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ANTROPOMETRIC ANALYSIS OF ATATÜRK UNIVERSITY CAMPUS

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Anthropometry
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Abstract

Anthropometry is an important parameter that should always be considered in the architecture and landscape architecture professions, helping designers determine the bare minimum space required to accommodate the human body when performing outdoor/indoor related activities. Anthropometric analogies focus on the human body and its relationship to the design goal. Within the scope of the study, the concept of anthropometry was explained in the literature, and the relationship between Landscape Architecture and Anthropometry and anthropometric standards were examined. Atatürk University campus was chosen as the research area, and current applications were investigated in line with anthropometric data. The evaluation of landscape construction elements regarding anthropometric standards has been examined under two headings. These; consist of 1. Floor elements (Stairs, Ramps, Roads, Sidewalks, Flooring elements), 2. Equipment Elements (Lighting elements, Trash cans, Seating elements, Sign boards, limiters, and Vegetative elements). In this study, the ergonomic and anthropometric correct and incorrect applications of landscape equipments in the example of Atatürk University Campus were revealed, and suggestions were made on correcting the inaccurate and incomplete applications.

ATATÜRK ÜNİVERSİTESİ KAMPÜSÜNÜN ANTROPOMETRİK ANALİZİ

Anahtar Kelimeler

Antropometri
Atatürk Üniversitesi
Ergonomi
Kampüs
Peyzaj mimarlığı

Öz

Antropometri, mimarlık ve peyzaj mimarlığı mesleklerinde her zaman göz önünde bulundurulması gereken önemli bir parametre olup tasarımcıların, dış / iç mekanla ilgili faaliyetler gerçekleştirirken insan vücudunu yerleştirmek için gerekli temel minimum alanı belirlemesine yardımcı olur. Antropometrik analojiler, insan vücuduna ve tasarım hedefiyle olan ilişkisine odaklanır. Çalışma kapsamında, antropometri kavramı literatürlerle açıklanarak, Peyzaj Mimarlığı-Antropometri ilişkisi ve antropometrik standartlar irdelenmiştir. Araştırma alanı olarak Atatürk Üniversitesi yerleşkesi seçilmiş, antropometrik veriler doğrultusunda mevcut uygulamalar araştırılmıştır. Peyzaj konstrüksiyon elemanlarının antropometrik standartlar bakımdan değerlendirilmesi 2 başlık altında incelenmiştir. Bunlar; 1. Zemin elemanları (Merdivenler, Rampalar, Yollar, Kaldırımlar, Döşeme elemanları), 2. Donatı birimleri (Aydınlatma elemanları, Çöp kutuları, Oturma elemanları, İşaret levhaları, Sınırlandırıcı ve Bitkisel elemanlar) oluşmaktadır. Yapılan bu çalışmada Atatürk Üniversitesi Kampus örneğinde peyzaj donatı elemanlarının ergonomik ve antropometrik açıdan doğru ve yanlış uygulamaları ortaya konmuş, yapılan yanlış ve eksik uygulamaların ne şekilde düzeltilebileceği için önerilerde bulunulmuştur.

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1. Introduction

Anthropometry is a research-based concept that examines human body measurement units, body movement and frequencies, and individual physical characteristics within the ergonomic science scope (Taşdemir et al., 2011).

Anthropometry: It was formed by combining the words Anthropos and metrics (human - measure). In standard words, it is a technique that divides the objective qualities of the human body into headings according to certain measurement principles and tools, length, and structure (Ankara University Open Textbooks, 2019).

In the planning of activity areas, designs should be made according to human body measurements. Since humans cannot be redesigned, areas and equipment units suitable for human body measurements should be planned, where the branch of science that we call "anthropometry," the main component of which is "human," comes to the fore (Gülgün and Türkyılmaz, 2001; Şişman and Gültürk, 2016).

According to Güleç (2006), individuals exhibit biological differences. Therefore, it is essential for the landscape architecture profession to design and apply suitable areas and equipment for individuals. The common point of the science of anthropometry, which aims to use in designs that will be created by determining the body measurements of human beings, and landscape architecture is human. Landscape architecture and Anthropometry science should cooperate between disciplines in the creation of areas compatible with the environment for people, and ergonomic, aesthetic, functional and functional designs should be provided by making use of anthropometric measurements and uses appropriate for the area and purpose to be created (Akpınar, 2018; Akpınar, 2018a).

If the tasks of landscape architecture and ergonomics science, the main component of which is human, are examined, Ergonomics; determines the basic rules and design principles for the highest efficiency by minimizing the wear and error margin of the human, regulating the harmony in the human-machine-work working environment. On the other hand, landscape architecture designs spaces where the individual will meet the activities and needs in the light of anthropometric information (Yörük et al., 2006).

However, within the scope of an introductory time in people's living spaces, only with the regulations brought about work and housing, organizations in the common spaces and usage areas of the cities (urban equipment units; sidewalks, ramps, seating units, lighting units, garbage cans, and containers) Ergonomic designs (such as information and sign boards, artistic items, fountains) are in a critical position in terms of improving the quality of life of the city user and making the cities a more livable place, making the users happy, comfortable and meeting all their needs (Tunay et al. ., 2005).

Our country's first comprehensive anthropometric research was carried out in 1937 at the request of Atatürk. A second study, from 1960, was conducted nationwide on women between 20 and 40. Following the following years, more regional studies were carried out (Güleç, 2006).

Anthropometric measures differ according to the nation, region, gender, age, body composition, nutrition, physical activity, and even economic and social status.

The fitness of activity areas and vehicles should generally be used to use measures derived from using the average, as they show when compared to human body sizes when measured with. According to the planned activity and purpose of use, more people should consider knee, hip, eye, and elbow heights, hand-foot length, and stretching beautiful eye features. It is especially or the most influential factor in collective leisure activities. Therefore, hand related handles, handles, the size of the sections, the form and surface areas, and the body of the building should be used by the human hand (Kartay and Korkut, 2009).

In addition, the height and backrest of the seating items should follow the standard dimensions and forms of the human body, especially the garbage items in children's playgrounds, for example, should be designed and accessible for children. (Doğan and Altan 2007).

Having a visual, morphological, physical, sensory, and psychological standard of ergonomic measures in a space makes it possible to transform that space into a living space. Harmony with living and non-living equipment and social, cultural, and natural resources is one of the main goals of landscape architecture studies. Another goal is to maintain these spaces in places where people will find all their needs met. The main goal at the intersection of these impressive ergonomics and landscape architecture concepts is to plan environmental designs compatible with people and people. Based on the consumption design intended to be used, these roads should reflect the urban areas and be designed in a way that is compatible with the environment, authentic, safe, and ergonomic (Gülgün & Türkyılmaz, 2001).

Outdoor spaces designed for the benefit of people according to all kinds of occupations and age groups against individual life are common areas where users continue their lives collectively. A different definition is outdoor units used for shared benefits and uses with documents (Kahraman, 1998).

In this context, starting from the idea of creating spaces that are in harmony with the user in the city, some structural exterior design elements and plant elements in the campus of Atatürk University in Erzurum were examined in terms of their functional aspects and their anthropometric compatibility degrees. The right and wrong practices were emphasized, and suggestions were made on improving these wrong area management.

3. Material and Method

This study focuses on the Atatürk University campus in the city of Erzurum. This campus is located west of the city centre and covers an area of 8,000,000 m2 (Figure 1). The settlement plan of Atatürk University was designed and implemented in 1958 by a team using a vital-based management approach (Kuzulugil et al., 2022).

The campus can be entered from three different points. The main entrance is the gate from the city centre of Erzurum, located about 500m away and marked by the eagle statue. The second entrance is the gate leading to the Faculty of Agriculture from the University Grove area on the Erzurum-Erzincan highway. It is located to the south of the campus. The third and last entrance is from the north of the campus, at the intersection of the Erzurum-Bingöl Highway and the Credit Dormitory Institution. Entrance to the campus is via controlled and card-based automatic barrier systems. There are 22 faculties and eight institutes on the campus. In addition, there are various structures such as administrative buildings, accommodation units, libraries, study halls, gyms, dormitories and student centre buildings. Campus planning is student-centred. The speed limit within the campus is limited to 30 km, and transportation is provided by various methods such as ring services, public transportation, individual vehicle use and pedestrian paths (Yılmaz, 2003; Kılıç, 2019; Kuzulugil et al., 2022).

On-site observations were made regarding the use of frequently used equipment in different areas of the campus, measurements were taken of the equipment elements, and photo archives were created. By comparing the measurements with literature information, the suitability of landscape equipments for ergonomic design was investigated together with anthropometric images. In the study area, the landscape equipments classified by Yıldızcı (2001) include flooring (concrete, stone, wood, asphalt, brick, etc.), reinforcing elements (seating units, benches, chairs, group seating elements), lighting elements (street lighting, area lighting), signs and information boards (routers, locators, information communication boards), other elements (litter bins, flower beds, bicycle parking areas, square clocks, plant elements, flagpoles, etc.), and boundary elements (boundary markers, deterrents, etc.). barriers, traffic barriers) were observed and measured. Correct and incorrect use was investigated using analysis and evaluation methods according to appropriate standards (Aksu, 2012).

In this study, a comprehensive observation-analysis-synthesis method was used to approach the landscape equipments on the Atatürk University campus from an ergonomic and anthropometric perspective. Current practices based on anthropometric data were examined in detail, and landscape equipments were carefully evaluated in terms of anthropometric standards. As a result of this analysis, correct and incorrect applications of landscape equipments on the Atatürk University campus were identified in terms of ergonomics and anthropometry, and valuable suggestions were made to eliminate these errors.

4. Findings

As a result of the observations and examinations carried out in Erzurum Atatürk University Campus, which covers the research area, the findings obtained regarding compliance with ergonomic and anthropometric measures are evaluated in detail below.

4.1. Floor Elements

Floor coverings, an essential feature in determining a central settlement, are the fundamental element of the landscape design model and form the floor of the three-dimensional space. The condensation feature is the operation of integrity and the harmony of the design with the space/city. The main factors that make up the selection of floor coverings used in horticultural design studies are the usage function, traffic, cost, climate, safety, durability, and local conditions (Başal et al., 1997; Güzel & Sözen, 2003). Floor coverings; They should be anti-slip, non-glare, have a forward-looking texture evaluation, and aesthetically support the area.

The road surface is often bombarded to cause road damage. Like impressing, camber is a slight elevation of the road surface relative to the pavement edges to orient the pavements. For this purpose, 1% of concrete roads, 2% of asphalt roads, and a minimum of 3% of roads with unbound aggregate or leveling value are used as camber slopes. Sometimes the road surface is also sloped on one side. City park paths are usually made with curbs and wall or edge grooves. The minimum slope of these gutters is less than 0.5% lift (Seçkin, 1997). The water on the surface can be easily removed from the area if these specifications are followed. However, at some points of the working view, since the subfloor is not sufficiently strong, it causes the floors to collapse and pond after the rain.

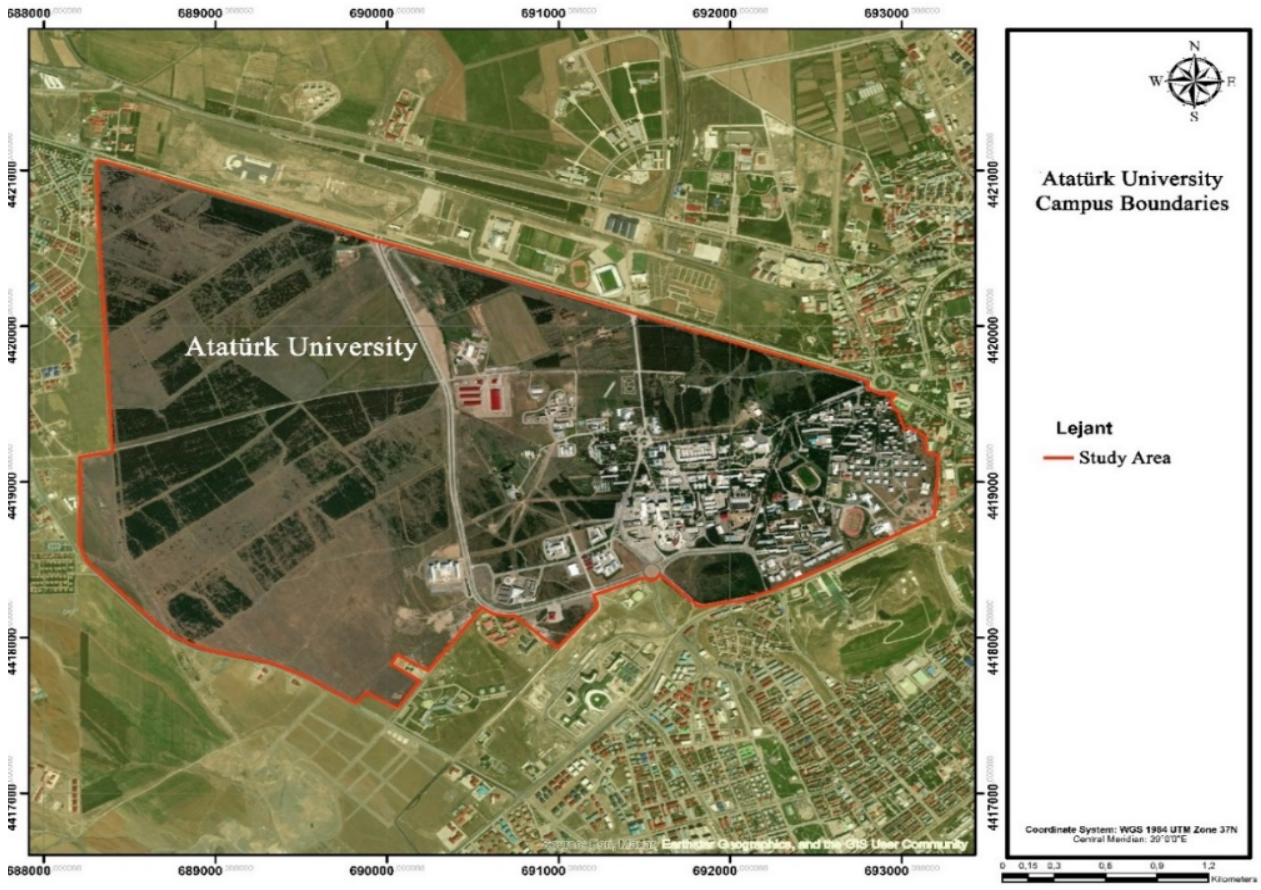

Figure 1. Study Area (Atatürk University Campus)

Pedestrian paths, bicycle-running paths, sidewalks, ramps, and steps were examined as ground elements within the scope of the research. Therefore, unlike the standard criteria throughout the research area, floor elements are unsuitable for safe and comfortable people's use. According to Turkish Standards Institution (TSE) (1990b), the upper level of the curbstone on the pedestrian pavement should be at a height of at most 0.15 m from the vehicle road pavement. The level of the old road pavement should be maintained in the repair or renewal of the pavement to be made on the vehicle road.

Figure 2. Vehicle Road-Asphalt (a), Pedestrian Crossing-Concrete Slab (b,d), Pavement-Concrete Slab (c), and Curb-Concrete (e)

According to the classification made within the scope of the floor coverings on the campus, It was determined that asphalt (Figure 2a) was used on vehicle roads, concrete slab stone (Figure 2b, d) was used in pedestrian crossings, concrete slab stone (Figure 2c) was used on pavements and concrete (Figure 2e) use on curbs. Especially the floor coverings on the pavements have lost their aesthetic and functional properties by breaking in some places due to mistakes in the construction phase and the inadequacy of the post-construction maintenance and repair works (Figure 2c). Floor coverings suitable for climatic conditions are used. However, the cracks and swellings on the ground can force the

users during walking and create situations that may cause injuries to the pedestrian.

Collapses and slips caused by defects in the quality of this material limit and complicate its use (Figure 2). Likewise, due to the lack of proper slope and artistry errors, puddles occur in places, especially after the rain. However, since the floors are not correctly adhered to the ground, water gets under them, and the water splashes out from under the coverings, which become mobile and flexible during walking, disturbing the user.

Figure 3. Pedestrian Crossing-Andesite (a,b,c), Sidewalk-Andesite (d)

The curb height is vital in terms of being a measure of the sociocultural development level of a country. The width of the pedestrian paths in Figure 3a, c is 310 cm and is suitable for standard dimensions. The 1-meter-wide pavement seen in (Figure 3d) does not comply with anthropometric standards. QOn the other hand, a border with a height of 16 cm is suitable for the standard size of 12-15 cm.

4.1.1. Bike Path

The bicycle path seen in (Figure 4) is an example suitable for anthropometric measurements (170 cm for a single bicycle) in terms of width (196 cm). The width of the bicycle path that separates from the walking track in (Figure 4c) is 235 cm, which complies with the standards required for using two bicycles (213-243 cm). However, there is no elevation difference (10 cm) between the track and the vehicle road, so barriers have been placed to prevent vehicles from entering the bicycle path. This causes a bad image.

Even though this track can be easily perceived with the different flooring colors, it is unsuitable for ergonomic features because it is not separated from the walking track by lines of different colors, and some traffic signs and signs are positioned on the bike path.

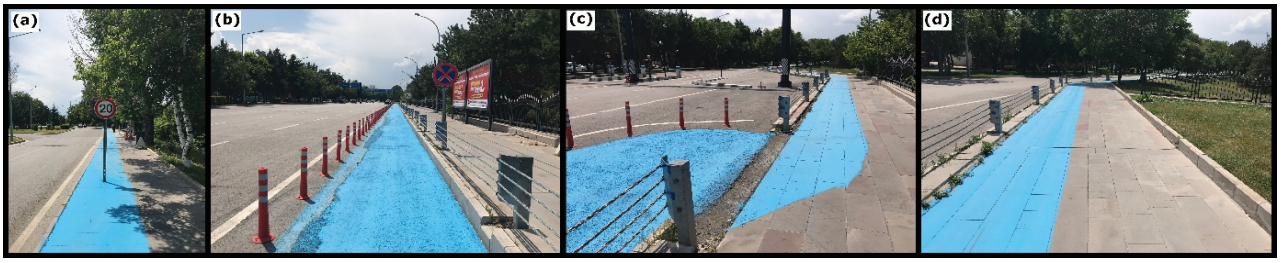

Figure 4. The Bicycle Path in Atatürk University

4.1.2. Stairs and Ramps

The stairs used to connect the floors of two different heights and to provide the transition between the levels should be safe and comfortable. In order for the stairs to carry these features, some Measurements must be used appropriately and correctly. Stair widths are 60–100 cm for one person, 120 cm for two people, and 160 cm for three people (Neufert, 1978).

Figure 5. Stairs-marble Stone (a), Stairs-Andesite Stone (b,c,d), Stairs-Concrete (e)

The steps and dimensions used in the research area are of appropriate quality and do not disrupt pedestrian circulation. However, errors were also observed in some of the ramps' lower and upper connection points. This situation disrupts the landing and exit movements of children and disabled cars. In Figure 5a, marble was used as the material selection for the stairs of the School of Foreign Languages building entrance. This situation allows slipping and risk of injury in cold climatic conditions. Figure 5b is a standard ladder for one person in the illustration. However, the groups on the floor have a bad appearance and are in places far from visuality.

In the staircase in Figure 5c, 214-271 cm dimensions are left with landings in places, the pier load is 14 cm on the first step, and this height rises between 11-13 cm on the other steps. The rises at each step make it difficult for people to go up and down, causing stumbling and creating the danger of falling.

While the standard measurements for step width and riser height should be 29-30 cm and 16 cm, Figure 5d shows a step width of 27 cm and a riser height of 8 cm. Therefore, it is not suitable for human ergonomics. In Figure 5e, on the other hand, collapses have been observed due to construction errors during the construction phase.

The comfort of the staircase is dependent on the numerical difference between the step width and the riser height. If this difference is too large or too small, ascents and descents become tiring. Research studies have concluded that this difference should be 12 cm in the ideal slope relationship.

Figure 6. Ramps in Atatürk University

Ramps are primarily designed for vehicles and minor modes of transportation (such as wheelchairs, strollers, bicycles, etc.) (Başal et al., 1997). For outdoor ramps, the maximum slope should not exceed 20%. Walking becomes problematic when the ramp slope exceeds 15%. In such cases, platforms should be constructed regularly (Uzun, 2000). Ramp-floor junctions should be rounded, and abrupt and sharp corners should be avoided as they can cause pedestrians to stumble and vehicles to shake. The slope of the ramp should be compatible with the natural slope of the area. Slippery materials should not be used when the surface is wet, and ramps should be adequately illuminated for safety purposes during dark hours (Başal et al., 1997).

The ramps to be built on the curb should be inclined in 3 directions. In places where a 3-way sloped ramp cannot be built due to vegetation on the pavement, a one-way sloped ramp should be constructed as in (Figure 6a, d, e). The slope of the ramp seen in (Figure 6a) is 21.33%, and the point where it meets the pavement is sharp, so it needs to be more ergonomic. The ramp (Figure 6b) is inclined in one direction due to the vegetation on the pavement, and the width of the ramps to be built on the sidewalks with a slope of 17.05% is min. It complies with the rule that it should be 120 cm. In (Figure 6c), the slope of the ramp is 4.39%, which is below the standard (Min. 5%). The images (Figure 6d,e) have a ramp slope of 18.11% and 18.66%, respectively, and are suitable examples for anthropometric measurements.

4.2. Landscape Equipments

These elements are essential because they provide people with areas of use that are compatible with their surroundings, the scale of the city parallels the human scale, and they add visual richness to the cities. The research examined stops, billboards, sign-direction signs, lighting elements, seating elements, pergolas, garbage cans, and plant boxes starting from the landscape equipments. In the research area, the landscape equipments that is not as suitable as it is suitable for the standards has been determined.

4.2.1. Seating Units

Landscape architecture is the constructive elements used for resting their tired physical structures and people's comfort in the outdoor design order (Uzun, 2000). Seating elements should look ergonomic, comfortable, and inviting. In addition to being suitable, the building should have qualities that can support its compatibility with the landscape and the characteristics of the ground on which it is placed (Yurtdaş, 1994). According to Turkish Standards Institution (TSE) equipment, the seat structure of the seating elements is a minimum of 40 cm and a maximum of 48 cm (Turkish Standards Institution (TSE), 1990a), and according to Neufert (2000), it is a minimum of 37.5 cm and a maximum of 40 cm. Seating should be at least 115 cm for two-person

benches (Turkish Standards Institution (TSE), 1990a).

Four different seating elements were used in the study area. The heights of the seating units are generally suitable for Turkish Standards Institution (TSE) standards and ergonomic use (Figure 7). The benches used are modern in landscape, seating units with wood-concrete construction, sufficient in number, comfortable in terms of ergonomic dimensions, and resistant to Erzurum climatic conditions.

Figure 7. Seating Groups in Atatürk University Campus

Top cover elements made of wooden material were used in the area. The top cover elements are functional as they create a sheltered area in sunny and rainy weather (Figure 8).

The pergola examples (a, b, c, d) in Figure 8 are 250 cm tall and comply with anthropometric measurements (250-300 cm). In the example of the arbor given in Figure 8e, the height is 257 cm, which is by the anthropometric value.

Figure 8. Top Cover Elements in Atatürk University Building

4.2.2. Lighting Elements

They are elements generally used for aesthetics and protection to provide night use and visual perception of urban spaces (Şişman & Yetim, 2004). Many lighting standards are determined by predicting the height of an adult's eye when standing. The head rescue height, which is the height measurement for the lighting elements, is 220 cm. In addition, while the lighting elements are positioned together with the plant elements, the lighting-blocking properties of the plant should be minimized. They should not be positioned close to the stem of the plants.

The primary purpose of outdoor lighting is to produce lighting that reveals outdoor elements' function, form, and texture. While choosing the lighting elements, the durability of the luminaires according to the weather conditions, the durability, and the color, etc., and the lighting technique. (Bulut et al., 2008; Karayılmazlar, 2017). The primary purpose of outdoor lighting is to provide lighting that reveals outdoor elements' function, form, and texture. While choosing the lighting elements, the durability of the luminaires according to the weather conditions, the durability and the color, etc., and the lighting technique. Such as physical properties should be considered (Bulut et al., 2008; Karayılmazlar, 2017).

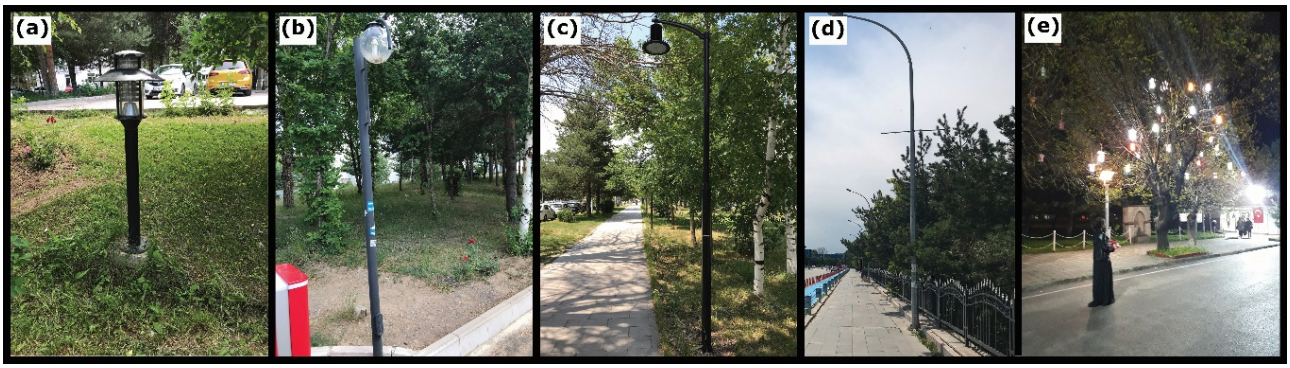

Figure 9. Tree Lighting (e) with Single Lighting Elements (a, b, c, d) in Atatürk University Campus

Lighting elements can be met, such as durable concrete, glass, sheet metal, aluminum, and galvanized steel that can adapt to the place and climatic conditions they are in. As a result of the research, adapting to these features of the lighting elements in the research area, especially the high lighting elements with aluminum material used in flight lighting, can bring the usage and ergonomic conditions to a sufficient level. Although the medium-weight lighting elements in the research area are suitable in various personnel places, they are either absent in some parts or placed and out of use. The lighting elements in (Figure 9a,c) were suitable for aesthetics, function, and ergonomics. Still exist as objects. On the other hand, the tree lighting used in the area provides a pleasant and beautiful appearance (Figure 9e). Apart from these, no lighting other than high-weight street lighting was used inside the passenger.

4.2.3. Bus stops

Buses, one of the public vehicles people use for transportation, are stopping places made to wait comfortably apart from vehicle traffic. The points to be considered at the design stage are ease of construction, conformity with aesthetic values, environmental harmony, suitability for purpose, securing people, and protecting against environmental conditions.

Figure 10. Stops Within the Atatürk University Campus

In the research center, the stops are positioned as fixed type with aluminum+PVC construction. They provide the 600cm stop distance rule (Uzun, 1997; Kuşkun, 2002). Since they are designed as transparent in terms of their structural features, they provide a wide viewing angle. The fixed seating benches inside allow sitting and waiting. They are also planned as multi-purpose with billboards inside. Due to their three-sided closed design and dark-colored transparent roof, they effectively protect both from the sun's effect and wind and rain.

In the example of the seating unit of the bus stops in Figure 10, the height of the seating unit is 39 cm and is of appropriate size (37.82 cm-40 cm), but the depth of 45 cm is above the anthropometric standards (38.70-43.36 cm.). This depth prevents the user from sitting comfortably. The distance between the stop and the roadway is minimal (Figure 10b). Therefore, the movement of pedestrians is restricted. This situation is not particularly suitable for this place with heavy foot traffic.

4.2.4. Signs and information plates

They are the elements that transmit essential information in finding the way, prohibitions, providing control, and increasing the visual quality. They should be designed for their intended use and be perceptible. These elements help protect the environment, use their purpose, and protect society (Özaydın et al., 1991). They should be surrounded so that they can be seen to be sufficient, do not create a dangerous position for pedestrians and vehicles, and should not prevent human movements in terms of height and location (Yörük et al., 2006). Their height should be in the range of 210-250 cm.

Signs and information signs are generally used on sidewalks and bicycle path routes; many are human-sized, placed in a way that limits pedestrian passage and vision, and are far from ergonomic. In addition, some of the signs are placed far from the pedestrian path, generally do not obstruct the vision of the vehicles, do not affect the traffic on the medians or the roadsides, not to limit the view and other uses.

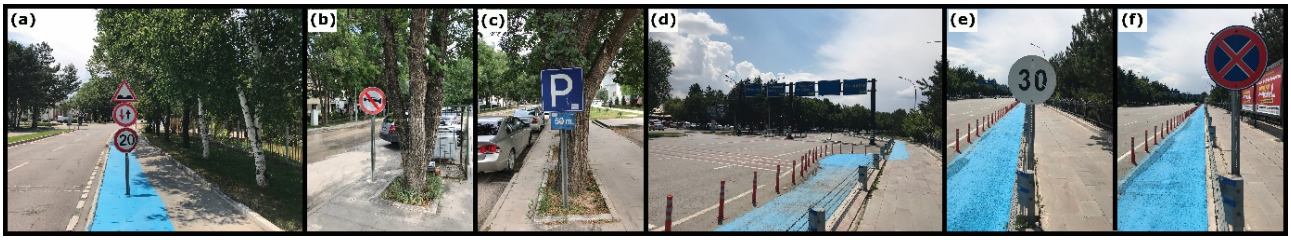

Figure 11. Traffic Signs (a, b, c, e, f), Direction Sign/Locator (d) in Atatürk University Campus

Signs and information signs, directional signs (Figure 11d), (Figure 12b,d), traffic signs (Figure 11a,b,c,e,f), and advertising boards (Figure 12a,c,e) on the Atatürk University trip was accommodated. Guidance signs and billboards are generally good, with heavy paint in the area. Some boards need maintenance.

As a result of the observations and analyses, it was observed that the signs and information signs were made in standard sizes specified in the regulation. However, it was in a situation that could pose a danger to pedestrians and cyclists, as seen in Figure 11a. It is essential to position them so that people will not be disturbed.

Figure 12. Direction Sign/Locator (b, d) and Advertising Boards (a, e) in Atatürk University Campus

4.2.5. Trash Cans

Garbage pieces for more functional purposes can be designed with other landscape equipments. It should be positioned to be directly removed using outdoor use units that do not contain garbage and pedestrian circulation. It should be mounted at least 40 cm long, at least 90 cm, and at most 120 cm above the curbstone along the pedestrian pavement to prevent the movement of garbage to or lift (Turkish Standarts Institution (TSE), 1999).

The garbage cans at Atatürk University are of different types and are used without a lid (Figure 13). Therefore, odor and liquid wastes that may spread around are not protective. The garbage container (Figure 13a) randomly placed on the campus has become a threat to human competition due to neglect and causes visual pollution.

Figure 13. Waste Bins (b, c, d) and Garbage Container (a) in the Atatürk University Traveler

4.2.6. Limiting and Herbal Elements

Border elements, which are the regulation elements that keep vehicle traffic under control without creating visual barriers rather than human traffic in the outdoors (Şişman & Yetim, 2004), should not

constitute a visual obstacle as they are elements that keep the physical passage under control.

It has been observed that railings and barriers are generally used in the research area among these elements, which prevent involuntary passages. Barriers (Figure 14) are used to prevent the passage of vehicles on the Atatürk University campus. Barriers that cannot provide integrity with each other and with other landscape equipments around them cause physical and visual confusion.

Figure 14. Barriers on Atatürk University

Green sections must be of a quality that includes aesthetic and functional features. Plantings that branch from the bottom in a way that disturbs the people walking on the road and that has a form and size approaching the view from a certain point of view will disturb the psychological sounds. Appropriate maintenance and pruning studies should be carried out on plants that will fulfill the necessary characteristics of plant-human connections when you think of pedestrian-tree interaction along tree trunk length or first branching lengths greater than 240 cm in a pedestrian area.

Herbal elements on the Atatürk University passenger; The constraint was formed by using plants in plant boxes (Figure 15c,d,e) and road vegetation (Figure 15b). Vegetative elements are generally well preserved. Plant elements used for aesthetic and functional purposes add aesthetic features to where they are placed, directing, emphasizing desired points, preserving negative views and restrictions, etc. Areas with such functional features are of great importance for urban ecosystems.

Figure 15. Restrictor-iron Wrought Iron (a), Road Planting (b) and Plant Boxes (c,d,e) in Atatürk University Campus

5. Discussion and Conclusion

When campuses are considered urban settlement areas in terms of the population they host and the functions they offer, the design of the units they contain, the relationships between these units, and the outdoor spaces are of extremely critical importance. This importance stems from the fact that social interactions between individuals occur both inside buildings and in outdoor spaces around buildings. When space planning has an effectively organized design, it will shape individuals' behavior while supporting social development between users and the designed environment (Kuzulugil vd. 2022; Çakın ve Güngör, 2023).

When analyzing the previous studies on this topic, it was found that the design of the spaces in Ege University Campus; (2006), it was found that the design of the spaces in the Ege University campus and the reinforcing elements used in these spaces partially comply with ergonomic standards. In addition, it was concluded that the pavement heights on the sides of the roads within the campus that are open to vehicular traffic do not meet anthropometric standards.

The study by Karakaya et al. (2023) compared the campuses of Wageningen University and Research Centre (the Netherlands), which ranked first in the world according to the GeeenMetric University

Sustainability Ranking criteria, and Istanbul Technical University, which ranked first in Turkey, in terms of sustainability. Although the two universities approach sustainability under different headings, they were found to have a common denominator. Based on the results of the research, suggestions and design criteria for the development of university campuses in the field of sustainability are presented.

In the study conducted by Aslan, Akça and Aşur (2018), it was found that the reinforcing elements in the research area are partially suitable for anthropometric and ergonomic standards. Approximately 95% of the lighting elements, 92% of the waste bins and 90% of the seating elements in the campus are anthropometrically suitable.

When the result of this research is evaluated in general, It has been determined that a specific part of the existing landscape equipment's cause visual pollution in terms of aesthetics due to not carrying out maintenance and repair works. Landscape equipment's were examined according to standard dimensions and features obtained from various sources. Due to the intense use of the study area, diversity is also observed in the landscape equipment's As seen in the examples, it has been determined that besides the landscape equipment's that are suitable for anthropometric measurements, suitable for the comfortable use of people, and make life easier, there are also elements that do not comply with these measurements.

It has been determined that the general purpose of the vehicle roads and curbs is good, and no lane lines separate the bicycle path from the vehicle and pedestrian path. Addition of all damaged floor coverings and maintenance repairs, and the floor to be painted very well and covered with suitable stabilized material during the maintenance and repair years. Lighting elements are of various types, some decorative, some with standard forms, and occasionally functional and non-functional organs have been encountered. Lighting elements should be evaluated not only to give light but also in terms of aesthetics. The region's climatic conditions and the application technique, pedestrian strips, and flooring material show positive results. However, it has been determined that collapses from the works have occurred at some points on the pedestrian roads. Ramps are far from being an accessible place, especially for people with disabilities. In order to solve this situation, the places where the ramp and the road of the vehicles meet should be smooth, especially the movements of disabled pedestrians and any exit or pothole pipe of the junction. For the visually impaired pedestrians to use the ramps safely, the landing areas at the beginning and end should be 150 cm long with different textured materials. The surfaces of the ramps should be covered with a hard, stable, non-slip, and slightly rough material. On the ramps to be built on the sidewalks, 60 cm wide kissable surfaces should be made. The color of these surfaces should be chosen from a color that contrasts with the color tones that make up the floor. Signs and information signs are generally good, but some are not in ergonomic positions and are intended as dangerous, affecting pedestrian fatalities. To a certain standard, maintenance, and repairs should be arranged and harmonized to consider the functional and aesthetic appearance of the color, model, paint, etc. Bus stops, garbage storage, and seating units need to be improved in terms of human use and size, but the damage is seen negatively where some of the elements' joining materials are found and displayed. Although the size and location of the garbage cans located outside the campus are appropriate, the location of the garbage containers could be more suitable. Pockets not interfering with pedestrian circulation should be designed for garbage containers. The parts that are appropriate and necessary for the conduct of the research; It is necessary to use garbage cans to protect against odor and liquid wastes that can be spread around in sufficient quantities. Herbal elements; add an aesthetic feature to the plant use mechanism in the plant boxes; the road afforestation is generally in good condition, and it is observed that the maintenance and completion elements are insufficient in some parts. The vegetation in good condition should be preserved, and the plant structure with a functional and aesthetic appearance should be transmitted to the plant species used in road afforestation.

The parts that are appropriate and necessary for the conduct of the research; It is necessary to use garbage cans to protect against odor and liquid wastes that can be spread around in sufficient quantities. Herbal elements; add an aesthetic feature to the plant use mechanism in the plant boxes; the road afforestation is generally in good condition, and it is observed that the maintenance and completion elements are insufficient in some parts. The vegetation in good condition should be preserved, and the plant structure with a functional and aesthetic appearance should be transmitted to the plant species used in road afforestation.

The groups of the clusters of the landscape equipment's of the examined region will be influential in fulfilling their functions and meeting the needs. It will improve the user's ergonomics for the maintenance of some parts. Due to the intense usage area of the workplace, it should take place more than functional and aesthetic elements; material selection should be provided according to this criterion, considering the climatic conditions of the region; this should be considered in seating groups, flooring materials, and bus stops.

Based on this study, it should be ensured that all places' people use, and donors are in harmony with anthropometric data, users should be able to move comfortably away from dangers in all places where they are located, and life safety should be given priority to the rooms. As a result, ergonomics, urban health, functionality, and visual aesthetics should be the main target at all stages, from the maintenance and repair company to its placement in urban spaces, the results of the organized work of different professional disciplines.

Conflict of Interest

The authors have declared no conflict of interest.

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