
An Investigation of Urban Furniture Use at Topkapı Earthquake Park

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Abstract

The study aimed to investigate and analyze the suitability of urban furniture at the Topkapı Earthquake Park, which was designed as a venue, where people could take shelter and their basic needs could be met in case of a potential disaster, against universal earthquake park standards. Turkey is located in one of the most active earthquake zones, exposed to devastating effects of this natural disaster on both human lives, nature, and built environment. It is of great importance to effectively design and manage earthquake parks and urban furniture in order to minimize the loss of life that may occur before, during and after the disaster. Accordingly, the urban furniture included in Topkapı Earthquake Park was compared to Tokyo Rinkai Disaster Prevention Park, an international example, in terms of sitting area, lighting, cover element, garbage bins, signboards, support service elements, and social activity areas based on given criteria and expectations. In addition to the literature review, the similarities and differences between the two earthquake park examples were investigated upon review of data obtained through on-site discovery, observation, and measurement studies, and a detailed comparison was made in a tabular format, supported by visuals. The comparative study helped identify the inadequate elements and problems of the park. In conclusion, although the use of urban furniture in Topkapı Earthquake Park provided a suitable environment for regular daily life, there were inadequate elements with regard to readiness to disaster situations and Tokyo Rinkai Disaster Prevention Park was at a much better level in terms of planning and design compared to the Topkapı Earthquake Park.

Keywords

Urban furniture, earthquake, Topkapı earthquake park, assembly area, functionality

1. INTRODUCTION

Society must wage an all-out struggle in order to prevent natural disaster-associated events and minimize their damage, to intervene and control catastrophe that may occur after disasters at the right time, quickly, and effectively, and to create a safe and orderly new environment for people exposed to disasters. An earthquake is a phenomenon, in which the tremors occurring due to fractures in the earth's

crust expands into seismic waves and erupts on the earth. As seismic waves propagate, they affect every area they can reach and pass through, causing breaks. In other words, an earthquake results from a sudden release of energy in the solid, outer part of earth, i.e., the lithosphere, that creates seismic waves that moves the crustal plates onto each other or slides along each other with devastating effect (URL-1).

Earthquake parks are open areas that can be used following an earthquake for people can escape from the adverse effects of the earthquake and meet their basic vital needs, including shelter, assembly, and food in case the residences cannot be used. Typically, recreational open areas are used for the purposes of earthquake parks. The urban furniture included in those parks is designed to meet people's basic needs. Therefore, it is very important to be prepared and take the necessary precautions by considering the earthquake danger and identifying the risks that may follow the earthquake. It is well-established that during previous earthquakes people fled to urban open green areas to protect their lives after an earthquake. Existing parks can be rearranged as earthquake parks following an earthquake, or open green areas can be specifically designed for this purpose (Çavuş, 2013).

The urban furniture included in the earthquake parks are fittings designed so as to protect people from adverse factors that may occur following a disaster and to meet their basic living needs (Koçan and Sürün, 2020). The following requirements should be met in order for an earthquake park furniture can provide complete service: All age groups and disabled people should be able to use the urban furniture of the earthquake park, in case of a situation that requires intervention, the tools and equipment in the park should be sufficient and accessible, there should be mobile kitchens and kiosks that people can use; Sitting units in the park should be designed to be suitable for setting up tents following an earthquake; Confined spaces should be created to meet people's toilet and bathroom needs; Shower rooms should be built next to the toilets and the showers should provide hot water from installed solar energy systems; An appropriate lighting system should be created in the earthquake park, and a generator should be kept in the park to meet electricity needs or solar lighting should be used (Çavuş, 2013). Furthermore, security measures should be taken against chaos, disorder, and theft that may occur in the parking areas after an earthquake (Demirkurt, 2019). Earthquake parks, which meet above requirements can better meet people's needs in case of a disaster in terms of the aesthetics and functionality of urban furniture. This is an indication that an earthquake park is suitable for its intended purpose.

The earthquake park urban furniture can be categorized by type as follows: Floor coverings (concrete, stone, wood, brick), sitting units (benches, chairs, group sitting elements), lighting elements (road illuminators, area illuminators), sign and information signs (routers, locators), cover elements (stations, canopies), sales units (kiosks, buffets), and playground elements (Yıldızcı, 2001). Other items include trash cans, flower beds, bicycle parking areas, square clocks, plant items, and flagpoles, etc. (Güner, 2015).

Expectations from disaster parks and urban furniture envisage those places, where concrete solutions are produced to evacuate disaster victims, who suffered material and moral damage after the earthquake, to provide security and temporary shelter, and to help survivors continue their social activities as close as possible to their previous levels. Accordingly, the present study on the compliance of urban furniture in Topkapı Earthquake Park to earthquake park standards can be considered an important step in terms of disaster preparedness. Earthquake parks meet the recreational needs of the public in regular times, and serve as a hub for disaster management after a disaster. Necessary arrangements for the safety and efficiency of the park should be taken to ensure that the survivors maintain access to a safer environment in case of disaster. This study focuses on design issues, which should be taken into consideration in urban furniture design, which may be of vital importance in planning and design process of the earthquake parks. This study aimed to investigate the use of urban furniture in earthquake parks.

2. METHOD

2.1. Research Areas

Tokyo Rinkai Earthquake Park, Japan, features an area of 132 acres is known as the first earthquake park ever introduced. It was designed as a disaster park, which would allow disaster response teams in Tokyo use it as a hub to gather information, coordinate relief units, and provide medical care in the event of an emergency. All of Tokyo's refuge parks are actually cleverly designed survival shelters for the masses in times of urban chaos and dysfunction. The parks feature solar-powered charging stations for electric bikes and smartphones in case of power outages, public benches that turn into cooking stoves, and manholes that



double as emergency toilets. Beneath the trees are reservoirs of water and storehouses containing enough food to allow entire population of the relevant district to survive the critical first 72 hours after a disaster. The park serves as a hub where information flow and emergency services can be directed for the entire city. Covering an area of 33 decaire, with electrical outlets and LAN connections, temporary toilets and heating materials, the park functions as the headquarters for disaster relief efforts (Mckean, 2014). There is a simulation area, helipad, parking lot, communication center, garbage bin, buffet/cafeteria, picnic area, medical care support area, and festival area. The park was officially opened in 2011 (URL-2). Topkapı earthquake park was opened in 2009 within the Zeytinburnu district of Istanbul. The 10-decaire park is located in the area where Millet Street intersects with Mevlana Kapı-Edirnekapı point. There is an earthquake simulation area, two underground and one open parking LOT, toilets, sink, shower, fountain, garbage bin, buffet/cafeteria, picnic area, children’s playground, and assembly

area (URL-3). In addition, a bicycle path, a 1400-ton water tank for irrigation of the park, an observation terrace of approximately 15 m height, a helipad, an open-air theatre, sitting and rest areas were built, and a strong lighting system was made available throughout the park (URL-4).

2.2. Research Method

The literature review for this study included a review of articles and theses related to earthquake parks and furniture in use. Information about urban furniture used in Topkapı Earthquake Park and Tokyo Rinkai Disaster Prevention Earthquake Park was collected. Observation, field work, measurements, tabulation, and photography activities were held for Topkapı Earthquake Park. The items on the checklist were marked with either a tick ✓ or a cross mark (x) depending on availability/suitability of the relevant item for each park. Upon an analysis of study results, suggestions were made for potential improvement areas.

Table 1. Research Area Features (URL-5; URL-6).

Research Area	Topkapı Earthquake Park	Tokyo Rinkai Disaster Prevention Park
		
Year of Construction	2009	2011
Location	Istanbul Türkiye	Tokyo, Japan
Coordinates	41.02007506434505, 28.920506988651475	35.635053982888145, 139.795813931777
Project Area	160,000 m ²	132,000 m ²

3. RESEARCH RESULTS

Upon a review as per the sitting elements, Tokyo Rinkai Earthquake Park was generally sufficient, yet Topkapi Earthquake Park was inadequate in terms of benches that could be transformed into a grill, sitting elements positioned in empty areas, and picnic tables. Ground lighting, in the scope of lighting elements, was not available in both parks. There were no solar powered lamps. Tokyo Rinkai was highly sufficient in terms of top cover elements, while Topkapi did not have any elements in this category. Garbage bins and

signboards were available in sufficient numbers in Tokyo Rinkai and Topkapi Earthquake Park. A review of the support service personnel indicated that there were no changing rooms in both parks and there were no toilets in the Topkapi earthquake park. As regards other urban furniture elements, sports equipment was not available in both parks, while there was no children’s playground equipment in Tokyo Rinkai, and no food and beverage vending machines in Topkapi.

*** Photographs were taken by the authors.**

Table 2. Research Results

	Topkapi Earthquake Park	Tokyo Rinkai Earthquake Park
Sitting Elements		
Benches placed at every 100 meters (Min.) to 200 meters (Max.)	✓	X
Benches that transform into grills	X	✓
Availability of smart banks (Benches with charging stations powered by solar energy)	✓	✓
Movable sitting group positioned in empty areas for emergency use	X	✓
Use of reinforced concrete or stone	✓	✓
Availability of picnic tables	X	✓





Lighting Elements		
Use of low energy consuming lamps	✓	✓
Availability of floodlights intended for the assembly area and emergency areas	✓	✓
Availability of solar powered lamps	X	✓
Adequate ground lighting	X	X






Top Cover Elements		
Availability of shade elements	X	✓
Existence of gazebos to meet the shelter need after an earthquake	X	✓
Availability of tents ready for use after an earthquake	X	✓

Trash Bins		
Availability of smart trash bins	✓	✓
Availability of large trash bins	✓	✓



Signboards		
Park map at the entrance	✓	✓
Signs indicating assembly points	✓	✓
Informational signage systems with emergency numbers	✓	✓
Direction signs showing emergency exits	✓	✓
		
Support Service Personnel		
Security cameras	✓	✓
Manhole toilets	X	✓
Container WC	✓	✓
Changing rooms	X	X
Showers available	✓	✓
Emergency shelter	✓	✓
		

Other Furniture Elements		
Food and beverage vending machines	X	✓
Sports equipment	X	X
Children's playground elements	✓	X
Availability of Amphitheatre-type of sitting area	✓	✓
Availability of bicycle parking spaces	✓	X

4. DISCUSSION

Upon initial study visits to Topkapı Earthquake Park, the urban furniture was not used in sufficient numbers, and that during subsequent visits, it was observed that the missing furniture was not replaced. Accordingly, the urban furniture in the Topkapı earthquake park was investigated under five categories to assess its positive and negative aspects. These included sitting elements, top cover elements, trash bins, signboards, and lighting elements (Caymaz & Komar, 2021). Sitting Elements must have functional suitability, anthropometric measurements, and sufficient numbers for all user groups in earthquake parks. The sitting elements in Tokyo Rinkai Park had a suitable design for post-earthquake use, but the sitting elements in Topkapı Earthquake Park rather engaged higher functional and aesthetic concerns. XXXXXXXX It is important for all user groups to place sitting elements designed in open spaces at a every 100 and 200 meters as a minimum and maximum, respectively (Güner, 2015). Those standards were met in Topkapı Earthquake Park, but not in Tokyo Rinkai Park.

The benches, which featured grill systems in order to provide a practical solution for people's need for hot food were not available in Topkapı Earthquake Park. These multipurpose

benches may prove to be convenient following an earthquake and are recommended to be placed in the park for faster food preparation needs. The smart benches, which were produced and placed to meet communication and transportation needs during the first 72 hours following a disaster, were located in the correct locations in both parks. These solar powered benches were functioned with a charging station. Reinforced concrete and stone were used in both parks. These materials were used especially to mitigate the risks associated with natural disasters (fire, etc.). People of all age groups need sitting groups where they can relax and assembly in the park area (Komar, 2021). Picnic tables were used in Tokyo Rinkai Earthquake Park to meet these needs. The same were not available in Topkapı Earthquake Park and it was necessary to do so.

The lighting elements in use were generally adequate in both parks. For example, projector lamps and low-energy lamps were used at regular intervals to illuminate the assembly areas and emergency areas in both parks. Solar energy is recommended in case of a natural disaster, which can provide a temporary solution, instead of mains that may not be available upon a disaster. Accordingly, unlike Topkapı Earthquake Park, Tokyo Rinkai Park used solar

powered lamps. The ground lighting was not adequate in both earthquake parks. Ground lighting is recommended to guide people accurately and quickly. Upon a comparison of the sitting elements in use both parks, those in Topkapı Earthquake Park were not adequate. As regards the top cover elements, where people can feel safe and protected under furniture elements such as tents or gazebos were available in Tokyo Rinkai Earthquake Park, but there were no shade elements in Topkapı Earthquake Park. It is recommended that shade elements should be designed and placed appropriately in the Topkapı earthquake park. Trash bins were available in both parks in the form of smart and large trash bins placed at a minimum of 100 and a maximum 200 meters from each other. Upon measurements in Topkapı Earthquake Park, it was anthropometrically suitable and at a sufficient level with 45x50x105 cm (Caymaz & Komar, 2021). In both parks, signboards were strategically positioned every 100-200 meters to provide an effective guidance and information system. A park map made available map at the entrance is an important element to easily direct people. Furthermore, both parks featured signs indicating assembly points, informative sign systems containing emergency numbers, and directional signs indicating emergency exits (Çelik & Ender, 2016). A map of the park layout was provided in an easily-understandable format for the convenience of the public at the entrance, guiding people to explore and use different areas in the park. Therefore, the signboards were adequate at Topkapı Earthquake Park. In general, it is suggested that in order for the urban furniture of both parks can be used effectively in disaster situations, the sitting elements and lighting elements should be improved, their deficiencies should be completed, and top cover elements should be made available (Önal, 2019). Furthermore, the availability of adequate trash bins and signboards was considered a positive aspect.

5. CONCLUSION

As a result of this study, the urban furniture in Topkapı Earthquake Park was generally suitable for use in regular daily life, but was inadequate for disaster situations. An analysis of sitting elements, top cover elements, trash bins, signboards, and lighting elements suggested positive and negative practices in both parks. Topkapı Earthquake Park had inadequate sitting and lighting elements. There was a

lack of shade elements, where people would feel safe, in Topkapı Earthquake Park. The trash bins and signboards were at an adequate level to meet people's needs in both parks. In conclusion, the designs of sitting elements and lighting elements in Topkapı Earthquake Park were inadequate compared to Tokyo Rinkai Disaster Prevention Park; there were no top cover elements in the Topkapı earthquake park; yet the trash bins and signboards were sufficient in both parks.

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