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Research article/Araştırma makalesi

The visual quality assessment of urban coastline landscapes: A case study of Akçakoca City (Turkey)

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Abstract

This research has been conducted along a 14 km part of Akçakoca coastline. Research findings, which depend on visual quality assessment criteria, include analysis of the current situation of the research area, and the comparisons of current visual landscape and proposed improvements, supported with expert and public participation. For visual quality assessment; the factors determined by Lynch (1960) for his study and Nasar (1992)'s spatial characteristics in his study, also used by Çakcı (2009), were used to develop a visual criteria modelling process.The main materials of the research are 17 photographs of the coastline which were selected from 42 photographs depending on expert opinions. User group, selected from the public, were asked to assess the spatial characteristics of the research area by comparing the selected photographs and the photographs that represent proposed improvements. Significant data were derived depending on the analysis results of the methodology used in this research. Levels of order, openness, maintenance and presence of natural elements were determined by assessing research findings, and the differences between spatial characteristics were displayed using comparison results of photographs of current landscape and proposed improvements.

Key words: visual quality assessment, visual quality, landscape quality, coastline landscapes

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Kentsel kıyı peyzajlarının görsel kalite değerlendirmesi: Akçakoca örneği

Özet

Bu çalışma; Akçakoca kenti kıyı bandının yaklaşık 14 km'lik kısmı ve yakın çevresinde sürdürülmüştür. Görsel kalite değerlendirme ölçütlerine bağlı olarak yapılan çalışmada elde edilen bulgular, kıyı bandının mevcut durum analizi ile iyileştirilmiş hallerinin kıyaslanmasından oluşmakta; uzman grubu ve halkın katılımı ile de desteklenmektedir. Görsel kalite değerlendirmesinde; Lynch (1960)'in "kent imgeleri" nin oluşturulmasında belirlediği etmenlerden ve Çakcı (2009)'nın da çalışmasında kullandığı Nasar (1992)'ın çalışmasındaki mekânsal karakteristiklerden yararlanılarak bir görsel ölçüt modelleme süreci geliştirilmeye çalışılmıştır. Kıyı bandı üzerinde görüntülenen 42 adet fotoğrafın, uzman görüşleri doğrultusunda elenmesi ile belirlenen 17 adet fotoğraf araştırmanın ana materyalini oluşturmaktadır. Halkın içerisinden rastgele seçilen kullanıcı grubundan da bu 17 adet fotoğraf ve iyileştirilmiş halleri olan kurgu tasar görüntülerinin mekânsal karakteristiklere göre değerlendirilmeleri istenmiştir.Araştırmada kullanılan yöntemin analiz sonuçlarına dayanılarak, istatistiksel anlamda anlamlı veriler elde edilmiştir. Araştırma bulgularının değerlendirilmesi sonucu her bir fotoğrafın; düzenlilik, açıklık, bakımlılık ve doğal elemanların varlığının seviyeleri belirlenmiş ve mevcut görüntüler ile kurgu tasar görüntüler arasındaki mekansal karakteristikler açısından farklar ortaya konulmuştur.

Anahtar kelimeler: görsel kalite değerlendirmesi, görsel kalite, peyzaj kalitesi, kıyı peyzajı

1. Introduction

Physical changes taking place in urban areas usually result from industrial developments. Touristic events trigger these changes as the coastlines between the sea and the city are critical transition districts. Arranging the

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environment in order to create new resources for the facilitation of human life lead to some changes in environmental features and their redefining. The basis of this defining consists of the aging which occurs after usage of long years and the fact of change as it is replaced with new ones (Kalın, 2014, Jacobs, 1975).

Visual quality studies are important tools which visually examines the changes in the physical environment. They should be used in planning and designing urban and rural environments (Ak, 2013). They should also be seen as a guide in the making of some administrative policies (Lothian, 1999).

Common purpose of environmental visual studies is to extend environmental data which are essential for environment protection and enhancement by improving the processes of visual criterion modelling which can be used in planning and designing processes. Particular purposes of the study can be sequenced as providing data to determine development strategies, comparing different environments or detecting visual impact districts of recommended developments in order to guide the development control decisions, researching the environment's sensitivity to changing in terms of the addition of new elements or existing ones. Environmental visual studies oriented with these purposes can be classified into different environments, studies which detect different people and different groups' choices, studies which assess environment aesthetic quality and studies of environment image analysis.

Within the scope of this study, shaping problems of today's urban open areas are scrutinized along with human-environment relations. With the help of various related studies, a method research which will produce "visual quality" design principles and bring criteria for such places has been developed.

Within the scope of the topic of the research, the model which Lynch (1960) created and various resources guided the study. In this respect, by interpreting physical impacts, design principles which are as valuable as a guide used in the forming of urban open areas were determined.

In another part of the study which consists of the practice, a survey with expert opinions and users was carried out through the quality criteria determined earlier on the coastline of Akçakoca which was chosen as the sample district.

In the result part, an estimate of the situation is done for the coastline which was taken as sample district and a model which uses the method that can provide visual quality design principles and criteria is suggested. In this sense, while Akçakoca coastline is being assessed in terms of visual quality, data for future designs are gathered and visual quality design principles are determined.

2. Materials and methods

1.1. Study area

Study area contains a 14km coastline and surrounding places with the city centre of Akçakoca County in Düzce Province situated in West Blacksea Region. The starting point of the study corridor is at where the river Haciz flows into Blacksea in the east of the coastline and the endpoint is at the Castle of Genoese in the west of the city centre (Figure 1).

Figure 1. Study area

1.2. Materials

The main material of the study consists of 17 photographs which were taken in the district and determined by expert opinion. In the determination of the photographs, the main criteria was the factors that Lynch (1960) determined in making city landmarks. Other materials are programmes such as 3D-Max which is used for simulation with Photoshop CS2 and SPSS 15.0 to assess the surveys. Another important material of the study is the user and expert groups on which the surveys are carried out. 10 surveys were carried out in the expert group whereas 100 surveys were done in the user group within the study. The expert group consists of academicians who did some research on visual quality assessment earlier and the user group consists of the local community of Akçakoca. Literatures acquired within the research are also one of the materials of the study.

1.3. Method

Within the study, a process of visual criteria modelling was tried to be developed. For this purpose, we made use of the factors specified in making of "City Landmarks" by Lynch (1960) and Nasar (1992)'s study named "Visual preferences in urban street scenes: a cross cultural comparison between Japan and the United States". Lynch is sequencing these factors as paths, edges, districts, nodes and landmarks in his study.

Nasar correlated the expert and user survey results with each other. Comparative factors based on spatial characteristics which Nasar specified in his study are sequenced as existence of natural elements – absence of natural elements – existence of vehicles – absence of vehicles, being complex – being regular, being neglected, being well-kept and being simple, plain, intelligible – being in a various condition.

In this study, spatial characteristics which Nasar used above as part of purpose and content were changed in Çakcı (2009)'s study and the method of the study was adapted accordingly as seen under the title "Preparation of Surveys".

Instead of the whole usages remaining within Akçakoca borders, the coastline was chosen as the sampling area for visual quality assessment in this research. If we had dealt with the whole urban area, different area usage types would have emerged, therefore there would have been a need to assess different place typologies. If we had dealt with different place typologies in the sampling area being researched, survey questions would have been complex, evaluation process would have extended and as the possibility of absence of common characteristics increases during the evaluation of different place typologies, there would have been inanities and problems during the analysis of the survey results and the comparison between choices. For these reasons, limiting the sampling area only with "the coastline" let the study control better and affected the consistency of "visual quality" results positively in the wake of the evaluation of research evidences. This result is also supported by the research that Çakcı (2009) did on visual landscaping assessment.

Demographic characteristics of the user group is ignored, because these features does not directly affect to the scope of the study.

1.4. Preparation of surveys

Evaluation of the photographs concerning Akçakoca coastline was made through surveys. So survey was done with two different groups. The first group is the expert group. First, the researcher took 300 photographs and they were eliminated to 42 by the researcher and then a pre-survey was prepared to be asked to the expert group. In the pre-survey study, the expert group was asked to assess the visuals through likert scale. Pre-survey study was completed by ticking the boxes specified between -3 and +3 according to the existence and clarity of the factors (Müderrisoğlu et al., 2006; Eroğlu and Demir 2016; Lynch, 1960; Daniel, 1983) specified in making of "city landmarks" in the photographs.

With the surveys which were applied to the expert group individually, each expert was asked to assess the visuals within the criteria under the title "Method" and in Table 1. Table of weighted point result of each visual criteria is shown in Table 3.

Table 1. Valuation table of expert group

Paths	*Min*	□	□	□	□	□	□	□	*Max*
Edges	*Min*	□	□	□	□	□	□	□	*Max*
Districts	*Min*	□	□	□	□	□	□	□	*Max*
Nodes	*Min*	□	□	□	□	□	□	□	*Max*
Landmarks	*Min*	□	□	□	□	□	□	□	*Max*

The researcher prepared simulation visuals on the photographs which the expert group decided on by using the method of "Virtual Reality Modelling Language (VRML)". The user group was asked to make evaluation of 34 photographs in a 5-point scale and those photographs were decided by the expert group and the researcher prepared the simulation of them(one simulation visual for each photograph).

In the survey prepared for the user group, like Nasar (1992)'s study, Çakcı (2009) sequenced these factors to clarify as regular – irregular, visible – invisible, well-kept – neglected, simple – complex and dominant natural elements – dominant structural elements. Within this study, users' admiration were assessed through these criteria.

While the questions of the user group were being prepared, we scanned so many domestic and foreign survey forms, used expert opinions and paid attention on the survey's being intelligible in order to achieve the purpose. Additionally, user survey was applied to the study area and the subjects around. Half of the surveys were done in weekdays and the other half were done at the weekend and the forms were filled during face to face interviews.

Data analyses were done through "chi square tests" and "cross-tables" which compares parameters.

Enhancements keeping in mind the criteria below were made on 17 photographs which were determined through the result of the survey applied to the expert group.

Botanic enhancements were made and an identity was tried to be assigned to the district.

We paid attention on providing a view of crown base above the eye level in the trees used for botanic arrangement in the coastline so as not to block the scenery.

Structural enhancements were made and an identity was tried to be assigned to the district (road pavements, sitting areas, illumination elements, etc.).

Elements which make visual pollution were covered with plantal materials, re-arranged or removed (ruined buildings, billboards, etc.).

Utility poles were suggested to be removed and transmitted underground so that there was a clearer view.

The number of the survey prepared for the user group was applied to 100 participators which were calculated through "Simple random sampling method" which is explained below.

A more objective result was provided by distributing total subject numbers to the neighbourhoods with percentages.

$n=N/(Nd^2+1) = 36944/(36944.0,1^2)+1 = 99.73$

n=Number of people that will take the survey

N=Number of population

d=Tolerance (%10)

In individual surveys that were applied to the user group, each participator was asked to assess the visuals depending on the criteria explained in 2.2 Method and given in Table 2.

Table 2. Valuation table of occupant group

Regular	□	□	□	□	□	**Irregular**
Visible	□	□	□	□	□	**Invisible**
Well-kept	□	□	□	□	□	**Neglected**
Simple	□	□	□	□	□	**Complex**
Dominant natural elements	□	□	□	□	□	**Dominant structural elements**

3. Results

1.1. Results concerning expert group surveys

With the pre-survey study which was applied to the expert group individually, each expert was asked to assess the visuals within the criteria under the title "Material and Method" which were specified through the factors Lynch (1960) created during his study "city landmarks". Weighted mean of the points given to the criteria was calculated and according to the result, the photographs with the numbers 7,8,9,11,13,14,16,17,18,19,20,21,22,23,24,25 and 26 got positive valence to be presented in the main survey which looks like the user survey in Table 3.

1.2. Results concerning user group surveys

17 photographs determined by the pre-survey with expert group were enhanced within the criteria explained in "Preparation of surveys" part and these photographs were introduced as original and simulation to the users to be assessed (Figure 2). In the method stage of the research, main survey form was prepared by examining former survey studies and getting help from expert opinions after deciding on the survey study. This form contains visual quality assessment conditions of original and simulation of the research's main material.

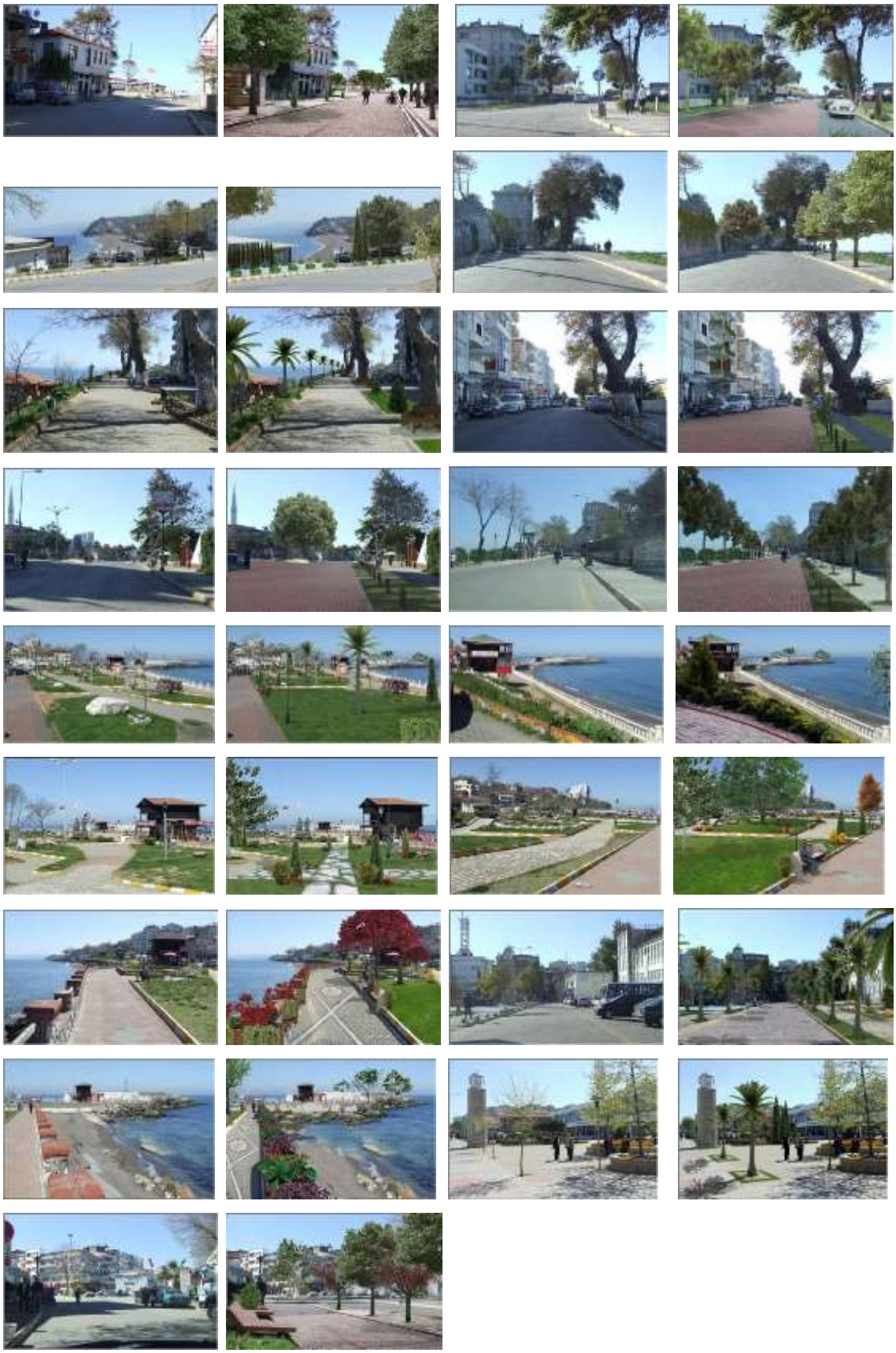

Figure 2. Existing and simulated images

1.3. Evaluation conditions of subjects on visuals within visual quality criteria

With the main survey applied to user group, evaluation results of 17 original visuals which make up the main material of the research and 17 simulations made of these visuals are given in Table 4.

Table 3. Weighted average values of images as the result of preliminary survey

Photo Number	Weighted Mean Value	Photo Number	Weighted Mean Value	Photo Number	Weighted Mean Value
1	-0,84	**15**	-0,56	**29**	-0,8
2	-0,98	**16**	**0,74**	**30**	-0,2
3	-0,46	**17**	**0,28**	**31**	-0,24
4	-1,1	**18**	**0,6**	**32**	-0,06
5	-0,12	**19**	**0,6**	**33**	-0,02
6	-0,38	**20**	**0,22**	**34**	-0,32
7	**0,16**	**21**	**0,56**	**35**	-1,2
8	**0,18**	**22**	**0,72**	**36**	-1,56
9	**0,7**	**23**	**0,7**	**37**	-0,72
10	-1,04	**24**	**0,3**	**38**	-1,24
11	**0,6**	**25**	**0,66**	**39**	-0,54
12	-0,1	**26**	**0,08**	**40**	-0,24
13	**0,12**	**27**	-0,54	**41**	-0,6
14	**0,32**	**28**	-0,24	**42**	-0,76

Table 4. Assessments of images and simulated images by occupants

Photo Number and Type	**Spatial Characteristics**				
	Regular - Irregular	Visible - Invisible	Well-kept - Neglected	Simple - Complex	Dominant Natural-Structural Elements
1. Original	3,67	3,38	3,63	3,52	3,67
1.1. Simulated	1,57	2,03	1,66	1,75	1,55
2. Original	3,38	3,13	3,31	3,47	3,64
2.1. Simulated	1,52	1,92	1,71	1,78	1,47
3. Original	3,53	3,19	3,29	3,34	3,81
3.1. Simulated	1,51	1,63	1,84	2,07	1,52
4. Original	3,46	3,18	3,36	3,58	3,64
4.1. Simulated	1,35	1,95	1,69	1,79	1,48
5. Original	3,64	3,11	3,45	3,57	3,17
5.1. Simulated	1,41	1,78	1,83	2,01	1,44
6. Original	3,08	3,24	3,26	3,67	3,81
6.1. Simulated	1,65	2,42	1,70	1,67	2,18
7. Original	3,35	3,24	3,50	3,74	3,39
7.1. Simulated	1,43	1,73	1,83	1,83	1,53
8. Original	3,36	3,20	3,35	3,55	3,67
8.1. Simulated	1,47	1,83	2,07	1,77	1,59
9. Original	3,90	2,91	3,62	3,77	3,46
9.1. Simulated	1,41	1,89	1,73	1,80	1,54
10. Original	3,31	2,94	3,40	3,59	3,61
10.1. Simulated	1,93	1,62	2,03	1,83	1,69
11. Original	3,91	2,96	3,33	3,95	3,70
11.1. Simulated	1,56	1,79	1,70	1,76	1,66
12. Original	3,87	2,89	4,11	4,05	3,86
12.1. Simulated	1,34	1,87	1,48	1,73	1,45
13. Original	3,56	3,08	3,61	3,64	3,71
13.1. Simulated	1,53	1,81	1,62	1,82	1,64
14. Original	3,99	3,40	3,69	3,95	3,84
14.1. Simulated	1,63	2,12	1,97	1,99	1,87
15. Original	3,34	2,56	3,22	3,24	3,52
15.1. Simulated	1,37	1,66	1,76	1,71	1,63
16. Original	2,26	2,81	1,98	2,79	2,82
16.1. Simulated	1,68	2,09	1,77	1,77	2,05
17. Original	4,10	3,72	3,96	4,09	4,14
17.1. Simulated	1,58	2,24	1,65	1,98	1,61

According to the results after seeing the Tables;

Subjects decided that all of the simulation visuals have a higher visual quality values than the original ones. Simulation visual number 12 got the best value with the average rate of 1,574 compared to others. Original visual number 17 got the worst value with the average rate of 4,002 compared to others in terms of visual quality. When we examine the visual quality differences between original visuals and their simulations, the difference in photograph 17 got the highest value with 10,95 and the difference in photograph 16 got the lowest with 3,30.

When the criteria are examined one by one, the most regular visual is simulation visual 12 with 1,34 points, the most irregular visual is photograph 17 with 4,10 points, the most visible visual is simulation visual 10 with 1,62 points, the most invisible visual is photograph 17 with 3,72 points, the most well-kept visual is simulation visual 12 with 1,48 points, the most neglected visual is photograph 12 with 4,11 points, the simplest visual is simulation visual 6 with 1,67 points, the most complex visual is photograph 17 with 4,09 points, the visual in which the most dominant natural elements are seen is simulation visual 5 with 1,44 points and the visual in which the most dominant structural elements are seen is photograph 17 with 4,14 points.

4. Conclusions and discussion

Not all the studies can be generalized as the simulation visuals which were produced during the research are point scenarios but it is thought that quality criteria which are explained in the method process are usable for other similar researches. Accordingly, validity of this method which is suggested for researches about visual quality has to be tested by the next researchers examining visual quality issues.

Based on the fact that design-focused researches are relative, this study, which aims to clarify the issue of "how to research what" that is the common dilemma of such researches, sequenced the criteria that can be used during the decision and assessment of the environment's visual quality and a sample method was suggested for researchers at this juncture.

One of the important issues that the study tries to emphasize is the necessity that the integration of original and simulation visuals is provided during the design decisions which will be developed for a sample area to be studied on. So the user, who lives in the sample area being studied on, should be included in the research. This result is also supported by Pryce (1991) and Oğuz (2000)'s studies which examine user satisfaction.

When assessments made on survey results of the user group are examined, it is seen that the subjects liked all of the simulation visuals more than the original ones. This result shows that the criteria which are taken into consideration during the preparation of simulation visuals and which are under the title "Preparation of surveys" are important criteria that should be included in visual quality studies.

One of the important results gained by the user group's assessing the phorographs is that the difference between the original and simulation visual of photograph 17 is the highest compared to the other visuals. Original visual 17 is among the least liked visuals (avg=4.002). Simulation visual 17 is among the most liked visuals (avg=1.812). Simulation visual 17 is the one on which there were more changes compared to the other simulation visuals. This result is supported with the fact that the original visual of photograph 17 is the most irregular, complex, invisible and has the most dominant structural elements; simulation visual of the same photograph, on the other hand, is the second most liked visual.

Another important result gained by the user group's assessing the photographs is that the difference between the original and simulation visual of photograph 16 is the lowest compared to the other visuals. This assessment suggests that simulation visual 16 is the one on which there were fewer changes compared to other simulation visuals. This result is supported with the fact that the original visual of photograph 16 is the most liked compared to the other visuals when examined on the assessment table.

Simulation visuals suggested in the research to increase visual quality were produced by making limited assumptions. Quality criteria in the suggested method construction is one of the constructions that can be developed for the researches containing the issue of "determination and assessment of visual quality". Besides, making new quality groups in which the suggested quality criteria can be increased-decreased or changed, including all or some of the factors such as the effect of seasonal changes on quality criteria in the researches are so important in terms of developing and expanding designed-focused researches. This result is also supported with Kalın (2014)'s study.

On the basis of the research results above, results, suggestions and user choices that can guide landscape architects and local governments during the design of a coastline can be sequenced as follows:

A botanic enhancement should be made in order to create a space identity.

A visual harmony should be provided for the buildings in the coastline and historical structures should be restored.

Deciduous trees used in the coastline should be organized in a style in which they look like a crown base above the eye level in order to create scenery harmony.

An enhancement should be made on structural landscaping and an identity should be assigned to the space (road pavements, sitting areas, illumination elements, etc.).

Elements which make visual pollution should be covered with plantal materials, re-arranged or removed (ruined buildings, billboards, etc.).

Utility poles should be removed and suggested to go under the ground so that there is a clearer view. According to the user survey results, 43% of the subjects chose "neglect" as the first factor for their not liking the landscape design of the coastline. This factor should be taken into consideration by local governments and a sufficient importance should be paid on the issue of keep.

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