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Visual impact assessment of the Istanbul Land-wall

Hüseyin Ögçe[1], Haldun Müderrisoğlu[2] and Serir Uzun[2]

Abstract

Visual impact assessment studies are reasonably substantial to understand an environment which has different features. The aim of this study is to evaluate the visual impact of the Istanbul Land-wall and contribute to future design/planning stages. For this purpose, the study area was separated into four different spatial usages which are recreational, transportation, agricultural and neglected places. Twenty-four different photographs were taken and a survey was conducted upon an expert and a public sample group. The public survey included four parameters: well-kept, exciting, safety and beautiful scenery. The expert survey also involved four parameters which were coherence, imageability, stewardship and historicity. One-way ANOVA test was conducted to reveal sample groups' effect on the preferences. The results showed that the average scores of photographs evaluated by public and experts were 11.07 and 9.80 scores respectively. In the public survey, the photograph, has the lowest scores for all parameters, was Photo-11 (P11). Experts' result shows particularly that historicity is lower than the others although the area is a historical region. Specifically, neglected places obtained lower scores than the other spatial types. Consequently, the Istanbul Land-wall does not have adequate visual quality regarding the selected parameters.

Keywords

Visual assessment, Spatial types, Perception, Land-wall, Istanbul

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Introduction

Visual impact assessment studies are based upon seeing first of all. The seeing comes before words and people recognize their location around them by seeing.[1] Eye is the most advanced sense organ. Because of this, visual perception is more permanent in memory compared with that comprehended by the other sensory organs.[2] Aesthetic experience begins with the physical stimulation of senses.[3] The quality of the visual experience is very important for the physical and psychological health of people[4] and also affects location preference.[5,6]

By general expression, visual impact assessment studies are also based on evaluating the visual qualities of a place or route which has a functional relationship of spatial fiction and social life.[7] Also, this sort of studies plays an important role in characterizing a region.[8] They address a sense of natural and cultural aspects of an area[9] and are associated with a change of landscape views, people's responses and area's appearance.[10,11]

Landscape means an area perceived by people[12] composed of many different field types inside the environment. Historical landscapes are no doubt an important type and part of the environment. A landscape assessment is focused on defining landscape character instead of some part of the region[13]. The study of the historical landscape supports the regeneration ability of landscapes and makes to understand how and why the landscape changes.[14,15]

Over the last half centuries, visual impact assessment studies are involved in academic studies all over the world. In Turkey, Özhancı and Yılmaz[16] investigate

[1]Faculty of Fine Arts, Design and Architecture, Department of Landscape Architecture, Recep Tayyip Erdoğan University, Rize, Turkey
[2]Faculty of Forestry, Department of Landscape Architecture, Düzce University, Düzce, Turkey

Corresponding author:
Hüseyin Ögçe, Faculty of Fine Arts, Design and Architecture, Department of Landscape Architecture, Recep Tayyip Erdoğan University, Rize, Turkey.
Email: huseyin.ogce@erdogan.edu.tr

the visual impact of the recreational landscape. Eroğlu and Acar[17] studied the visual quality impact on the plant.

Assessment of visual landscape quality is a methodological study area and can be divided into two approaches which are made upon expert and public perceptions.[18] The expert approach converts biophysical features of the landscape into classical models of public perception and aesthetic judgement.[11]

In recent years, the quality of the landscape has been important because of the increasing interest in environmental quality and awareness.[19,20] Therefore, the quality of historical places remarks as much as the other landscape types. They are generally defined as settlements and remnants that pass down from past civilizations.[21] Historical regions must be evaluated as carefully as other spatial types and subjected to equal diligent investigation.[22] They have a significant environmental value for people,[23] an expression of the diversity of societies throughout history, and include a strong identity, related to the social and physical aspect.[24]

As a part of the historical place, city walls possess a remarkable component within a landscape and are involved in many of different academic study areas such as history, archaeology, architecture, city and region planning and landscape architecture. Preservation of historic environment reinforces a sense of place, identity, evolution, ownership and community.[25]

With increasing population, rapid urbanization, traffic and transportation problems, inadequate conservation precautions, incorrect city planning, earthquake and fire disasters etc., historic landscapes are confronted by deterioration as almost all other places.[26] It consistently needs a large-scale survey over the public preferences in order to proceed sustainability and to enhance the quality of landscape.[27]

City walls were generally constructed to protect the city (dynasty and people) against their enemies. It possesses many historic events and value for many nations within their different perspectives. Walls reflect their architectural features and war technologies at the time.[28] On the other hand, walls also have administrative functions to keep citizens separate from peasants and to regulate the flow of visitors and goods, including the levy of taxes and fees.[29] Nowadays, it means the edge of a city according to academic studies.[30] Therefore, it must be protected towards destructive effects.

A study on the Land-wall of Istanbul is needed to define the visual quality of different spatial uses. The purpose of this study is to make a visual impact assessment of Istanbul Land-wall by expert and public perception and contribute to improving quality of landscape for this environment through the results obtained from this visual impact assessment.

Material and methods

The Istanbul walls and its environs

The study area covers Land-wall of Istanbul which is called the Theodosian wall. Istanbul walls are part of The Historic Peninsula of Istanbul (Figure 1). The triangular land, bounded by Bosporus to the east side, Golden Horn to the north side and Sea of Marmara to the south side, defines the Historic Peninsula.[31] Historic Peninsula has hosted several empires such as East Roman, Byzantine and Ottoman, as a capital during the history and includes important values such as Hagia Sophia, Grand Bazaar, Topkapı Palace, Blue and Süleymaniye Mosques as well as Istanbul Walls. Nowadays, the Historic Peninsula is called Fatih district. According to a census in 2017, the population of the historic peninsula was 417,285.[32] However, a daily population is more than the census of 2017 because of the existence of many touristic places.

The walls of Istanbul

The city walls, which belong to Byzantine era, are surely one of the most important historical constructions of Istanbul.[33] The walls of Istanbul constitute five main sections: Sea wall, Golden Horn wall, Galata wall, Topkapı Palace wall and Land-wall. The Sea-wall is settled in Marmara Sea side of Historic Peninsula and its length is 9 km. The Golden Horn Wall is located in Golden Horn side and its length is 5.5 km. Galata-wall was settled in the north of Golden Horn, but it does not exist today. Topkapı Palace wall is settled within the historic peninsula and it was built by Mehmet the II (Conqueror of Istanbul) in 1478 in order to preserve the palace and Ottoman dynasty.

The Land-wall of Istanbul

Istanbul Land-wall whose length is approximately 7.5 km was built by 'Theodosius the II' in the 5th century in order to protect the city (then called Constantinople) against enemies of Byzantium.[34] The wall was constructed as three parts: first, moat; second, outer wall; and third, inner wall (Figure 2). The inner wall was the main bulwark of the city.[35] During its history, the Land-wall, which means a part of the image of city,[36] was damaged due to wars and was reconstructed.[37] Therefore, the Land-wall of Istanbul infers image and historic evidential value of the city.[38] It is also included in UNESCO's World Heritage List since 1985.[39]

As for the location of Land-wall, it has lots of both little and big towers, starts from south-west of historic peninsula of Istanbul and reaches to the north-west of the same region (Figure 3).[40] It involves many historical

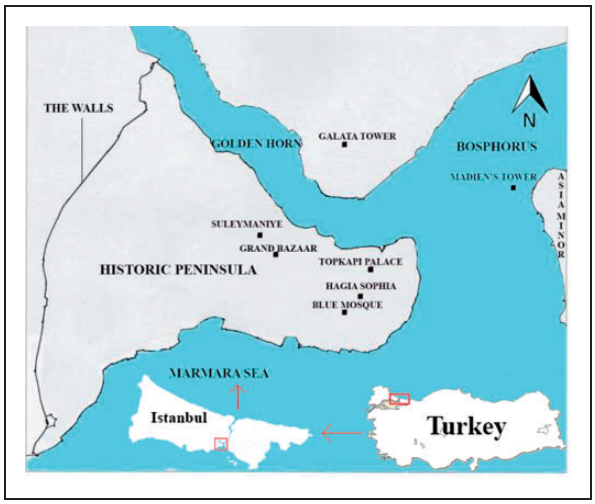


Figure 1. Location of Historic Peninsula (original, 2018).

valuable gates such as Golden Gate, Belgrade Gate, Romanos Gate (Topkapı) and Edirne Gate.

Methods

In the study, there are two sample groups: public and expert. The public survey consists of 90 citizens and the expert survey is composed of 28 Landscape Architects. The study was composed of four essential parts.

Data collecting

This part includes literature studies about the Landwall of Istanbul and involves the field-surveys implemented in the study area.

Field-works

Twenty-four different photographs (Table 1) were taken throughout the determined route in the area 11.00 out of 13.45 via a 14.0-megapixel camera on 18 March 2018 (Figure 3).

Composing of questionnaires

Two different questionnaires were composed in order to define public and expert approaches between 1 and 5 scores. The public survey was estimated by using adjective pairs which are unkempt vs. well-kept, unsafe vs. safe, unexciting vs. exciting and ugly scenery vs. beautiful scenery. Each photograph was printed out on A4 paper and can take a minimum of 4 maximum of 20 scores. A public survey lasted 15 out of 20 min averagely. Expert approach questionnaire contains four different parameters which are coherence, imageability, stewardship and historicity. For evaluating these four parameters, different sub-dimensions were used. They

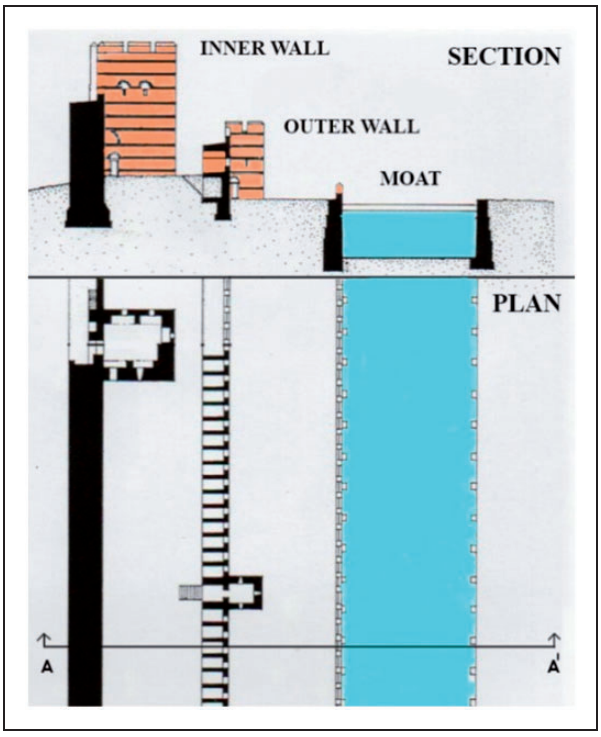


Figure 2. Section of walls.[33]

are corresponding to natural conditions (coh1) and repeating texture piece (coh2) for *coherence*, density of historical elements (img1), density of landmarks (img2) and density of spectacular built features (img3) for *imageability*, maintenance level of vegetation (ste1), maintenance level of historic buildings (ste2) and frequency of management (ste3) for *stewardship*, density of cultural elements (his1), presence of traditional land use (his2) for *historicity*. In this study, sub-dimensions were evaluated via two different measurements. Those are piece and density analysis. The piece analysis has coh2, ste3 and his2; density analysis contains sub-dimensions of coh1, img1, img2, img3, ste1, ste2 and his1. Whereas piece analysis composes of 1 out of 5+ piece, density analysis consists of five different gaps which are 0–20% (1 score), 21–40% (2 scores), 41–60% (3 scores), 61–80% (4 scores) and 81–100% (5 scores). An expert questionnaire, conducted on digital media, lasted 45 out of 60 min averagely. The parameters were selected based on the academic study of Ode et al.[13]

Evaluations and results

First of all, gender, educational status and age range of subject groups were inquired and photographs were categorized in the form of four different spatial types: agricultural, transportation, recreational and neglected place (Table 2). Statistical analyses of the data obtained

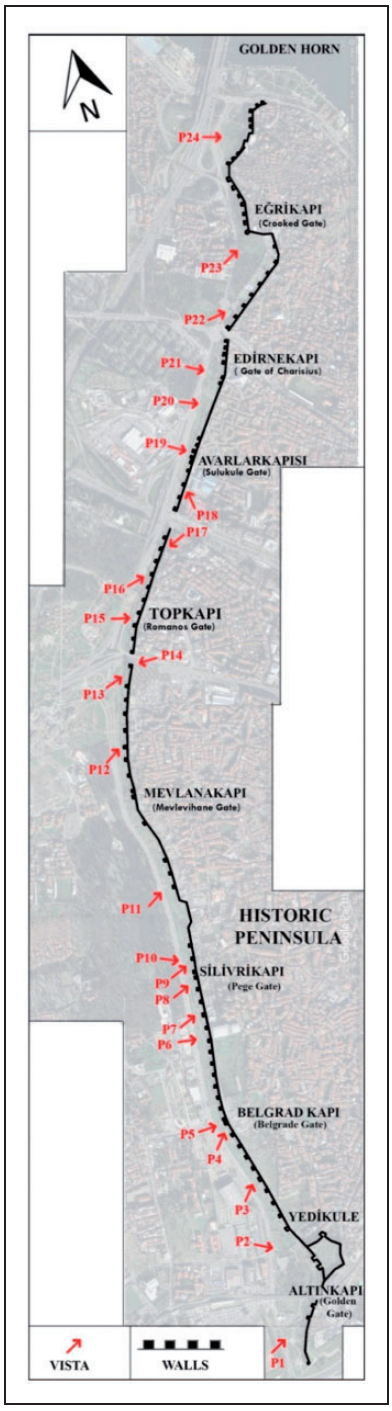


Figure 3. Vista of photographs (original, 2018).

by questionnaires were made with SPSS (Statistical Package for Social Sciences) 21.0 program. Arithmetic averages were calculated; and the highest and lowest points were determined for each parameter and photograph. In order to reveal the statistical differences of these arithmetic means, One-way ANOVA test was preferred. Overlapping and non-overlapping approaches were compared with results of the analysis. Each photograph that has the highest and lowest score for expert and public perceptions was determined and these were investigated in detail. Moreover, reliability analysis was carried out for public and expert approaches.

Result and discussion

Evaluation of public approaches

The public survey consists of 90 participants; 36.7% of the participants were male (33 male users) and 63.3% were female (57 female users). 14.4% of users were graduated from elementary schools (13), 13.3% were graduated from high schools (13), and 72.2% were graduated from universities (65). 5.6% of the users' age range were between 12 and 17 (5), 44.4% were between 18 and 23 (40), 32.2% were between 24 and 29 (29), 4.4% were between 30 and 35 (4), 2.2% were between 36 and 41(2) and 11.1% was 42+ (10) age.

Table 2 shows values of parameters and scores of photographs in total. The three highest scored photographs were detected as: P1, P4 and P9 and the three lowest scored photographs were detected as: P11, P3 and P14, respectively. The highest scored photograph of well-kept and safe parameters were determined as P1 and also for exciting and beautiful scenery parameters were calculated as P4. As for the worst scores, P11 possesses the lowest score of all of the parameters (Table 2).

In order to define statistical differences among the gender, the educational status and the age range, the one-way ANOVA test was conducted ($p < 0.05$) and the results are demonstrated at Tables 3 to 5.

According to the analysis of these tables the average of female scores has lower values compared with males for all parameters. This determination is shown in the P3 and the P22 prominently (Table 3). Also, the parameters' score is inversely proportional to the educational status except for P2 for Safety. As educational status increases, the score of parameters decreases (Table 4). In addition, there is partially a direct proportion between age and parameters (Table 5).

In Table 2, 15 photographs have lower average values than the medians (12 scores). The agricultural and neglected places have a lower score than the recreational and transportation places. The gender factor is highly effective on exciting and beautiful scenery parameters only (Table 3); educational status and age range factors are effective on all parameters (Tables 4 and 5). In order to support these evaluations, reliability analysis was conducted. For the reliability analysis,

Table 1. Photographs (original, 2018).



the Cronbach alpha value was acquired as '0.89', which demonstrates that the survey is reliable.[41]

Investigation of the highest and lowest three photographs according to public perceptions

Tables 6 to 11 show the photographs which obtained the highest and lowest three scores according to public perceptions.

Evaluation of experts' approaches

All expert participants consisted of landscape architects. Of the total 28 experts who participated in the survey, 32.1% were male (9 male experts) and 67.9% were female (19 female experts). In Turkey, most landscape architects are female.[42] The result supports this situation. The results on the age range of experts who participated in the survey show that 17.9% of participants were between 18 and 23 (5), 64.3% were between

Table 2. Values of photographs.

Codes of photographs	Parameters (participants' scores)				Total[a]
	Well-kept	Exciting	Safety	Beautiful scenery	
P1 [*r*]	4.24	3.37	3.74	3.93	15.29
P2 [*a*]	2.13	2.28	2.08	2.57	9.06
P3 [*a*]	1.84	1.82	1.93	2.02	7.62
P4 [*a*]	3.87	3.44	3.34	3.97	14.62
P5 [*t*]	3.61	2.80	3.28	3.27	12.96
P6 [*t*]	3.67	3.16	3.11	3.33	13.26
P7 [*n*]	2.39	2.20	2.33	2.48	9.40
P8 [*t*]	3.40	3.00	3.29	3.20	12.89
P9 [*r*]	3.84	3.22	3.31	3.58	13.96
P10 [*r*]	3.04	2.80	2.82	2.70	11.37
P11 [*n*]	1.48	1.64	1.51	1.74	6.38
P12 [*t*,*r*]	2.48	2.32	2.41	2.58	9.79
P13 [*t*,*r*]	3.76	3.18	3.40	3.47	13.80
P14 [*n*]	1.77	2.02	1.80	2.18	7.77
P15 [*t*]	3.66	3.14	3.44	3.32	13.57
P16 [*t*]	2.34	2.24	2.26	2.33	9.18
P17 [*t*]	2.12	2.20	2.23	2.21	8.77
P18 [t]	2.88	2.36	2.80	2.42	10.46
P19 [*t*]	2.28	2.29	2.18	2.36	9.10
P20 [*r*]	2.44	2.56	2.49	2.84	10.33
P21 [t]	2.90	2.89	2.91	3.16	11.86
P22 [*r*]	3.54	3.06	3.11	3.21	12.92
P23 [*t*]	2.94	2.68	2.82	2.87	11.31
P24 [*r*]	2.41	2.44	2.38	2.82	10.06
Average	2.88	2.63	2.71	2.86	11.07

[*a*]: agricultural; [*t*]:transportation; [*r*]: recreational; [*n*]: neglected.
[a]Each photograph can take min. 4, max. 20 points.

Table 3. ANOVA test of scores of different users and their genders.

	Well-kept	Exciting	Safety	Beautiful scenery
P2	–	–	0.033[a]	0.016[a]
P3	0.049[a]	0.001[a]	0.002[a]	0.0002[a]
P4	–	0.049[a]	–	–
P10	–	0.008[a]	–	0.004[a]
P11	–	0.010[a]	–	–
P15	–	0.011[a]	–	–
P16	–	0.012[a]	–	0.036[a]
P18	–	–	0.038[a]	0.023[a]
P19	0.031[a]	–	–	–
P21	–	–	–	0.029[a]
P22	0.008[a]	0.008[a]	0.039[a]	0.030[a]
P23	–	0.037[a]	–	–

[a]Average of female score < averages of male score.

Table 4. ANOVA test of scores of different users and their educational status.

	Well-kept	Exciting	Safety	Beautiful scenery
P2	–	–	0.048[a]	–
P4	0.021[c]	0.026[b]	–	–
P5	–	0.038[c]	0.020[c]	0.045[b]
P8	–	0.014[b]	–	–
P9	0.021[b]	–	0.006[b]	–
P12	0.006[c]	–	–	0.007[b]
P13	0.006[c]	0.001[b]	0.0004[c]	0.011[c]
P15	–	0.008[b]	–	0.046[b]
P18	0.042[b]	0.022[b]	0.048[b]	–
P20	0.001[b]	0.001[b]	0.001[b]	0.001[c]

[a]Average is directly proportional with educational status.
[b]Average is inversely proportional with educational status.
[c]Average is partially inverse proportional with educational status.

24 and 29 (18), 3.6% were between 30 and 35 (1), 10.6% were between 36 and 41 (3) and 3.6% were 42+(1) years of age. Regarding the education graduation status of participants, 57.1% had a bachelor's degree (16), 28.6% had a master's/doctoral degree (8) and 14.3% were scholar (4).

As shown in Table 12, the highest scored given for the three photographs were P4, P15 and P1. The three

photographs that have lowest scored in total were P18, P10 and P17, respectively. The highest scored photograph for *imageability* was P5 and for *historicity* parameters, was P4 and also for *coherence* and *stewardship* parameters, these were P4 and P15, respectively. When evaluating the parameters specifically, P10 for *coherence*, P11 for *imageability* and *stewardship*, P19 for *historicity*, these produced the lowest scores. The sub-dimensions, which caused the decreasing overall score for all photographs, were the density of spectacular built features (img3) and frequency of management (ste3) (Table 12).

In order to determine statistical differences among the gender, the educational status and the age range, the one-way ANOVA test was also conducted ($p < 0.05$) just as in public perception and the results were demonstrated in Tables 13 to 15. The tables reveal different valuable results. The results of *coh1*, *coh2* and *img3* show that the average score of the females is higher than that of males. That is, the females gave high points compared with males' score. Moreover, the results of *ste1*, *ste2* and *ste3* indicate that the average score of the male is higher than that of females (Table 13). On the other hand, there is a difference between educational status and coh1. Namely, as the educational status increases, the scores of *coh1* were of low values (Table 14). A direct or inverse proportional difference was not found between the age and the parameters which we determined as significant (Table 15).

As shown in Table 12, all photographs possess lower average values than the medians (12 scores). Furthermore, the agricultural and recreational places possess a lower score than the neglected and transportation places (Table 12). As for the ANOVA test, the educational status and age range factor are highly effective on *coh1* parameters only specifically (Tables 14 and 15). Additionally, the *historicity* parameter has the worst score among all the parameters although the study area is a historical region.

In order to support these results, the reliability analysis was also conducted just as for the public perception and the Cronbach alpha value was '0.75'. This result shows that the survey is reliable.

Table 5. ANOVA test of scores by different users of different age range.

	Well-kept	Exciting	Safety	Beautiful scenery
P2	–	–	–	0.031[b]
P4	0.016[b]	–	–	–
P9	–	0.011[a]	0.038[b]	–
P11	–	–	0.024[a]	–
P12	0.042[b]	–	0.016[b]	0.007[a]
P13	0.034[a]	0.002[a]	–	0.009[a]
P14	0.007[a]	0.041[a]	0.013[a]	0.010[b]
P15	0.031[a]	0.032[b]	–	–
P18	0.031[b]	0.013[b]	–	0.023[b]
P20	0.002[b]	0.001[a]	0.006[a]	0.011[a]
P23	–	–	–	0.043[a]

[a]Average is partially direct proportional with age.
[b]There is no apparent difference proportionally.

Investigation of highest and lowest three photographs according to experts' perceptions

Tables 16 to 21 show the photographs which obtained the highest and lowest three scores according to perceptions of experts.

Table 6. The photograph (P1) that has the highest score.



Spatial usage

This section, called International Peace Park, is used as a recreational activity area.

Statistical appearance

P1 obtained 15.29 score in total and gained the highest score for well-kept (4.24) and safety (3.74) parameters (Table 2). The significant value was not detected in regards to all the one-way ANOVA tests in public perception. Hence, the perception of users on this photo has a consensus upon P1 positively.

Table 7. The photograph (P4) that has the second highest score.



Spatial usage

The place, was used as a moat in the past, is used as an agricultural area today. Yellow blooming plants are *Brassica spp*.

Statistical appearance

P4 achieved 14.62 scores in total and obtained the highest score for beautiful scenery (3.97) and exciting (3.44) parameters (Table 2). The significant values were detected: exciting (0.049) by ANOVA test of user's gender (Table 3), well-kept (0.021) and exciting (0.026) by ANOVA test of user's educational status (Table 4) and lastly well-kept (0.016) by ANOVA test of user's age range (Table 5). Overall, users' perception of this photo did not have a consensus upon P4 completely.

Table 8. The photograph (P9) that has the third highest score.



Spatial usage

The place is used as a recreational activity area.

Statistical appearance

P9 gained 13.96 scores in total (Table 2). The significant values were detected according to the one-way ANOVA tests in public perception. The significant values were detected according to the one-way ANOVA test in public perception. These are exciting (0.008) and beautiful scenery (0.004) as shown in Table 3, well-kept (0.021) and safety (0.006) in Table 4 and lastly exciting (0.011) and safety (0.038) in Table 5. Overall, users' perceptions of this photo did not have an agreement on P9 in terms of all parameters entirely.

Table 9. The photograph (P11) that has the lowest score.



Spatial usage

This section is looked like a neglected space.

Statistical appearance

P11 achieved 6.38 score in total. In this case, it was the lowest scored photograph. Moreover, P11 was the worst score for every single parameter. The only significant value was safety (0.024) as given in Table 5. Users' perceptions of this photo have an agreement with P11 in all parameters negatively.

Table 10. The photograph (P3) that has the second lowest score.



Spatial usage

The place, which was used as a moat in the past, is used as an agricultural area today as in P4. However, the Land-wall is more neglected compared with P4.

Statistical appearance

P3 obtained 7.62 scores in total and was the second lowest scored photograph (Table 2). The significant values were detected at the gender test for each parameter. These are well-kept (0.049), exciting (0.001), safety (0.002) and beautiful scenery (0.0002). According to ANOVA test of users' gender (Table 3), public perception of this photo did not have an agreement with P3 completely.

Table 11. The photograph (P14) that has the third lowest score.



Spatial usage

Although P13 scored pretty well by users, P14 looks like a neglected place which is the other side of P13.

Statistical appearance

P14 gained 7.77 scores in total and was the third lowest scored photograph (Table 2). The significant values were determined by some of the tests. These are exciting (0.011) in Table 3 and well-kept (0.007), exciting (0.041), safety (0.013) and beautiful scenery (0.010) in Table 5. Users' perceptions of the photo did not have a consensus upon P14.

Comparative analysis

In the comparative analysis section, both overlapping and non-overlapping results and literature data were presented.

The mean of recreational places has a higher score than the other spatial types in the public and expert approaches. Similarly, the average of neglected places has produced a lower score than other spatial types in public and expert results. The plants were almost leafless when we took photographs from the area. Therefore, the scores of the photographs could be lower compared with their leafed period.

Although the photographs were investigated via two different questionnaires according to different parameters, the scores of photographs are generally lower than median points (12). Furthermore, although the study area is a historical place, the *historicity* gained low score on almost all photographs due to a lack of cultural elements and traditional land use.

The public perception does not have an agreement on all the parameters. There are some differences in the view of perception over the area (Tables 3 to 5). Contrary to this, the expert approaches have a consensus upon the *imageability*, *stewardship* and *historicity* parameters according to one-way ANOVA tests in terms of gender (Table 13), age range and educational status (Tables 14 and 15).

The public approaches show that the area, which has well-kept plants and Land-wall, possesses a high visual quality compared to without vegetation and neglected Land-wall. Accordingly, the *well-kept* parameter is pretty important for the visual quality of a landscape. Moreover, the *well-kept* parameter is directly

Table 12. Scores given by experts' on perceptions.

	Coh1	Coh2	Mean Coh.	Img1	Img2	Img3	Mean Img.	Ste1	Ste2	Ste3	Mean Ste.	His1	His2	Mean His.	Total Scores[a]
P1[*r*]	2.75	2.75	2.75	3.21	2.96	2.04	2.74	4.21	3.21	2.57	3.33	2.39	2.14	2.27	11.09
P2[*a*]	2.79	2.50	2.64	3.04	2.04	1.50	2.19	1.93	3.04	1.36	2.11	2.11	2.36	2.23	9.17
P3[*a*]	2.96	3.29	3.13	3.86	2.18	1.93	2.65	2.04	1.68	1.79	1.83	2.54	2.25	2.39	10.01
P4[*a*]	3.43	3.68	3.55	4.18	2.75	2.39	3.11	2.68	3.57	1.75	2.67	2.75	2.46	2.61	11.93
P5[*t*]	2.50	2.89	2.70	4.07	3.46	2.32	3.29	1.54	3.68	2.25	2.49	2.82	1.96	2.39	10.86
P6[*t*]	2.61	2.79	2.70	3.29	3.00	2.04	2.77	3.75	2.71	1.82	2.76	2.64	2.29	2.46	10.70
P7[*n*]	2.36	2.96	2.66	2.89	2.14	1.71	2.25	3.46	2.18	1.68	2.44	2.11	1.96	2.04	9.39
P8[*t*]	2.54	2.71	2.63	3.79	2.96	2.25	3.00	2.71	3.50	2.25	2.82	2.50	2.36	2.43	10.87
P9[*r*]	2.89	2.75	2.82	3.29	2.32	1.79	2.46	2.61	3.50	1.75	2.62	2.11	2.04	2.07	9.98
P10[*r*]	1.57	1.79	1.68	2.46	2.36	1.57	2.13	2.25	2.68	1.71	2.21	2.25	2.11	2.18	8.20
P11[*n*]	4.25	2.39	3.32	2.71	1.61	1.61	1.98	1.39	1.61	1.32	1.44	1.96	2.29	2.13	8.86
P12[*t, r*]	2.21	2.61	2.41	3.00	2.11	1.79	2.30	1.75	2.04	1.71	1.83	1.93	1.93	1.93	8.47
P13[*t, r*]	2.57	3.00	2.79	3.21	2.96	2.36	2.85	3.21	3.36	2.43	3.00	2.54	1.96	2.25	10.88
P14[*n*]	3.39	2.04	2.71	3.11	2.11	1.71	2.31	1.29	2.21	1.25	1.58	1.96	1.96	1.96	8.57
P15[*t*]	2.25	3.11	2.68	3.46	2.82	2.29	2.86	3.57	3.71	2.96	3.42	2.46	1.93	2.20	11.15
P16[*t*]	2.18	3.00	2.59	3.18	2.39	1.96	2.51	2.68	2.29	2.61	2.52	2.46	1.93	2.20	9.82
P17[*t*]	2.39	2.43	2.41	2.96	2.18	1.82	2.32	1.25	1.46	2.14	1.62	2.00	1.86	1.93	8.28
P18[*t*]	1.68	2.11	1.89	2.79	2.39	1.61	2.26	[b]	2.18	2.07	2.13	1.93	1.64	1.79	8.07
P19[*t*]	3.00	1.82	2.41	3.61	2.39	2.00	2.67	2.00	2.00	1.29	1.76	1.71	1.71	1.71	8.55
P20[*r*]	2.96	2.46	2.71	2.86	2.00	1.86	2.24	2.29	2.39	1.54	2.07	1.93	2.11	2.02	9.04
P21[*t*]	2.93	2.57	2.75	3.18	2.54	1.96	2.56	1.82	3.11	2.18	2.37	2.11	1.96	2.04	9.71
P22[*r*]	3.00	2.39	2.70	3.21	3.36	1.93	2.83	3.79	3.36	1.82	2.99	1.96	2.18	2.07	10.59
P23[*t*]	2.89	3.29	3.09	3.14	3.00	2.11	2.75	2.32	2.50	2.25	2.36	2.50	2.61	2.55	10.75
P24[*r*]	3.68	2.68	3.18	3.36	2.11	2.14	2.54	2.18	2.36	1.54	2.02	2.29	2.64	2.46	10.20
Average	2.74	2.67	2.70	3.24	2.51	1.95	2.57	2.36	2.68	1.92	2.35	2.25	2.11	2.18	9.80

[*a*]: agricultural; [*t*]: transportation; [*r*]: recreational; [*n*]: neglected.
[a]Each photograph can take min. 4, max. 20 points.
[b]This parameter was not included in P18 due to absence of vegetation.

Table 13. ANOVA test of expert's gender.

	Coh1	Coh2	Img1	Img2	Img3	Ste1	Ste2	Ste3	His1	His2
P2	–	–	–	–	–	0.043[a]	–	–	–	–
P3	–	0.023[b]	–	–	–	–	–	–	–	–
P10	–	–	0.041[b]	–	–	–	–	0.036[a]	–	–
P14	0.020[b]	–	–	–	–	–	–	–	–	–
P21	–	–	–	–	–	0.037[a]	–	0.028[a]	–	–
P24	–	–	–	–	–	–	0.039[a]	–	–	–

[a]Average of female score < average of male score.
[b]Average of male score < average of female score.

proportional to the other parameters. That is, as the *well-kept* score increases, the score of the other parameters improves. This finding is also supported by studies conducted by Aytaç and Uzun[43]; Çakcı and Çelem.[44] The photographs, which are found unexciting, gained low score broadly. The finding is consistent with the study by Surat.[2] In addition, there is a similar relationship between the *safety* and the *beautiful scenery* parameters. That is, both of them show directly proportional values (Tables 3 to 5). The result is supported by Müderrisoğlu and Demir.[45]

To determine a preferring location, the *historicity* and the *coherence* parameters are known to be important. In the expert approaches, the *historicity* and the *coherence* parameters have had a low average score in total. In this case, the Land-wall of Istanbul possesses weak preferability according to scores of photographs and this finding is supported by Alpak et al.[46]

Table 14. ANOVA test of expert's educational status.

	Coh1	Coh2	Img1	Img2	Img3	Ste1	Ste2	Ste3	His1	His2
P3	0.012[c]	–	–	–	–	–	–	–	–	–
P4	0.037[c]	–	–	–	–	–	–	–	–	–
P9	–	–	–	–	–	0.040[a]	–	–	–	–
P11	0.013[b]	–	–	–	–	–	–	–	–	–
P17	0.039[b]	–	–	–	–	–	–	–	–	–
P19	0.019[b]	–	–	–	–	–	–	–	–	–
P24	0.014[b]	–	–	–	–	–	–	–	–	–

[a]Average is directly proportional with educational status.
[b]Average is inversely proportional with educational status.
[c]There is no apparent difference proportionally.

Table 15. ANOVA test of expert's age range.

	Coh1	Coh2	Img1	Img2	Img3	Ste1	Ste2	Ste3	His1	His2
P1	–	–	–	–	–	0.042[c]	–	–	–	–
P3	–	0.014[c]		–	–	–	–	–	–	–
P4	0.022[c]	–	–	–	–	–	–	–	–	–
P7	–	–	0.038[c]	–	–	–	–	–	–	–
P9	–	–	–	–	–	0.008[c]	–	–	–	–
P10	–	–	–	–	–	0.010[c]	–	–	–	–
P11	0.000[c]	–	–	–	–	–	–	–	–	–
P14	0.030[a]	–	–	–	–	–	–	–		0.022[c]
P15	–	0.045[c]	–	–	–	–	–	–	–	–
P16	–	–	–	–	–	–	0.019[b]	–		–
P17	0.030[c]	–	–	–	–	–	–	–	–	–
P24	0.002[a]	–	–	–	–	–	–	–	0.019[c]	–

[a]Average is inversely proportional with age.
[b]Average is partially direct proportional with age.
[c]There is no apparent difference.

Table 16. The photograph (P4) that has the highest score.



Spatial usage

The place, used as a moat in the past, is being used as an agricultural area today. The Plants, seen yellow, are *Brassica spp.*

Statistical appearance

P4 obtained 11.93 scores in total and gained the highest score for the *coherence* (3.55) and *historicity* (2.61) parameters (Table 12). The significant values were determined according to the one-way ANOVA tests of experts' perceptions. These are coh1 (0.037) at ANOVA test of user's educational status (Table 14), and coh1 (0.022) at ANOVA test of the user's age range (Table 15). Experts' perceptions have an agreement on P4 for almost all parameters without *coherence* (especially coh1).

Table 17. The photograph (P15) that has the second highest score.



Spatial usage
The area called Topkapı is used as a transportation route generally.
Statistical appearance
P15 achieved 11.15 score totally and obtained the highest score for the *stewardship* (3.42) parameters (Table 12). The significant value was detected according to the one-way ANOVA tests of expert perception. It is coh2 (0.045) at ANOVA test of the user's age range (Table 15). Overall, experts' perceptions have a consensus upon P15 for almost all parameters without *coherence* (especially coh2).

Table 18. The photograph (P1) that has the third highest score.



Spatial usage
The area is called International Peace Park and is used as a recreational activity area.
Statistical appearance
P1 gained 11.09 score totally (Table 12). The significant value was gained according to the one-way ANOVA tests of expert perception. It is ste1 (0.042) in ANOVA test of the user's age range (Table 15). Experts' perceptions have a positive consensus on P1 except for a sub-dimension (ste1).

Table 19. The photograph (P18) that has the lowest score.



Spatial usage
The area is used as a street and for vehicles parking.
Statistical appearance
P18 achieved 8.07 score in total and was the lowest scored photograph. Furthermore, It gained the lowest score for some of the subdimensions. These are his1 (1.93) and his2 (1.64) (Table 12). The significant value was not determined. Experts' perceptions have an agreement over P18 negatively.

Table 20. The photograph (P10) that has the second lowest score.



Spatial usage

The area is used as a playground. However, materials of the playground are not suitable for the historical area. It should have been preferred as wooden.

Statistical appearance

P10 acquired 8.20 score in total and was the second lowest score photograph. Additionally, the lowest scores were determined for some of the sub-dimensions. These are coh1 (1.57), coh2 (1.79) and img1 (2.46) (Table 12). As for the parameters *coherence* (1.68) and *imageability* (2.13), both achieved the lowest scores. The significant values were determined at gender (Table 13) and age range (Table 15) tests. These are img1 (0.041) and ste3 (0.036) for gender, ste1 (0.010) for age range test. Experts' perceptions have an agreement upon P10.

Table 21. The photograph (P17) that has the third lowest score.



Spatial usage

This part is used as a street.

Statistical appearance

P17 gained 8.28 score totally and was the third lowest scored photograph. Moreover, the lowest scores were determined for some of the sub-dimensions. These are ste1 (1.25) and ste2 (1.46) (Table 12). The significant values were detected. These are coh1 (0.039) for ANOVA test of educational status (Table 14) and coh1 (0.030) for ANOVA test of the age range (Table 15). Hence, experts' perceptions have a negative consensus upon P17 generally.

Lynch[47] claimed that an area, which has high imageability, gives confidence. Based on the detection of Lynch, the results of this study support his opinion according to Tables 2 and 12.

Historical places need proper construction materials for the harmony of the environment. The photographs of P9 and P10 were taken on the same area; however, P10 took a lower score compared to P9 due to the wrong construction material of the playground (Table 20). Consequently, the material which is not suitable for a historical place affects visual quality negatively. This situation shows that the *stewardship* of the area does not have adequate quality.

From the analysis results of this study, we thought that the quality of the Land-wall of Istanbul is weak owing to the unsuitable material usage and inadequate maintenance level.

Conclusions and suggestions

Visual impact assessment studies can be used as a guideline in order to make decisions on the design, planning and applications. The environment has uncountable spatial types. The visual perspective of an environment is important to discover landscape characters, property and potential.

To expand the visual impact assessment study on the Land-wall of Istanbul, different studies – which were carried out using the night, panoramic and drone photos – may be added over this study. Also, determining the correlational relationship among the spatial types could contribute to improving the quality of the area. Thereby, Istanbul Land-wall may be investigated in detail in terms of the visual impact assessment.

Both public and expert results show that visual quality of Land-wall of Istanbul is lower than median point (12). In conclusion, the study performed shows the visual quality of Istanbul Land-wall is weak and needs to be improved by proper methods immediately.

Authors' contribution

HO and HM designed the study and developed the methodology. HO collected the secondary data and performed the analysis. HM and SU contributed to the theoretical framing of the paper and interpretation of data. HO, HM and SU jointly produced the manuscript text, and HO and SU performed later manuscript revisions.

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ORCID iD

Hüseyin Ögçe https://orcid.org/0000-0001-9051-4272

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