



ÇANKIRI BARIŞ MANÇO CHILDREN'S PLAYGROUND SAFETY EVALUATION OF COMPLIANCE CRITERIA

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ABSTRACT

Playgrounds are so effective for the children's social, sensual, cognitive and physical development. These grounds, if they wouldn't designed in significant criterias, they can cause hurtings and injuries that affects child's development negatively. In this study, Barış Manço Children's Playground, located in Çankırı and as specified for the kids aged between 0-7, and the physical properties of the game elements on the playground were analyzed by TSE (Turkish Standards Institution) safety standards, were assayed for standards compliance. USCPSC (U.S. Consumer Product Safety Commission) standards were included the study, because TSE standards don't have criteria in terms of discriminations in the age of the children and playground site selection. Besides, in this study, it was examined that other outfit equipments, plants on the area and playground's maintenance status in terms of safety. At the end of the study, 78% of playground equipments were determined that not suitable for TSE standards. In accordance with the results that are obtained, suggestions have been made in terms of landscape architecture.

Key Words: Child, play, safety, game equipment, playground

1.INTRODUCTION

The main factor of a healthy child is a game which has an aim or not, whether it can be done by rule or not but in every situation, it is consisted of child's activities that makes him happy (Dönmez, 1992; MEB, 2012; Jaspert et al., 1988). Child learns lots of things about life and himself with game, she/he agrees with social and physical environment and she/he develops her/his creativity (Heseltine and Holborn, 1987; Senda, 1992).

According to Alqudah (2003), playgrounds are places which are designed for the purpose of supporting child's social, sensual, cognitive and physical activities (Bal, 2005). For Zinger (2002), playgrounds are beneficial and constructive educational areas for children, and at the same time they are ideal areas for outdoor activities (Botsoglou et al., 2011).

In children's developmental stages, physical situation and behaviours differ. Playgrounds, if it is not constructed for the needs of children's developmental stages, it can be bring security problems and injury risks. These injuries usually happen depending on children's falling down from the game equipments, their clothes' or other parts' rambling, their heads' are caught some potential gaps on the equipments, oversetting of game equipments or construction error. Besides in playgrounds, children hit game equipments while they're running; contact with broken, rusty, sharp points and keen corners and game equipments which are made by false materials that can be heated quickly; are the other danger risks that could hurt children (USCPSC, 2008; Heseltine and Holborn, 1987).

Many countries such as European Union, America, Canada, Australia and New Zeland developed standards on the purpose of preventing accidents, providing child safe (Caglar et al., 2010).

Generally, aged between 0-12 is evaluated as a childhood (Şişman ve Özyavuz, 2010). By USCPSC (2008), child age groups; according to child development, are discussed 06 months- 2 (toddler), 2-5 (pre-school) and 5-

12 (school age) and standards were developed, besides these age groups not shows differences only physical measures and skills, but also intellectual and social skills.

Turkey, EU harmonization in the framework by the European Union in 1998 created the EN 1176 and EN 1177's standards, defined TS EN 1176 series in 2008, had given time for transition period by the company until 2010 and adopted 31 October 2010. TS EN 1177 standard was enacted in 2011. These standards consist of playground equipments for the children, elder than 3 years. It is indicated that, younger children and the children who has less power and less skill can use these playground equipments under family supervision (Çakıroğlu ve Arslan, 2010, Deretarla Gül, 2012; SMP, 2013).

Açık and his/her friends did a research in Turkey's Elazığ city in 24 playground to determine their security levels and suitability for the USNPSS (The National Program for Playground Safety) and USCPSC safety criterias; it is indicated that just 12.5% of this are suitable for age groups. According to research results, %95.8 of playground equipments of Elazığ aren't suitable. A similar research in Greece Volos and Nea Ionia 45 playground have been done to determine the level of compliance to USNPSS, USCPSC and ELOT (Greek Organization for Standardisation) safety criteria. As a result of this research most of the playground does not fulfill safety criteria, especially regarding inspection and maintenance of the playground have stated that a plan must be created at the national level (Botsoglou et al., 2011).

In this research, Barış Manço Children's Playground located in Çankırı city that is only playground for 0-7 age group and its game equipments' physical properties were compared to TSE safety standards and were evaluated to compliance these standards. USCPSC criterias were included the study, because TSE standards don't have criteria in terms of discriminations in the age of the children and playground site selection. Besides, in this study, it was examined that other outfit equipments, plants on the area and playground's maintenance status in terms of safety. Within the results that are obtained, suggestions have been made in terms of landscape architecture.

2.MATERIALS and METHODS

In this study, located in the central district of the city Çankırı and as belonging to the age group 0-7 Barış Manço Children's Playground was selected as the research area. Çankırı province is located on the northwest of the Central Anatolia region, between 40° 30' and 41° north latitude and 32° 30' and 34° east longitude. Kastamonu and Zonguldak lie north of the city, while Bolu is on the west, Ankara is on the south and Çorum is on the east (Figure 1)

The research materials are constituted by the research area, studies conducted on the children's playground, domestic and foreign standards about playgrounds, obtained data as a result of measurements and observations conducted in the survey site, on-site photographs taken.

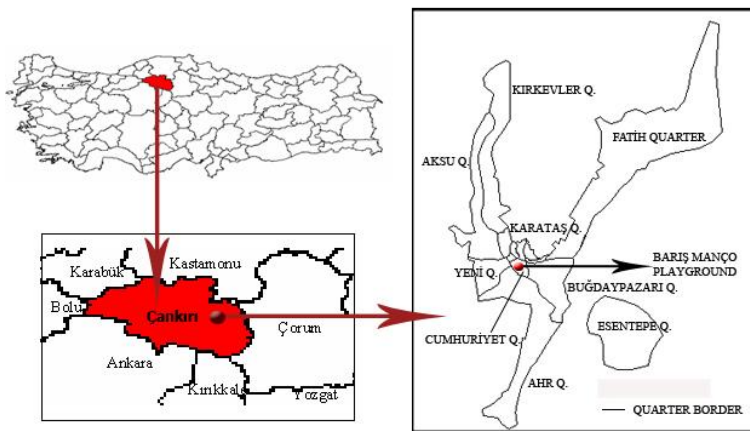


Figure 1. Location of Barış Manço Playground (Original, 2013)

In this study conducted in 2013, landscape research method was used depending on etude, data collection, analysis and synthesis.

Research area was evaluated according to TS EN 1176's 7 series and TS EN-1177. USCPSC safety standards were included, because of the research area for the 0-7 age group.

At the first stage of the research, a literature review was made on the subject, various countries safety standards were examined on the safety of playground and playground safety forms were prepared in accordance with area's physical characteristics, TS EN 1176-1177 and USCPSC standards. Then in accordance with this forms, observations and measurements made in the playground, photos were taken. In the third step, the data obtained was analyzed in comparison with the TS EN 1176-1177 and USCPSC standards. The playground, game equipments, other outfit elements, plants on the area and maintenance status of the area were evaluated in terms of safety as based on literature reviews and observations and these analysis, recommendations have been developed in terms of landscape architecture.

3.RESULTS and DISCUSSIONS

Barış Manco Children's Playground, differs from in other playgrounds, is the only playground as specified age group. It is located in a very central location in the city and so is used extensively. Playground was expanded in 2011 and new game equipments were added.

Çankırı City Center's total population is 80 590 according to in 2010. In Çankırı City Center, 06 months-2 years children population is 1410, 2-5 years population is 6695 (Çankırı İl Sağlık Müdürlüğü, 2012). 06 months-5 years old children constitute 10% of the population of the city center. Barış Manco Children's Playground is extremely important because of it is the only playground that appeals to this age group.

According to Öztan (2004); it is recommended that ground measurements between 250m² and 1000m² for the period pre-school playgrounds. Barış Manco children's playground is 294m². By the same investigator is recommended not to be less than 6.5m² average field size for each child (Şişman ve Özyavuz, 2010). In this case, research area is suitable that can play for 45 children at the same time.

Assessment of Safety on The Area in terms of Place Selection

In this research as a priority, the place selection of the playground in terms of safety features (power lines, irrigation canals, lakes, rivers, traffic, etc.) are suitable for standards because they does not take place in the Turkish Standards. TSE standards in terms of safety features in the choice of location is not specified, the playground is evaluated according to the criteria specified in USCPSC.

Playground is located at the intersection of Adnan Menderes Street and Atatürk Boulevard. There is 2m footpath between the playground and street. Plastic fencing was used on a low wall to cut the relation between street and playground . Playground has two entry-exit doors. One of the exit door is a way to road. Here's not a barrier to prevent the rapid advent of children and on this point there is no crosswalk exit from the area for the children. This situation causes dangerous for children. The west side of the playground is adjacent to Tatlıçay which comes through the city Çankırı, was surrounded by metal fences. The children's theater is located on the south side of the playground.

Taking into account that children due to the smallness of the mass heats up quickly than adults, in the selection the place for the playground the situation of excessive sun exposure of children should be considered. The areas which sun's rays are intensive to prevent burns because of heating of metal slide, platform or stairs these areas must be shaded or must be provided with warning signs (Moore, 1993; USCSPC, 2008).

According to Özgüç (1998), children's playgrounds; in winter at noon and in the afternoon the sunshine is able to received as long as possible, in summer is able to shaded in the afternoon (Yılmaz and Bulut, 2002). The city Çankırı where the playground located in; has continental climate which summers are hot and dry, winters are

cold and harsh (Çankırı Valiliği, 2010). Therefore, in terms of protecting the health of children playing in the area, especially in summer afternoons the area must be shaded.

Bariş Manco Children's Playground made after the 2011 partition (where the swing section 2 and 3/Figure 3) are completely unprotected against the sun. Children who stay under the sun can cause many ailments. Also located in this part of the playground is made of metal swing chains and that there is no warning sign of this condition, children's hands can cause burns. Shading on the other part of research area is provided with the use of trees. From this perspective having metal parts (slides, stairs and handrails, swing chains, carousel) game equipments are not a problem.

Safety Assessment of the Game Equipments

Game equipments in the playground, consist of three two-seater and a three-seater swing, unified structure one tunnel and one free slides, one carousel, one seesaw, one that is unusable from two rocking element.

Safety criteria for swing; TS EN-1176-2 (Additional Specific Safety Requirements and Test Methods for Swings) symbols are shown in Figure 2.



Figure 2. According to TS EN-1176-2 (2010), symbols of safety criteria for swing (Orijinal, 2013)

The measurement results on the swing safety, according to TS EN-1176-2 (2010) was analyzed and evaluated and presented in Table 1.



Figure 3. General view of swings in the playground (Original, 2013)

According to Table 1, next to the game equipment to provide passing (h_5) is required to leave a space at least 150cm. In the research area, Swing 1 and Swing 3 show compliance to TSE safety criterias, Swing 2 and Swing 4 don't (Figure 3)

Between swing seat and the side of iron (swing leg) should be safety distance (C). Swing1 and 4 provide, Swing 2 and 3 do not provide this criterias.

Take consideration of the safety distance between seats (S), Swing1 and 4 show suitability, Swing 2 and 3 do not show.

Table 1. Assessment of swings safety dimensions to TS EN-1176-2 (2010) and USCSPC (2008)

		TS EN-1176-2	USCSPC			Swing 1		Swing 2		Swing 3		Swing 4	
		Age group	Age group			R.A.	√ X	R.A.	√ X	R.A.	√X	R.A.	√X
		0-12	0-2	2-5	5-12								
Safety criteria	h4	≥35cm	60,9	30,4	30,4	38	√	32	X	35	√	50	√
	h5	150	180	180	180	330	√	160	√	114	X	110	X
		150	180	180	180	235	√	240	√	142	X	130	X
	C	≥%20h2+20	50,8	76,2	76,2	65	√	55	X	50	X	65	√
	S	≥%20h2+30	50,8	60,9	60,9	85	√	55	X	50	X	70	√
	L	≥0,867h2+175	180	180	180	340	√	330	X	270	X	445	√

h4:Seat height, h5:Side space, h2:Chain height, C:Distance swing leg-seat, S:Distance between seats, L:Fall distance, R.A:Research Area, √:Suitable, X:Not suitable(measurments are cm)

There must be a gap in front of the swings at least as much as L value. Swing 1 and 4 are suitable swings on the playground according to the safety criteria, Swing 2 and 3 are not suitable.

Swings which have more than two seats, structure should be divided with intermediate elements. The three-seater swing in the research area is not suitable for use as structural because it is not divided with an intermediate element.

Each swing must be provide in Table 1's all the criteria mentioned at the same time. It is determined that only one two-seater swing (Swing 1) fulfills TS EN-1176-2's safety criteria from the four swing in the resarch area, other three swing-mentioned reasons, it is not suitable for use.

USCSPC standards were examined in this study as the purpose of information. Because there is no distinction age group in TSE safety standards. In the area any swing are not appropriate according to USCSPC standards safety criteria. For USCSPC (2008), swings for children ages 06 months-2 years are required to be seat safety belt in the triple (full bucket) in order to prevent children from falling down the sliding. This is a successful application not to be our country standards in terms of child safety.

One free slide and one tunnel slide in unified structure located in Barış Manço children's playground were examined according to TS EN 1176-3 (2010) (Additional Specific Safety Requirements And Test Methods For Slides), safety standards and are shown in Table 2. Accordingly, in front of the slides must be found a space at least 100cm (R). In front of the two slides have 150cm space. Therefore, from this perspective slides are suitable to safety standards.

It stated that this standard slide slip angle must be smaller than 40°. In the research area, the slip angle were measured and was found 30° as average. The slides are suitable according to the standard in terms of these characteristics mentioned.

Start section which allow the user to slide slip section for the specified, is also stated that a portion at least 35cm in the TS EN 1176-3 standards. Because of free slides have 40cm start section in the study area, this slide is suitable to standards. However, tunnel slide does not have any start section and it does not comply with safety standards. Due to corporate structure, slides as a whole examined, it is understood that not provide the EN 1176-3 security criteria.

General observations and measurements about slides in the research area, metal surfaces of stairs and railings on slides was determined that it is rusty. Taking into account children's age groups, average 20cm height of the stairs to be done in a lower height will be more convenient.

USCSPC standards were examined in this study as the purpose of information. Because there is no distinction age group in TSE safety standards. Unified slides in the playground are not appropriate according to USCSPC standards. For USCSPC (2008), transparent sections should be on the tunnel slides. This application, in terms of supervision and control of children is a good practice.

Table 2. Assesment of slides to TS EN-1176-3 (2010) ve USCSPC (2008) safety dimensions

		TS EN-1176-2	USCSPC			Free Slide		Tunnel Slide	
		Age group	Age group			R.A.	√ X	R.A.	√ X
		0-12	0-2	2-5	5-12				
Safety criterias	W	≤ 70cm	≥58,4	≥58,4	≥58,4	44	√	70	√
	Ω	≥40°	24°	30°	30°	30 °	√	30 °	√
	A	≥35cm	--	--	--	35	√	--	X
	p	≥10cm	10	10	10	13	√	--	--
	R	≥100cm	91	182	182	150	√	150	√

W: Slip section width, Ω : Slip angle, A: Start section, p : Side barriers, R: Fall space, R.A:Research Area (measurements are cm),

One carousel located in Barış Manço Children's Playground was analyzed according to TS EN 1176-5 (2010) (Additional specific safety requirements and test methods for carousels safety standards). Type B Carousel was found in the research area. This carousel does not have a protective skirt and this carousel's height from floor is 30cm. There are two rules to provide safety criteria for this type of carousels. The first of these rules, to provide a smooth floor, the second rule, the distance between the bottom rolling surface and floor(b) must be $6\text{cm} \leq b \leq 11\text{cm}$. The b value of the carousel is 10cm. This value with this property is suitable to TSE standards. Around the carousel's falling space must be at least 200cm to TS EN 1176-5 (L). From this perspective, the carousel's measurement is suitable to these criteria. As a result, carousel located in the area has all safety criteria to TS EN 1176-5 (Figure 3).

USCSPC standards were examined in this study, as the purpose of information. Because there is no distinction age group in TSE safety standards. According to USCSPC (2008), the carousel especially while in motion may cause some danger for pre-school age children. Therefore, it is recommended that this equipment use under the supervision by aforementioned age group. Also it is not recommended for 06 months-2 years age group. Carousel located in the area is suitable for use by pre-school age to USCSPC.

The swinging elements in the research area were evaluated according to TS EN 1176-6 (2010) (Additional Specific Safety Requirements and Test Methods for Rocking Equipment). Accordingly, the research area have one vertical axis moving seesaw-Type 1 (with support point) and two rocking equipments (Figure 3). However, one of the rocking equipment was broken and can not be used.

Seesaw must be have footrests to the standarts. It is not found footrests on the seesaw in the research area. In addition, the end position of the seesaw when measured from the periphery of the element, falling space must be minimum 100cm. The seesaw fall gap height is 130cm and this feature is suitable. According to the aforementioned standard, slope seat of seesaw in the highest position must be no more than 20°. The seesaw in the research area is suitable in terms of this criteria. When TS EN 1176-6's all criteria examined, although the seesaw measurements are suitable all criteria, resulting from it doesn't have footrests, it is not suitable to TSE standarts.

USCSPC standards were examined in this study as the purpose of information. Because there is no distinction age group in TSE safety standards. According to USCSPC (2008), "the typical seesaw consists of a board or pole with a seat at each end supported at the center by a fulcrum. Because of the complex way, children are required to cooperate and combine their actions, fulcrum seesaws are not recommended for toddlers or pre-school age children". In addition, in this standard, in the part of touching the ground surface of seesaw should be use shock-

absorbing material or should be buried tires there to prevent children legs's crushed between the floor and seesaw. In the research area, part of seesaw's touching the ground are used rubber materials.

Rocking equipments don't have footrests and hand-holding part (specified in TS EN 1176-6) in te research area. According to the standard, it must be least 100cm fall gap distance around this elements. This distance was measured 80cm in the playground. The rocking equipments are not suitable to standards.

USCSPC standards were examined in this study as the purpose of information. Because there is no distinction age group in TS EN safety standards. According to USCSPC (2008), "toddlers and preschool-age children enjoy the bouncing and rocking activities presented by rocking equipments (spring rockers), and they are the primary users of rocking equipment". There is at least 273cm between equipment when adjacent designated play surfaces are more than 45cm high. The seat should be between 30 and 41cm high for toddlers. The seat should be between 35 and 71cm high for preschooler. Rocking equipments which existed our research area, are not suitable according to USPCSC.



Figure 3. Carousel, seesaw and rocking element in the playground (Original, 2013)

Maintenance Status and Evaluation of Hazards in the Playground

The metal parts in the area of the game elements were appeared rusty and unpainted, it is understood that wasn't done regularly maintenance. One of the swings's screw had been out of, metal wire was connected to the chain instead of screws. Fractures swinging element (rocking element) part have been left the area, this is creating a danger to running children (Figure 4).



Figure 4. A view of neglected game equipments (Original, 2013)

Electricity transformer in the area, disrupting both vision as well as pose a danger to children. In the same way, the empty concrete planter in the field poses visual pollution and danger to running children (Figure 5).

Also stemming from the lack of supervision on the playground, while forbidden eating in the area, some peddlers were appeared in the area and they sell unhealthy foods to the children. This situation create health risks for children.



Figure 5. Elements which create danger in the playground (Original, 2013)

Evaluation of the Other Outfit Equipments and Plants in the Playground

There are five binary lighting element in the research area so that the area can be used in the evening. There isn't a staff officer in the area for auditing purposes. Children often are playing games under the supervision of parents. Six metal, five made of wood total of 11 seating element serves for families of children. Metal benches pose problems for the summer because of sun can heat up the benches. In addition, there are five trash on the playground. There is a fountain in the area as water element. Fence element's materials (plastic and iron) in the playground vary like sitting elements on the playground (Figure 6). This leads to complicated appearance in the area.

USCPSC (2008), said to be one of the most important factors is used surface element under and around the game elements for reducing the possibility of threatening the life of the child. Rubber paving stone was used in Barış Manço Children's Playground as a surface element that is suitable to TS EN 1177 (2011) in terms of flexible and shock absorbing properties. However, staircase surface of two entries in the playground was made from marble. This poses the risk of slipping on rainy days. Having neglected of staircases will be cause children's to fall (Figure 6).



Figure 6. Outfit equipments in the playground (Original, 2013)

One of the safety issues is plants which used in the design of children's playground. The selections of plants in the playgrounds consider toxicological and allergenic properties of plants in terms of children health and safety (Pekin Timur, 2013).

There are eight *Pinus nigra* as coniferous tree species, one *Platanus orientalis* and one *Acer negundo* as deciduous tree in Barış Manço Children's Playground. According to Yılmaz et al. (2006), *Pinus nigra* and *Acer negundo* have toxicological substances that could affect negatively of children health, so these species are undesirable species to use in children playgrounds. Uluğ (2007), noted that *Acer negundo* has significantly pollen allergen and *Platanus orientalis* has moderate pollen allergen. Therefore, warning signs should be put indicating period of the pollen of these trees (Pekin Timur, 2013).

Trees to be planted in the playgrounds for children should be used as hillside and in the background, to be protective against sunlight, yet, not to deprive children completely of sunlight. The sunlight requirements of children should not be hampered by large plants and plants with wide petals, particularly in the playgrounds with moving equipment. When the Barış Manço Children's Playground was established, trees were found in the area. The *Platanus orientalis* tree species cover the entire field and block play in playground (Pekin Timur, 2013).

4. CONCLUSIONS

Safety is an important element which affects children's health and the quality of the game in children's playgrounds. When safety doesn't consider in the planning and design stage, may occur several dangers for children. To minimize of these dangers, primarily selected area should be analysed in terms of the various factors (transportation, sun, traffic, proximity to lakes, proximity to rivers, the slope and drainage). Then must be taken to care the design of the game elements and age groups in terms of their suitability standards and use the appropriate surface material.

In our country, according to European Union TS EN 1176 and TS EN 1177 standards were developed, in order to comply with the European Union since 2010. These standards apply to all children older than 3 years. According to USCPSC in the America, children age group distinction is clearer. The children age group distinction is made randomly in the research area.

Just one swing was appropriate to TS EN 1176 series from the 3 two-seater swings and 1 three-seater swing in the playground. There is one unified structure consisting of the free and tunnel slides in the playground. The combined slide does not show conformity to TS EN 1176 series. Seesaw in the research area is not suitable to TS EN 1176 series. One of two rocking equipments in the field is unavailable, the other is not suitable to standards for lack of hand-holding and footrest. Carousel in the playground is suitable to standards. As a result, 78% of the game elements in Barış Manço Children's Playground were determined that not suitable to the Turkish Standards. Elements that do not meet the standard should be replaced with the appropriate property in terms of children's health and safety.

Rubber paving stones was used in Barış Manço Children's Playground as a surface element that have used widespread in recent years in the world. This element is suitable to TS EN 1177 standards. Broken stairs made of marble entry to the area must be replaced with a suitable material. Broken stairs create danger for children. Also marble is slippery material and children may shift in rain and snow on this material.

Need to be barrier in front of enter and exit doors of Barış Manço Children's Playground to prevent sudden jump to road of children. In addition, must be made crosswalk to this point.

Game and other outfit elements to be maintained regularly is extremely important to ensure the children's safety. to be neglected of these elements, may cause injury in the playground. It is determined that not make regularly maintenance in accordance with the standards in the research area. Rusty and paint peeled metal parts of game elements should be maintained in the field, broken and rusty swing element (spring rocker), metal wire that connects to the swing should be repaired. Threatening the safety of children in the playground area, the electrical transformer that may create a danger of death and empty concrete planter needs to be removed from the area. Metal parts of game elements and metal benches could produce the burning surface due to heating up in the sun. It should be specified with warning signs.

Also, the pollen period of trees which contain important and moderate pollen should indicate with warning signs in terms of children health. In the section of the playground area which was made in 2011, It is important to be planted mid-crown deciduous tree species to protect children from the negative effects of the sun.

It is effective in reducing accidents and injuries to children's play under the supervision of a parent or the personnel in playgrounds. Children often play in family control in Barış Manço Children's Playground. Vendors and people which come to use fountain should be prevented. In addition, although stated that the playground area

for children 0-7 age group, during the research, to be used by children older than 7 years were observed. Take consideration these reasons and to used area at night, has to be taken security personel in the playground. End of the research, it was seen that Barış Manço Children's Playground didn't meet TSE criterias. In the light of these assesments, all playgrounds should be checked by own municipalities in Turkey.

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