.4
At which times do you most often go to the areas of the Trabzon coast that are close to historical structures?	6.00–9.00	1
	9.00–12.00	6.8
	12.00–15.00	26.2
	15.00–18.00	35.9
	18.00–21.00	30.1
Historical and cultural structures increase the recreational and tourism potential of the coast.		11.7
Historical and cultural structures contribute to the coast in terms of socio-cultural effect.		57.2
Historical and cultural structures do not contribute to coastal use at all.		31.1

3.1. Results of Factor, AHP and ELECTRE Analyses

According to the results of survey data conducted on coastal users, all increasing and decreasing coastal use criteria of historical and cultural structures were grouped under main criteria according to Saaty [71], analyzing pairwise comparison for more than nine criteria in the AHP method. This led to an increase in the number of surveys and a decrease in the rate of consistency of the study. Therefore, 12 sub-criteria that increase the coastal use of historical and cultural structures and 21 sub-criteria that decrease them were grouped under the main criteria through factor analysis method, and thus it was ensured that criteria were reduced by grouping them by number. For this purpose, data was analyzed using the principal component analysis (PCA) method with varimax rotation to group all criteria by their similarities for factor analysis. All data were tested using the SPSS program with the Kaiser−Mayer−Olkin (KMO) and Bartlett test in order to determine unreliable criteria. According to KMO and Barrlett tests, the value of increasing coastal use criteria was taken as 0.687 and decreasing

criteria was taken as 0.674. In that case, the KMO value was higher than 0.5 and the significance value was found to be 0 by Barlett test, indicating that all criteria are correlated, and all data sets are reliable for factor analysis (Table 2).

Table 2. Factor analysis results of increasing and decreasing coastal use criteria of historical–cultural structures (all criteria with value ≥0.5 were taken into consideration).

Coastal Uses	Factors and Items	Factor Loading	Eigenvalue	Variance (%)	Mean
Increasing Criteria	**Factor 1: Socialization (S)**		**3.66**	**25.10**	**4.04**
	S1: Offering the opportunity to get rid of the stress of the city and daily intensities	0.541			4.00
	S2: Offering the opportunity to get to know new people	0.810			3.61
	S3: Having the effect of increasing the socio-cultural activities of children	0.572			4.07
	S4: Offering the opportunity to get to know and promote local and folkloric features	0.572			4.21
	S5: Allowing for the organization of festivals	0.856			4.30
	Factor 2: Sportive Activity (SA)		**3.08**	**21.60**	**3.85**
	SA1: Providing the opportunity to perform outdoor sports activities	0.809			3.94
	SA2: Fulfilling the wish to perform sportive fishing	0.859			3.82
	SA3: Providing the opportunity to perform water sports	0.779			3.85
	SA4: Providing the opportunity to perform exercise sports	0.788			3.79
	Factor 3: Visual Integrity (VI)		**2.12**	**20.48**	**4.41**
	VI1: Historical environment and landscape beauty	0.866			4.37
	VI2: Ensuring integrity with historical, cultural and natural structures	0.818			4.37
	VI3: Having spots for landscapes, sunset watching, photography, and painting	0.672			4.50
Decreasing Criteria	**Factor 1: Service Quality (SQ)**		**7.15**	**26.13**	**4.22**
	SQ1: Lack of direction signs and guide boards	0.713			3.89
	SQ2: Pollution in coastal areas and open green spaces (garbage, domestic waste, marine pollution, air pollution)	0.703			4.40
	SQ3: No compulsory areas required in coastal areas (restroom, child-care areas)	0.606			4.32
	SQ4: The green areas are uncared for	0.675			4.21
	SQ5: Incorrect practices in afforestation works and shortcomings in afforestation	0.582			4.01
	SQ6: Facilities rendering quality services are not adequate	0.757			4.37
	SQ7: Lack of infrastructure and maintenance	0.516			4.32
	Factor 2: Space Utilization (SU)		**1.67**	**10.96**	**3.82**
	SU1: The historical–cultural structures are not perceived well from the coast	0.607			4.15
	SU2: There is no accommodation opportunities near the coast with historical and cultural structures	0.874			3.81
	SU3: The climatic factors affect night–day use	0.774			3.50

Table 2. *Cont.*

Coastal Uses	Factors and Items	Factor Loading	Eigenvalue	Variance (%)	Mean
Decreasing Criteria	**Factor 3: Coast Connection (CC)**		**2.17**	**14.87**	**4.22**
	CC1: Inability to access the historical and cultural structures from the coast	0.694			4.05
	CC2: The effect of unplanned settlement on the coast	0.609			4.24
	CC3: Loss of the historical–cultural structures in the urban pattern	0.782			4.35
	CC4: The decrease in the connection between the coastal paths formed after coastal fills of the historical structures bordering the coast with the coast	0.778			4.22
	CC5: The motorways constructed as a result of filling the coast disconnect the coast from historical and cultural structures partially or fully	0.828			4.23
	Factor 4: Outdoor Equipment (OE)		**1.29**	**9.45**	**4.24**
	OE1: Inadequate sports, children playgrounds, and entertainment areas	0.568			4.23
	OE2: Lack of outdoor equipment (for sitting, eating–drinking, etc.) in coastal areas	0.616			4.25
	Factor 5: City Promotion (CP)		**1.75**	**13.37**	**3.92**
	CP1: Increasing usage density in the coastal areas during summer months	0.887			3.55
	CP2: Lack of promotion and advertisement info offices about the history of Trabzon on the coast	0.772			3.88
	CP3: No excursions and yacht tours that ensure the integrity with the coast and historical structures	0.844			4.06
	CP4: Lack of promotion, tours and organizations that activate the connection between historical structures and the coast	0.784			4.17

Note: For increasing criteria of coastal use Kaiser-Meyer-Olkin (KMO) = 0.687, and Bartlett's test of sphericity = 363,422 at Degrees of freedom (D.F.) = 78 with a significance of $p = 0.000$. Overall means cores are rated on a five-point Likert-type scale for increasing criteria. For decreasing criteria of coastal use, KMO = 0.674, and Bartlett's test of sphericity = 928,594 at D.F. = 253 with a significance of $p = 0.000$. Overall means cores are rated on a five-point Likert-type scale for decreasing criteria.

The main criteria grouped by factor analysis were applied to the expert groups through pairwise comparative survey. The Expert Choice program was used in order to determine the degrees of importance of the main criteria relative to each other, and the data were weighted through AHP and ranked by their priorities. Thus, results are easily understood. As a result of PCA analysis, all main criteria that increase or decrease the coastal use of historical and cultural structures were graded in percentages. Twelve sub-criteria that increase the coastal use of historical and cultural structures were divided into three categories: Socialization (25.10%), Sportive Activities (21.60%), and Visual Integrity (20.48%) with a variance of 67.18% in total. A total of 21 sub-criteria decreasing coastal use were categorized as per five factors: Service Quality (26.13), Coastal Connection (14.87), City Promotion (13.37), Space Utilization (10.96), and Outdoor Equipment (9.45), with a total variance of 74.78%.

The main criteria grouped by factor analysis were applied to the expert group (landscape architects, architects, urban and regional planners, civil engineers, and geomatics engineers) through pairwise comparative survey. The Expert Choice program was used in order to determine the importance degrees of the main criteria relative to each other, and the data were weighted through AHP and ranked by their priorities. According to the results, Socialization (S: 0.521) was selected as the most important main criterion in the ranking among the main increasing coastal use criteria. This result demonstrates that historical and cultural structures of costal area have positively affected

the social life in terms of recreational and tourism potential. The other main increasing criteria of coastal use were determined to be Sportive Activity (SA: 0.298) and Visual Integrity (VI: 0.181) for Trabzon city. The consistency ratio (CR) of these criteria is less than 0.1.

Considering the interaction between the coast and historical–cultural structures, Lack of City Promotion (CP: 0.27) for Trabzon city is the most important main criterion for improving recreation and tourism activities in this coastal area. The criteria Service Quality (SQ: 0.226), Outdoor Equipment (OE: 0.203), Coast Connection (CC: 0.168) and Space Utilization (SU: 0.133), decrease the effectiveness of the coast in terms of recreational and tourism in the study area.

3.2. Assessment of the Sub-Criteria Increasing and Decreasing Coastal Use

There are more than nine criteria for both sub-criteria. This causes a decrease in the value of CR. Therefore, instead of AHP, the other well-known multi-criteria method ELECTRE was preferred for comparing the options and establishing priority relations between the options. First, the sub-criteria were assessed separately under their main criteria by the coastal users. The weighted averages of all sub-criteria under the main criteria were determined by this method. For this, the comparison matrices were established with pairwise comparison. Next, all values of this ELECTRE matrix were assessed under the main criteria within the scope of the AHP method. Thus, finally, all increasing and decreasing sub-criteria of coastal use were ranked by their priorities amongst themselves (Tables A1 and A2).

According to the results of the increasing coastal use sub-criteria by combining ELECTRE and AHP (group priority), coastal users ranked Allowing for the Organization of Festivals (S5: 0.222) the highest priority, and Offering the Opportunity to Get to Know New People (S2: 0.177) was the lowest priority criteria under the main socialization criterion. The most important sportive activity criterion was providing the opportunity to perform outdoor sports activities (SA1: 0.256) and the least important criterion was Fulfilling the Wish of Performing Sportive Fishing (SA2: 0.239). The evaluation of visual integrity criterion showed that Historical–Cultural Landscape Beauty (VI1: 0.337) and Integrity with Historical, Cultural and Natural Structures (VI2: 0.337) were selected as the most important sub-criteria with the equal values, and Having Spots for Landscapes, Sunset Watching, Photography, and Painting (VI3: 0.327) was the least important criterion (Table 3). These results clearly show that organized festivals, development outdoor sport activities, and the continuity of the natural, historical, and cultural landscape can positively affect the historical–cultural structures of coastal areas to improve recreation and tourism activities in the coast. For overall priority evaluation of the increasing criteria, S5: Organization of Festivals stood out as the most important criterion (0.127). Then, the other socialization criteria were ranked in the order of S4 > S3 > S1 > S2 as the higher priorities. After these criteria, there is a sharp break in the level of priority to the main criteria of sportive activities and visual integrity, respectively. This showed that the socialization criteria of coastal area are the main priority decisions for improving recreation and tourism planning and coastal regulation. On the other hand, VI3: Having Spots for Landscapes, Sunset Watching, Photography, and Painting (0.043) was selected as the lowest priority criterion among the overall criteria. This shows that visual integrity criteria are less important for current recreation and tourism activities in this coastal area.

Table 3. Ranking of increasing (Consistency Ratio-CR: 0.03) and decreasing (CR: 0.06) sub-criteria by combining AHP–ELECTRE results.

Coastal Uses	Main Criteria	Priority Value TO: 0.09	Sub-Criteria	Group Priority	Overall Priority TO: 0.03	Priority Rankings
Increasing Criteria	Socialization (S)	0.521	S1	0.197	0.119	4
			S2	0.177	0.107	5
			S3	0.192	0.122	3
			S4	0.207	0.125	2
			S5	0.222	0.127	1
	Sportive Activities (SA)	0.298	SA1	0.256	0.073	6
			SA2	0.239	0.062	9
			SA3	0.251	0.066	7
			SA4	0.255	0.068	8
	Visual Integrity (VI)	0.181	VI1	0.337	0.044	10
			VI2	0.337	0.044	10
			VI3	0.327	0.043	11
Decreasing Criteria	City Promotion (CP)	0.270	CP1	0.216	0.053	6
			CP2	0.246	0.061	3
			CP3	0.264	0.065	2
			CP4	0.274	0.067	1
	Service Quality (SQ)	0.226	SQ1	0.127	0.048	9
			SQ2	0.150	0.056	4
			SQ3	0.148	0.055	5
			SQ4	0.143	0.053	6
			SQ5	0.133	0.050	8
			SQ6	0.150	0.056	4
			SQ7	0.148	0.055	5
	Outdoor Equipment (OE)	0.203	OE1	0.435	0.050	8
			OE2	0.505	0.51	7
	Coast Connection (CC)	0.168	CC1	0.191	0.37	13
			CC2	0.211	0.41	11
			CC3	0.219	0.42	10
			CC4	0.206	0.40	12
			CC5	0.173	0.33	14
	Space Utilization (SU)	0.133	SU1	0.376	0.33	14
			SU2	0.333	0.29	15
			SU3	0.292	0.26	16

Note: Underlined values display the highest and lowest values of each criterion.

According to the results of decreasing sub-criteria of coastal use combining ELECTRE−AHP (group priority), in terms of the effect of the historical–cultural structures of the coastal area in recreational and tourism terms for Trabzon city, Lack of Promotions, Tours and Organizations (CP4: 0.274) was selected as the sub-criterion that affects coastal use most negatively under the city promotion criterion. The sub-criteria Pollution in the Coastal Area and Open Green Spaces (SQ2: 0.150) and Facilities Rendering Quality Services Are Not Adequate (SQ6: 0.150) were ranked as the priorities that affected coastal use most negatively under service quality. In terms of outdoor equipment criterion, the Lack of Outdoor Coastal Area Equipment (OE2: 0.505) sub-criterion and in terms of the coastal connection the Loss of Historical–Cultural Structures in the Urban Pattern (CC3: 0.219) sub-criterion were determined as the most negative sub-criteria decreasing the recreational and tourism use of the coast. According to the result of the space utilization, the criteria Historical–Cultural Structures Are Not Perceived Well from the Coast (SU1: 0.376) was ranked of highest priority in terms of negatively affecting the coastal use (Table 3). These coastal user results indicate that lack of city promotions, tours and organizations, pollution and inadequate service quality, insufficient outdoor equipment, loss of value of historical–cultural structures in the urban pattern, and loss of perception of the historical–cultural structures from the coast can have negative effects on the historical–cultural structures of the coastal area in terms of recreation and tourism. In overall priority evaluation among the decreasing criteria, CP4: Lack of Promotion, Tours and Organizations (0.067) stood out as the highest priority criterion. Then other city promotion criteria were ranked in the order CP3 > CP2 > CP1 as the highest priorities. Furthermore, together with pollution problems, insufficient service quality

most negatively affected coastal uses (0.056). This showed that city promotion and service quality are the main important criteria, decreasing the importance of coastal planning. On the other hand, coast connection and space utilization were selected as lower priority criteria. In particular, SU3: Climatic Factors (0.026) was selected as the lowest priority among the overall decreasing criteria. This shows that space utilization is handled last in planning decisions for recreation and tourism among all criteria. Consequently, both sub-criteria results of coastal uses regarding to the historical–cultural structures can be assessed in the sustainable planning of the coastal region (Table 3).

4. Discussion

The changes in the historical, cultural, and natural landscapes of the coast should be analyzed in order to increase the usability of the recreational and tourism areas in the coastal cities. There are many factors affecting the recreational demands in these analyses. The quality of landscape analysis should be determined by physical, biological, and social features and their interactions in a systematic manner [76]. Joint assessment approaches based on the physical features and user perceptions need to be used [77]. Recreational uses differ depending on the socio-demographic properties and social environment of the people living in the cities [78]. Working waterfronts, in the Alabama coastal area, make a significant contribution to the state economy in tourism, shipping, fishing and other activities. The increase in development pressure on coastal areas is posing a threat to traditional water-dependent industries such as fishing and public recreation [35].

This study indicated that the usage of the coast was distinct depending on gender. According to the gender study, women preferred to use the coast. In particular, women with children preferred to use the coastline due to the possibility of participating in more comfortable activities in the open areas of the coastline.

Most of the studies carried out on tourism examined the subjects for determining socio-economic factors affecting tourism and in this context, the scientific research indicates that users have the most important role in determining recreational and tourism use [30]. According to the results with respect to coastal users, high school and university students, as well as working families used the coastal area more frequently. This demonstrates that students and city workers used coastal area for recreation more than other citizens. In order that coast identity and culture remain in the forefront, coast usage should be previously planned and determined. The study indicates that different activities have been preferred depending upon coast users and specifications.

Research on the historic pattern and recreational activity along Black Sea and Trabzon coast detected that the coastal users are dissatisfied with the lack of diversity in activities [79] and that different behavioral patterns are preferred with respect to Trabzon coastal band activity [80]. According to the research on the Black Sea coast, in terms of recreational and tourism planning, coastal use increases the recreational and tourism potential of the city depending on the socio-cultural values and the geographical and physical structure of the coast [49]. The Hagia Sophia Museum (serving as a mosque since 2013), the Trabzon city walls (setting the borders of the old Trabzon city), the Kanuni Anatolian High School (that continues to serve as a school), the natural rock formations of Ganita and Kalepark (constructed on the rocks), the Santa Maria Catholic Church (built for Catholics and currently lead by the Vatican), and historical and cultural structures such as the numerous guest houses and Turkish baths near the coast are important historical features that can attract the attention of domestic and foreign tourists visiting the city for socio-cultural trips. It is suggested that information offices be set up in order to inform the visitors and these offices can be supported by tourism and the cultural ministry, as well as by the local government. Consequently, as part of the study conducted on the coastal city Trabzon, criteria that promote and reduce the coast usage are examined and also the positive effect that historical and cultural structures have on tourism and recreation potential nearby is searched. It is figured out that these structures are in danger of extinction due to the pressure of rapid urbanization. The study evaluating the recreation and tourism potential in Trabzon coastal region may make a contribution to sustainability of the cultural and historical texture.

Main criteria that increase (SA/S/VI) and decrease (SQ/CP/OE/SU/CC) coastal uses based on historical–cultural structures were initially grouped in this research. As a result of the analyses carried out, it was found that the socialization criterion is the most important criterion increasing coastal use. Social activities should be given priority in the planning decisions for the sustainability of social life [41,42]. According to the result of this research, the socialization criteria were ranked as being of highest priority for coastal usage. Therefore, this study revealed that recognition of the characteristics of the coast and city by active use and sharing of ideas with respect to the history of coastal area and city among users can cause a better understanding of the history of the city and its coast. The development of the tourism industry of Shindu-ri coastal area has increased the number of tourists and this increase has resulted in positive effects including improved tourism attractiveness, enhanced tourism and local income, and increased tourism investment. On the other hand, it has also decreased the quality of the coastal landscape. As a result, this deterioration of the landscape has reduced the structure of the tourism industry [27,63]. Although regional activities and festivals were assessed mostly in terms of economic factors in planning studies regarding festivals, visitors, and tourism, they are obviously important in terms of tourist use today [63].

In scientific studies carried out for recreation and tourism, local activities in Turkey were grouped and the cultural and artistic activities were revealed important activities at a secondary level [80]. The study concludes that historical and cultural structures on the coastal regions having historical value are assets to enhance social activities. Furthermore, it should be noted that historical structures increase the usability of the spaces they are in. The historical structures in urban areas affect the cultural promotion of the city depending on the number of visitors [81]. Previous scientific studies showed that coastal cities with historical and natural coast patterns have an important advantage in terms of recreational and touristic use. In this study, it was found that holding festivals, increasing regional and folkloric cultural promotions, and carrying out advertisement of the city in a more widespread manner and reflecting the historic pattern to a greater degree will primarily increase the mobility of the coast. It was found that infrastructure problems based on service quality is one of the factors reducing coastal use. Previous scientific studies indicated that infrastructure and service quality are effective in terms of the use of the space [82], and that visitors were not satisfied with the infrastructure and service quality in the touristic areas of Akçakoca [39]. The study carried out here support this research.

5. Conclusions

Individuals are the most significant factor to identify a place. In this respect, carrying out spatial planning which is based on users' requirements will allow for making the forward decisions more correctly.

Criteria with respect to the historical and cultural structure of Trabzon that increase and decrease coastal use were investigated and ordered by level of priority in this study. In this context, factor analysis played a determining effect on the grouping criteria under the main criteria. The result of this study indicated that socialization maximally increased the recreation and tourism uses of coastal areas based on historical–cultural structures. As socialization improves one-on-one and group interactions, historical and cultural structures must be brought into service in a certain time and days and for certain purposes so as to enhance social activities. However, it must be known that increase in user capacity will lead to destruction of historical building and its environment. Local governing bodies will play a very critical role in implementing the research findings properly. Particularly for the sustainability of historical structures having the feature of attraction in coastal areas, local governing bodies and relevant specialists should handle such issues as taking safety measures and limiting the number of visitors.

Accordingly, it was suggested that it is mostly these structures and social activities that should be assessed for the recreation and tourism planning of coastal areas. Furthermore, protection strategies can be developed in order to ensure the conservation of these structures for the continuity of recreation and tourism activities in the coastal area. Hence, these structures will become more important and contribute to informing locals and other users. Demands for festivals, as well as cultural and social

activities under the socialization criteria demonstrated that users need and prefer various activities on the coast. This showed that the socialization of coastal area should be a main priority to improve recreation and tourism planning and coastal regulation. City promotion and service quality can also be assessed as a main priority in order to improve recreation and tourism in coastal areas. It was suggested that the location and dates of outdoor festivals and other activities can be determined and planned mutually by the administrative structure and locals.

The effect of the sea and sun in coastal cities increases the availability of the historical structures in the coast during the summer months. This allows for the historical–cultural structures to be in active use in the coastal area during this time. Furthermore, special promotions and festivals prepared in these areas will allow local people to have more information in order to inform tourists and this will contribute to greater socialization with them. The recreation and tourism activities of the coastal city, Trabzon are affected not only by social events but also visual factors. Enriching the historical and natural structures visually (night-time lighting) will create an aesthetic impact on the appearance of structures as well as making a significant contribution to coastal silhouette.

The natural formation of the coast can also be taken into consideration for recreation and tourism planning of coastal areas. In this context, coast planning decisions and coastal arrangements can be made with a holistic approach as a result of multi-actor participation. This approach will make it possible to make more realistic and usable decisions for coastal area planning. Therefore, it is necessary to improve infrastructure services and ensure a controlled management system in order to prevent the pollution of coastal areas. The coast is considered as a whole together with its historical, cultural, and natural values, and these factors can be assessed together for recreation and tourism planning. This study was carried out in order to promote the cultural and traditional values of the city by supporting the historic pattern in coastal cities and it can set an example as research that will contribute to future coastal city planning studies.

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Appendix A

Table A1. Comparison matrix of the increasing coastal use sub-criteria of historical–cultural structures.

	Socialization (1)												
	S1	**S2**	**S3**	**S4**	**S5**		**Sportive Activity (2)**						
S1	-	1.11	0.99	0.95	0.93		**SA1**	**SA2**	**SA3**	**SA4**	**Visual Integrity (3)**		
S2	0.90	-	0.89	0.86	0.86	**SA1**	-	1.03	1.04	1.02		**VI1**	**VI2**	**VI3**
S3	1.01	1.13	-	0.97	0.75	**SA2**	0.97	-	0.93	0.93	**VI1**	-	1	1.03
S4	1.05	1.17	1.03	-	0.98	**SA3**	0.96	1.08	-	0.98	**VI2**	1	-	1.03
S5	1.07	1.19	1.34	1.02	-	**SA4**	0.98	1.08	1.02	-	**VI3**	0.97	0.97	-

Note: Underlined values display the highest and lowest values of each criterion.

Appendix B

Table A2. Comparison matrix of the decreasing coastal use sub-criteria of the historical–cultural structure.

City Promotion (1)				
	CP1	**CP2**	**CP3**	**CP4**
CP1	-	0.87	0.81	0.78
CP2	1.15	-	0.94	0.9
CP3	1.23	1.07	-	0.96
CP4	1.28	1.11	1.04	-

Service Quality (2)							
	SQ1	**SQ2**	**SQ3**	**SQ4**	**SQ5**	**SQ6**	**SQ7**
SQ1	-	0.98	0.86	0.89	0.96	0.84	0.86
SQ2	1.2	-	1.03	1.07	1.15	1.01	1.03
SQ3	1.17	0.97	-	1.04	1.12	0.94	1
SQ4	1.13	0.94	0.96	-	1.07	0.94	0.96
SQ5	1.04	0.87	0.89	0.94	-	0.88	0.9
SQ6	1.19	0.99	1.07	1.06	1.14	-	1.01
SQ7	1.17	0.97	1	1.04	1.11	0.99	-

Outdoor Equipment (3)		
	OE1	**OE2**
OE1	-	0.99
OE2	1.01	-

Coast Connection (4)					
	CC1	**CC2**	**CC3**	**CC4**	**CC5**
CC1	-	0.94	0.9	0.96	1.19
CC2	1.07	-	0.96	1.02	1.27
CC3	1.11	1.04	-	0.11	1.32
CC4	1.04	0.98	0.94	-	1.24
CC5	0.84	0.79	0.76	0.81	-

Space Utilazition (5)			
	SU1	**SU2**	**SU3**
SU1	-	1.14	1.3
SU2	0.88	-	1.14
SU3	0.77	0.88	-

Note: Underlined values display the highest and lowest values of each criterion.

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