



A Survey on the Urban Residents' Recognition of Eco-friendly Outdoor Playground - Focused on Apartment House Playground Users in Seoul·Incheon·Gyeonggi-

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ABSTRACT

Urban outdoor playground serves as the space to promote the physical, cognitive, social, creative, emotional and linguistic development of children and the education center to stimulate the imagination and curiosity of them. It is also the place to be used as a basic park for urban residents and the local community space for associating with people of various levels. However, this playground as a banal space did not function properly before now. In 21st century, urban playground requires change and its various changes have been attempted. In particular, there is a need for the change into eco-friendly playground to provide children's health and urban healthy environment. Therefore, it requires much effort to construct and vitalize the eco-friendly playground adequate for domestic circumstances in Korea. This study derived the preferred planning items among eco-friendly playground planning elements focused on the people to use it and provided the data for the construction of local friendly, eco-friendly outdoor playground. For this purpose, we visited the playground of the apartment house built in 10 years with more than 300 households and surveyed 200 adults and investigated the residents' utilization and satisfaction on the current playground and the recognition and preference for eco-friendly playground.

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1. Introduction

1.1. Background and goal of research

In the cities of today, playgrounds where children can freely run around and play are rapidly disappearing. Therefore, an outdoor playground for children is an important place for them to develop physically, mentally, socially, creatively, emotionally and linguistically. It is playing a crucial role of true education that stimulates their imagination and curiosity.

Playgrounds in the city are like a park for urban city life. It has a variety of potential use, including being a community space where people from various classes can socialize. However, most playgrounds today are either too small or perfunctorily constructed with a few poorly made playing facilities available. Under the circumstance, it is hard to expect them to play the role of community space, not to mention stimulating children's development in various ways. On the other hand, the Park for Imaginative Children project that started in 2008 with Seoul city introduced a type of playgrounds that was different from existing ones, showing new possibility for playgrounds of future.

Moreover, since the Ministry of Environment reported various

safety issues associated with children's playgrounds in 2009, "Eco-friendly and Safe Children's Playgrounds Contest" was held to promote development of safer and more eco-friendly playgrounds, attracting positive public interest and promotion. However, although eco-friendly and safe playgrounds are being evaluated according to various classifications of design, construction and operation guideline, the focus of evaluation is mostly directed to presence of hazardous elements in raw materials and safety guideline for each component of the playground.

Also, the opinions of users of the playground and the residents of the place are excluded from the process. Since these guidelines are not used for actual design and construction of the playground, they have a limited use in terms of being used as a guideline for construction of eco-friendly playgrounds.

Eco-friendly playgrounds must be built for the city children of the 21st century as a healthy place for paying and community space for local residents. Therefore, in order to construct and promote eco-friendly playgrounds suitable for Korea, there is a need to reflect, in overall design and construction of playgrounds, eco-friendly factors and the opinions of local residents, who use the playground most frequently and use it as a community space. Then, by selecting and implementing the most popular category from the list of all eco-friendly plans to realize the eco-friendly playgrounds that users love, the playgrounds will yield the greatest benefits.

In this research, we will focus on local residents who live around outdoor playgrounds, i.e., parents of children who use the playgrounds and the local residents who use it as community facility. We will identify the current status on playground and the level of satisfaction for them and analyze how playground are being perceived and people's expectation for them. Then, we will derive factors that needed to be considered for actual users when eco-friendly outdoor playgrounds are built in the future and provide basic research data for further researches on developing local-specific eco-friendly playgrounds.

1.2. Method and scope of research

The goal of this research is to investigate the awareness of eco-friendly playgrounds of the users who live in city and actually use the playgrounds. The research progressed in the following ways.

First, previous literatures were studied to examine the concept of eco-friendly playgrounds and planning elements and needs were suggested. The findings were then used as basic research data to conduct field research and questionnaire survey to derive essential research categories.

Second, the current status on playgrounds in Korea were investigated and the findings were used to select a location to conduct a questionnaire survey.

Third, after selecting a location for field research and questionnaire survey, the locations will be actually visited to conduct the survey.

The questionnaire will research the current status and the level of satisfaction of the playgrounds, based on which user perception of and preference for eco-friendly playgrounds will be studied.

Fourth, the result of questionnaire survey will be used to analyze the frequency of each research categories. Then, variables for each factor was derived based on interviews and cross-analysis of categories.

To conduct the study, visits were made to the playgrounds of common residence with more than 300 households around Seoul, Incheon and Gyeonggi area. Questionnaire surveys were conducted on 207 residents who used the playgrounds as a community space and the parents of children who played in the playground. Analysis was done on 200 surveys from the respondents who faithfully answered the question.

2. Concept of Eco-friendly Playground and Its Status in Korea

2.1. Concept of eco-friendly playground

It will be helpful to reflect on the concept of playgrounds before

defining the concept of environment-friendly playgrounds. It is defined as "A place of protection and defense for children from dangerous condition of urban environment; an artificially constructed space designed to solve shortage of natural playgrounds for children; and, finally, a facility to support growth of children." ¹⁾ Also, in Section 52 of "Laws on Children's Welfare", it is defined as "A children's welfare facility that provides healthy entertainment and various other conveniences with the goal of providing services necessary for children to maintain good mental and physical health and enhance their general welfare." ²⁾ However, there is no single precise definition of eco-friendly playgrounds. Nevertheless, the closest concept that we are looking for can be found in the eco-friendly safe playground guideline published in 2010 by the Ministry of Environment, which defines it as "Eco-friendly and safe playgrounds refer to a playground that is safe from chemically hazardous environment and environmental diseases and in which children can play safely."

Therefore, in order to define eco-friendly playgrounds, we must apply the concept of both playgrounds and eco-friendliness. Eco-friendliness means "not polluting the natural environment, being integrated into the nature, and seeking mutual coexistence without disrupting the nature". The concept is in line with the concept of eco-friendly development and sustainable development. It is understood as a comprehensive idea that encompasses the natural, artificially constructed and socio-cultural environment in which the effect of development by human on the nature is minimized and ecological balance is sustained. Putting all the ideas together, eco-friendly playgrounds can be defined as "A playground designed to enhance general welfare of children and help sustain their mental and physical health by providing them with healthy entertainments and plays that they can enjoy safely while minimizing the adverse impact it might have on the nature and being in harmony with it."

2.2. Planning elements for eco-friendly outdoor playgrounds

Planning elements for eco-friendly outdoor playgrounds essentially consist of land, playground, playground facilities, playing materials and additional facilities. If we add to these "Safety Laws on Children's Playgrounds"; "Regulations on Housing Construction Standard", "Laws on Urban Park and Green Zone" in housing laws; design standard in "Laws on Raising Infants"; guideline to eco-friendly and safe children's playgrounds; and planning elements for eco-friendly building certification system and eco-friendly street space and apply comprehensive

1) Yoon, Seung-hwan, "A Study on Designing Playgrounds based on Children's Playing Behavior and Environmental psychology", Kookmin University Master's Thesis, 2008.12, pg. 42

2) Kim, Ji-Sun, "A Study on current situation and improvement of children's playground in apartment complex", Kyonggi University Master's Thesis, 2012.12, pg. 6

analysis, we can arrive at the following 10 categories: If we add to these "Safety Laws on Children's Playgrounds"; "Regulations on Housing Construction Standard", "Laws on Urban Park and Green Zone" in housing laws; design standard in "Laws on Raising Infants"; guideline to eco-friendly and safe children's playgrounds; and planning elements for eco-friendly building certification system and eco-friendly street space and apply comprehensive analysis, we can arrive at the following 10 categories: location and arrangement (location, land use, size and arrangement); ecological environment (green space, bio-habitat, place for learning about the nature); playing tools and buildings (sturdiness, safety, variety, aesthetics, embracing, naturalness, appropriateness, sustainability); additional facilities (hazardous materials, damaged condition, cleanliness, protection facility, rest facility, hygiene facility, sales facility, lighting facility, service facility); materials and resources (floor finishing, playground materials, eco-friendly materials, water resources); energy saving (natural energy, recyclable energy, high efficiency system), reduction in environmental load (hazardous materials, waste materials, minimizing waste materials, separate removal); design and construction; operation and maintenance management (operation, inspection, management). ³⁾

3) Here are the details of planning elements for eco-friendly outdoor playgrounds based on 10 categories derived here: 1. Location and arrangement - ① Location: creating land based on consideration for ecological environment, balance with surrounding environment, securing vision that enables good observation, safe accessibility, convenience of access

② Land use: reuse of land, securing natural ground surface, securing slopes and water system, firm ground and water system ③ Size: appropriate size, securing moving distance

④ Arrangement: remove possibility of traffic accident, keep distance from hazardous facilities, maintain distance from hazardous factors, secure safe entry, smooth line of movement to nearby facilities, securing parking lot for disabled person. 2. Ecological environment - ① Green space: conservation of natural green space, linked green network, green space ratio, application of artificial green technology, ecological landscaping, green space arrangement ② Bio-habitat: conservation and creation of bio-environment, creating water-born bio-top, creating land-born bio-top ③ Place for learning about the nature:

playground for learning about the nature, observation area for natural ecology, natural learning space with easy accessibility, artistic space for learning the nature. 3. Space for playing - ① Space arrangement: appropriate arrangement of natural and artificial space, space arrangement based on consideration for diversity of space with and without playground facilities, creating an environment that is fun to play in, creating space in which conflicts do not arise, reflecting local characteristics ② General play: space arranged for different age groups, new and exciting space for playing ③ Special play: place to experience diverse plays, creating special playing space, creating personalized playing space, picture story, space for playing with imagination, area for creative playing, playing space in which adults can participate. 4. Playground facilities - ① Sturdiness:

playground facilities not easily damaged or deformed, sturdily connected without flaws, sufficient strength and durability ② Safety: products inspected for safety, shock-absorbing floor installed in case of falling, aging status, signs for safety caution, compactly spaced handrails to prevent fall, good finishing for safety, secured enough distance in line of movement between playground facilities and facilities ③ Variety:

variety of color, raw materials and difficulty level, complex playing tool that enables diverse forms of playing ④ Aesthetics: aesthetic and artistic sensibility considered, aesthetic color considered ⑤ Embracing: universal design applied ⑥ Naturalness:

playground facilities appropriate for natural environment, playground facilities made of natural materials, product certified for eco-friendliness ⑦ Appropriateness: appropriate for age, size, color, brightness and touch that stimulates senses, number of playground facilities appropriate for demand ⑧ Sustainability: playground facilities made of recyclable materials, playground facilities and facilities using green energy. 5. Additional facilities - ① Common: use products inspected for safety and that do not emit hazardous materials, arrangement of additional facilities that do not disrupt line of movement, cleanliness of additional facilities ② Protective: protective fence, CCTV installed ③ Rest: provide resting place and shadow, creating rest space, shelter space, bench arrangement ④ Hygienic: washing bowl, restroom, trash can ⑤ Sales: vending machines, etc. ⑥ Lighting: lighting facility using green energy ⑦ Service: exercise facilities for residents, bicycle parking 6. Materials and resources - eco-friendly finishing and materials, recyclable materials, reusable materials, local materials, water permeable packaging, water resource saving system 7. Energy saving: use alternative (natural) energy, recyclable energy, piezoelectric element, other kinetic energies, high efficiency system 8. Reduction in environmental load - ① Hazardous materials: measures to minimize emission of hazardous materials, plan to reduce scattering dust ② Waste

materials: minimize waste materials, separate removal of recyclable waste materials ③ Other load: minimize thermal island effect 9. Construction: eco-friendly construction 10. Operation and maintenance management - ① Operation: guideline to operation/management ② Inspection: period inspection, safety inspection, period checking of hazardous chemical materials ③ Management: periodic repair, periodic hygienic cleaning, periodic replacement of materials, allocation of permanent staff.

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2.3. Need for eco-friendly outdoor playgrounds

What is work to adults is what playing is to children. Children develop character while playing. Children's living space is where they achieve physical and emotional development through experience of playing. Playgrounds is one of this living space and playground facilities is installed here. In particular, the necessity and importance of outdoor, rather than indoor, playgrounds, have been emphasized by researchers. Outdoor playgrounds, unlike indoor ones, have the following advantages. First, it provides ample opportunities for physical development. It allows a lot more muscular exercises and physical activities and helps children voluntarily make physical movements. Second, it is a place of learning about the nature where they interact with the nature. It provides open space, fresh air, earth, trees and sense of liveliness. Third, it provides children with activities that are not possible indoor so that they can engage in diverse exercises. Fourth, playgrounds in urban setting relieves children of psychological pressure and provides them with emotional stability. Fifth, it allows children to make diverse social relationship. It is outdoor, rather than indoor, places where more collaborative plays take place. They also develop more diverse social relationship, which allows them to become more sociable. Therefore, outdoor playgrounds are necessity in contemporary society where urbanization dominates. The space must be arranged to be appropriate for children's behaviors. It should be a place where children can be protected from environmental diseases and play safely. Likewise, the place must be constructed eco-friendly ways.

The reason why outdoor playgrounds in the future should be built eco-friendly ways is, in addition to its necessity, as follows. First, it can solve various problems associated with current playgrounds and make improvement upon them. Playgrounds built so far have had the size and facilities that nominally satisfied legal requirements. Consequently, it had problems in diverse areas. Therefore, it is necessary to built eco-friendly outdoor playgrounds that can secure safety for children and meet contemporary trend. Second, it is necessary from the urban planning perspective to secure sustainable urban environment and eco-friendly urban-based facilities to enhance quality of life. Securing space for eco-friendly playgrounds enhance pleasantness of urban space via formation of green network and expansion of community space. Third, it is necessary to build children-centered community facilities for healthier future from the perspective of general

materials: minimize waste materials, separate removal of recyclable waste materials ③ Other load: minimize thermal island effect 9. Construction: eco-friendly construction 10. Operation and maintenance management - ① Operation: guideline to operation/management ② Inspection: period inspection, safety inspection, period checking of hazardous chemical materials ③ Management: periodic repair, periodic hygienic cleaning, periodic replacement of materials, allocation of permanent staff.

welfare of children. It is crucial to build eco-friendly playgrounds that reflect the nature's organic system and secure safety of children from hazardous chemical materials by using natural raw materials so that they can safely play in the playgrounds. Moreover, it can provide space for rest and entertainment for local residents via physically pleasant environment. Fourth, children need a place to learn about environmental conservation from educational perspective. In the 21st century, the century of environment, children must be taught the importance of the nature and love for it from early in their life. Building eco-friendly playgrounds in which children mainly play in can help them develop natural emotional ties with the nature. It can play the role of a great learning place for environmental education. Fifth, it is needed for realizing the government policy of low carbon and green city from the perspective of government. Although there are projects on eco-friendly playgrounds in progress today, only the guidelines are available at present. Since there are no concrete way of developing environment-friendly playgrounds and no suggestions, it is necessary to develop diverse form of eco-friendly playgrounds that can be applied in diverse ways.

2.4. Status on eco-friendly outdoor playgrounds

In order to study current status on eco-friendly outdoor playgrounds, we need to first classify their types. Then, the concept of eco-friendliness and sustainability must be integrated into classification as opposed to the existing classification method.⁴⁾ However, there are currently no clear classification criteria and the case studies for such. In Korea, the concept of eco-friendly playgrounds was conceived when Playgrounds with Culture was created in 2005 by Seoul Design Foundation and Imagination Children's Park project started by Seoul City in 2008, which led to many attempts on creating diverse form of playgrounds, from which we can find playgrounds built on theme of the nature or using green energy. Then, through Eco-friendly and Safe Playgrounds contest hosted by the Ministry of Environment in 2008, there were much efforts made on promoting eco-friendly playgrounds and produce guidelines.

Eco-friendly playgrounds focus on eco-friendliness rather than names and themes. In terms of classification, depending on how much weight is given to eco-friendliness, playgrounds can be largely classified into 4 groups: eco-friendly, recycle, natural energy and nature theme and imagination.⁵⁾ Based on this, we can

survey the current status on eco-friendly playgrounds in Korea. There were 63 playgrounds based on 11 themes actually built since 2011. Among them, only 6 were classified as eco-friendly playgrounds of natural energy type. Also, there were 304 "imagination children's park" built as of 2011. They were remodeled from existing playgrounds and therefore are diverse in size and scale. In terms of themes, some of the themes were selected from contest; some from citizens; some from contest and re-assembled as imagination play. The playgrounds that are considered eco-friendly among them are "nature theme imagination playgrounds" based on the theme of the nature and "natural energy playgrounds" that uses self-generated solar and

Table 1. The Cases according to the type of Eco-friendly Outdoor Play- ground in Korea

Type	Image	Cases
Nature friendly		Dongtan Lotte Castle, Banseok Children's Park, Incheon Nonhyeon HillState, Munjeong hosunyi Geumcheon Nammoo-Hanui-Blue-Bear Sang-Sang Children's Park, Heukseok East Centreville Primary Playground, Gangdong Hanui Childre-n's Park, Mia tree baera Secondary Playground, Wi City blooming 3 Playground, containing a natural playground Cheongra Playground cont-aining Nature....
Recycling		Han River Seonyudo Park, Seoul resource rec-ycling theme pavilion, POSCO Playground, Junk Art Playground, Seoul Children's Folk Museum Playground, Anyang Art Park hosted the exhib ition (Flying City) Maze Hill, Gongju Design Center Imagination Playground....
Natural energy		National Museum Natural Energy Playground, Han River climate Playground, e-Pyeonhan ses-ang E-nergy Playground, Cheongju Osong Life Science Complex, Hwasung Sports Complex, Banpo MiJJu Hill State, Namseoul Heel State, Gangneung Gyeongpodae Elementary School Playground, Gwacheon Science Exhibition Play-ground, Cheongra Ggumegreen, Rewarding-Hope-Keunsol SangSang Children's Park ...
Nature theme imagination		Seokchon-Hagye-Beolmal-Peach Gaksim-Lark-Morning Star-Gangseoi angol SangSang Childre-n's Park, Zoo Playground, Dreams of Whales, Dreaming Larva, Playground growing ideas, Seo-ul Forest, SangSang Giant Country, Magpie Pla-yground, Banpo Xi, Ilsan Ggumegreen Playground

playgrounds is sustainable raw materials. It creates a new type of playground by reusing wastes from industrial process, construction work and everyday life as playground facilities or finishing materials. Also, it remanufactures steel waste or reuses junk scraps and uses them as playground facilities. Nature energy playgrounds, reflecting social issues associated with green industry, new recyclable energy industry, etc. that are arising today with energy depletion problem, saves energy and use the playgrounds as a place to learn about energy saving and eco-friendliness. It uses alternative natural power such as solar power and wind power to operate moving playground facilities. Also, it uses energy source of additional facilities or collects kinetic energy of children playing to use as source of power that operates the playgrounds, which is called energy production type playgrounds. Avoiding traditional type of playgrounds, it uses the nature as themes to create a theme park style playground that stimulate children's imagination and curiosity. All materials used for the playgrounds do not have hazardous materials and only eco-friendly raw materials. (Kim, Ja-Kyung, "A Study on the planning Elements for Eco-friendly Outdoor playground", Journal of the Korea Institute of Interior Design, edited from v.22 n.2, 2013.4, pp.123-125)

4) Playgrounds can be classified in terms of where they are located (apartment, park, school and kindergarten), age (low age (3-5), medium age (5-8), high age (8-12)); and purpose (traditional, thrift, creative, adventurous, transportation, real, comprehensive, castle, nursery, nature). Frost classifies outdoor playgrounds as traditional, modern, adventurous and creative.

5) Nature-friendly playgrounds mainly use natural materials as raw materials. It uses natural materials such as trees, earth and water; tries to maximize use of natural geographical condition; and utilizes abundant plants and natural water system. This way, it creates an atmosphere of playgrounds created within the nature. The keyword for recyclable

wind power. However, there are only a few eco-friendly playgrounds that were designed based on eco-friendly plan from the scratch. Among them, 20 playgrounds built based on contests are viewed as highly eco-friendly playgrounds. In addition, there are about 70 outdoor playgrounds chosen from contest for eco-friendly and safe playgrounds since 2008. Most playgrounds classified as eco-friendly in Korea are of nature-friendly, green energy and natural theme imagination type of playgrounds. The case of recyclable playgrounds actually installed on a given area includes Seonyu-do Park, POSCO, Junk Art Playgrounds at Nature Circulation Theme Exhibition Hall. However, they are mostly operated only as temporary project or part of exhibition programs. The well-known examples of eco-friendly outdoor playgrounds in Korea are as shown in Table 1.

3. Research Method

3.1. Questionnaire design

As we saw in the previous pages, eco-friendly outdoor playgrounds in Korea were mostly built by avoiding traditional types of playgrounds and using imagination and new cultural trend as a theme for playgrounds while introducing the theme of eco-friendliness partially. For more systematic promotion of local-friendly and eco-friendly outdoor playgrounds, we can study awareness and preference of eco-friendly playgrounds based on actual playgrounds and conducted a questionnaire survey to provide direction for planning process.

The target group for questionnaire survey was adults. The questionnaire primarily consists of "personal questions" such as the respondent's gender, age and the age of children they came with; how they currently "use" the playgrounds; their "satisfaction" of the playgrounds; and "awareness of and preference for eco-friendly playgrounds". We excluded from the questions basic things that need to be reflected in planning of eco-friendly playgrounds and instead created a questionnaire that can reflect the opinions of users. That is, we excluded the elements that need to be reflected for playgrounds from the planning elements for building eco-friendly outdoor playgrounds suggested earlier and instead investigated user preference from the perspective of users of playgrounds by focusing on user satisfaction and preference so that the results could be reflected in the planning elements. In terms of questionnaire format, considering that respondents are not experts and therefore they would find it difficult to use professional terms to give their answers, the questionnaire consisted primarily of questions in close-ended format. Open-ended questions were also made available as an option just in case the respondents could not choose from given options for their answer.

3.2. Sample questionnaire

For our questionnaire survey target, we chose playgrounds located in near residential housings with more than 300 households located in Seoul, Incheon and Gyeonggi area; built within last 10 years; has elementary schools nearby. We chose the location because we expected from the location relatively high number of users of playgrounds and the usage rate of playgrounds within the complex to be high. In addition, we chose housing complex that has, not necessarily eco-friendly playgrounds, but playgrounds where children can play adventure games around base frame structure and attempted changes from traditional playing method or playgrounds considered eco-friendly and safe playgrounds. we chose 3 locations from each region and chose a total of 9 locations for our research. The respondents were parents of children who actually come to playgrounds with their children or adults who use the place as a community space. We chose 23 respondents from each location, with a total of 207 respondents for our survey. We selected 200 respondents as our target respondents as we expected to exclude some correspondents who would answer the questions not faithfully. Thus, we chose 207 respondents. The location of our questionnaire survey and sample counts are presented in Table 2 below.

Table 2. Survey destination

Area	No	Apartment House	Image	Address	Move in	Sample
Seoul	1	Heukseok East Centreville Primary		Dongjak heukseokdong 335	2011. 09	23
	2	Hwanghak Lotte Castle		Jung-gu Cheonggye cheonro 400	2008. 04	23
	3	Wolgok Raemian		Seongbuk-gu Hawolgok-dong 225	2006. 07	23
Incheon	4	Nonhyeon Hill State		Namdong-gu Nonhyeon-dong 732 -1	2010. 11	23
	5	Cheongra Ggumegreen		Seo-gu Gyeongseo-dong 856-1	2012. 03	23
	6	Bupyeong Humansia 2		Bupyeong-gu Bupyeong-dong 938	2012. 07	23
Gyeonggi	7	Wondang e-Pyeonhan sesang		Goyang-si Deokyang-gu Seong-sadong 869	2009. 12	23
	8	Wi City blooming 3		Goyang-si Ilsandong-gu Siksa-dong 1510	2010. 10	23
	9	Raemian East Palace		Yongin-si Suji-gu Dongcheon-dong 932	2010. 05	23

3.3. Questionnaire survey and analysis method

With survey locations being scattered out in wide areas, the survey was conducted over 3 months from June 25, 2013 to September 25, 2013. The survey period being in the middle of summer with long days, we visited the playgrounds from 9 am to 11 am and 6 pm to 9 pm when people visited the playgrounds the most. We visited 9 chosen locations with 2 researchers accompanying. We collected 23 questionnaires from each location totaling 207. We chose 200 questionnaires we thought respondents answered faithfully as basis for our analysis.

Each questionnaire consisted of questions on previous researches done on playground facilities, eco-friendly playgrounds and guideline to eco-friendly and safe playgrounds as well as planning elements of eco-friendly playgrounds newly derived. Also, to facilitate understanding of respondents, we chose terms that were easy to understand and provided explanations along with pictures for questions with industry jargons the respondents may find unfamiliar to facilitate understanding of eco-friendliness.

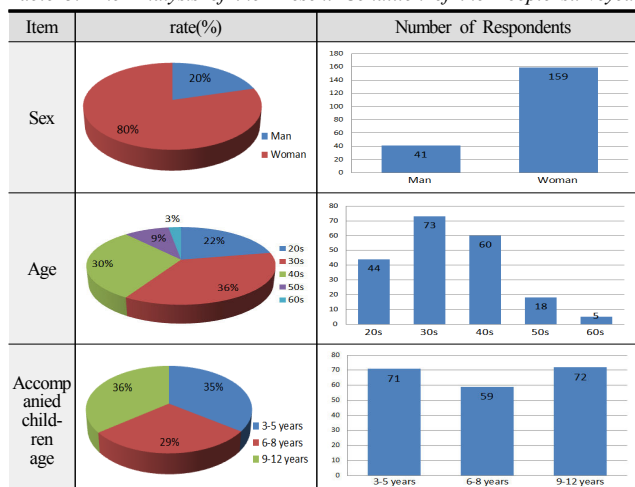
The goal of the survey was not to identify differences in awareness across regions but to understand basic understanding of playgrounds by residents in metropolitan area, discover the general status of playgrounds and the degree of satisfaction by users, and understand their perception of eco-friendly playgrounds. We selected 200 questionnaires by integrating the entire research area and conducted descriptive statistical analysis such as frequency and percentage on the entire questions.

4. Research results

4.1. General characteristics of questionnaire respondents

General information such as gender, age, the age of children accompanied to playgrounds collected to identify statistical

Table 3. The Analysis of the Present Condition of the People surveyed



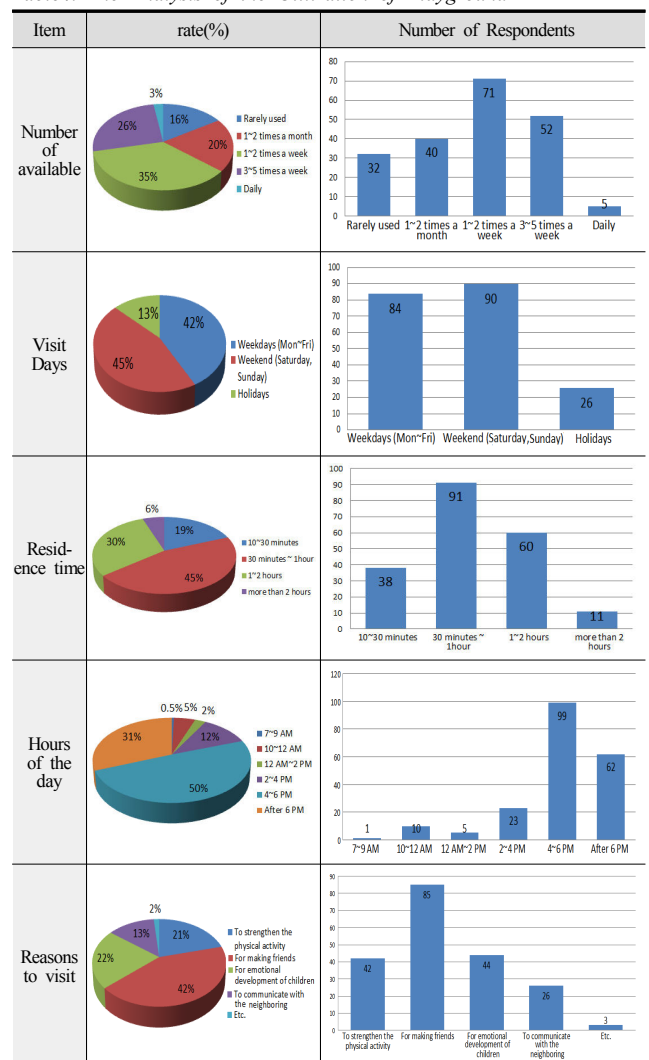
characteristics of survey respondents is shown in Table 3 below. The sample consisted of: men 41 (20%), women 159 (80%). Age in 20s, 44 (22%); 30s, 73 (36%); 40s, 60(30%); 50s, 18 (9%); 60s, 5 (3%). The age of children who came to playgrounds was: age between 3~5, 71 (35%); 6~8, 59 (29%); 9~12, 72 (36%).

4.2. Current use of playgrounds and the degree of satisfaction

1) Status on use

Questions were asked on 5 categories in terms of the status on playground uses. The results are shown in Table 4 below. In terms of frequency of playground use: 35% visited 1~2 times a week; 26%, 3~5 times; 20%, 1~2 times a month; 16%, almost never; 3%, everyday. In terms of the days of visit: 45% visited during weekend (Sat & Sun); 42%, during the week (Mon ~ Fri); 13%, during the holidays. In terms of how long they stayed at playgrounds: 45% stayed from 30 min ~ 1 hour; 30%, 1 ~ 2 hours; 19%, 10 min ~ 30 min; 6%, more than 2 hours. In terms of when they visited playgrounds: 50% used playgrounds between 4 pm ~ 6 pm; 31%,

Table4. The Analysis of the Utilization of Playground

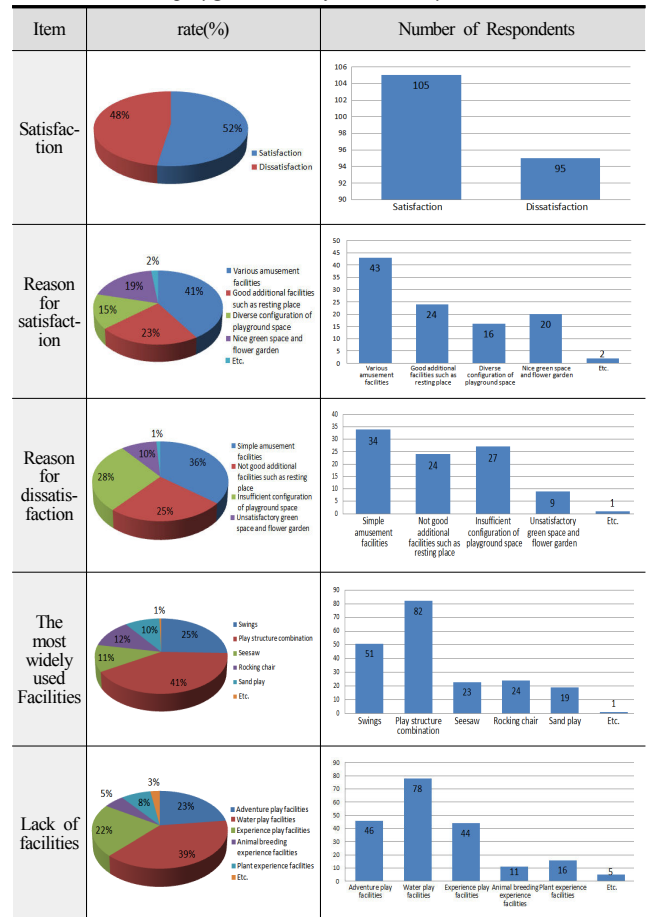


after 6 pm; 12%, 2 pm ~ 4 pm; 5%, 10 am ~ 12 pm; 2%, 12 pm ~ 2 pm; 0.5%, 7 pm ~ 9 pm. Although we expected much season difference in visiting hours, people primarily visited playgrounds between 4 pm ~ 6 pm and after school and therefore no drastically different results are expected. The difference is primarily due to long days during summer season where children visit playgrounds after 6 pm after the sun set. Finally, in terms of reasons for coming playgrounds: 42% wanted to make friends for their children; 22%, for emotional development of children; 21%, to improve physical strength; 13%, to communicate with neighbors; 2%, other reasons.

2) Degree of satisfaction

On the degree of satisfaction on playgrounds, the question asked their overall satisfaction. To the question if they were satisfied with playgrounds, 52% said they were satisfied; 48%, not satisfied. For reasons why they are satisfied: 41% said they were satisfied because of variety of playground facilities; 23%, other facilities, including rest facilities; 19%, good flower beds in green zone; 15%, variety in playing space arrangement; 2%, exercise equipment. On the other hand, for reasons for dissatisfaction: 36% said playground facilities were too simple; 28%, lack of space arrangement to engage in a variety of activities; 25%, absence of additional facilities such as rest facilities; 10%, lack of flower beds in green zone; 1%, risk of injury. There are some answers that overlap in both satisfied/dissatisfied category, which indicates that, for satisfaction of playgrounds, "variety of playground facilities" and installation of additional facilities such as rest facilities are very important. For reasons why some answers overlapped, we may consider age variables and playground environment mediation variable. As shown in Table 3, people aged between 30~40 accounts for 66% of respondents. They also account for major share of opinions given to this research. There was no significant difference across categories in actual answers in questionnaire. Meanwhile, in terms of composition of playgrounds, based on Table 2, playground 1, 4, 5, 7 & 8 are considered eco-friendly playground built based on nature themes and the respondents answered that they have a variety of playground facilities that were different from traditional playgrounds. On the other hand, playground 2, 3, 6 & 9 were playgrounds built by adding new additional facilities to traditional facilities, which caused respondents to say that they lacked playing facilities in comparison. For the question on the playground facilities most frequently used, 41% said basic assembly frame; 25%, swing; 12%, rocking chair; 11%, seesaw; 10%, sand playing; 1%, others. To the question which facilities are most needed in the playgrounds, 29% said water play facility; 23%, adventure play; 22%, experience-based play facility; 8%, experience of real object; 5%, experience of training animals; 3%, others, including inline

Table 5. Current playground Satisfaction Analysis



skate link, mini soccer field and seasonally appropriate playing facilities.

4.3. Perception of and preference to eco-friendly outdoor playgrounds

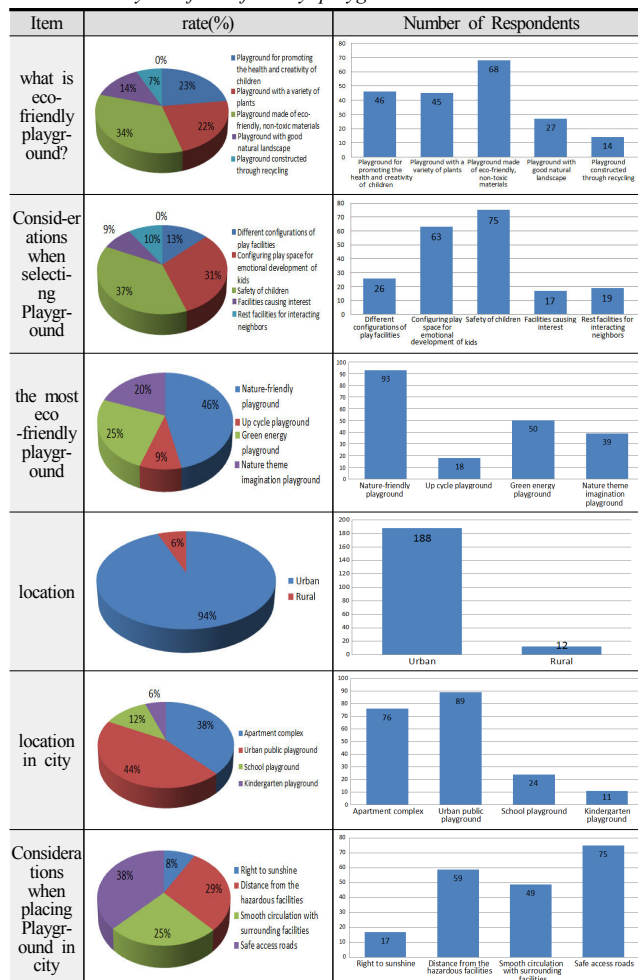
1) Perception on eco-friendly playgrounds

In terms of research on general perception of urban residents on eco-friendly playgrounds, 6 questions were asked in order to measure how general users of playgrounds perceive playgrounds and the degree of their understanding of eco-friendly playgrounds.

First, to the question what they think eco-friendly playground is; 34% said it is a playground made by eco-friendly and non-toxic materials; 23%, a playground that enhances children's health and creativity; 22%, a playground with abundant plants and great landscaping; 7%, a playground made by recycled raw materials. The results show that people tend to focus on chemical safety when they think of eco-friendliness. Second, to the question what they think most important when selecting a playground; 37% said, safety of children; 31%, playground facilities that enhance children's emotional development; 13%, variety of playground facilities; 10%, rest facilities that enable mutual exchange of neighborhood; 10%, facilities that stimulate children's interest. Here, parents are

most concerned with physical safety of children and therefore it is crucial to consider safety from diverse perspectives. Third, when shown traditional 4 types of eco-friendly playgrounds and asked what they consider most eco-friendly playgrounds: 46% said nature-friendly playgrounds; 25%, green energy playgrounds; 20%, nature theme imagination playgrounds; 9%, up-cycle playgrounds. From the results, we learn that urban residents associate eco-friendliness with a lot of trees and use of natural materials. Fourth, in terms of where eco-friendly playgrounds should be located, 94% said they should be built in city rather than rural areas. When asked where in the city the playgrounds should be built: 44% said public playgrounds in appropriate urban locations; 38%, in apartment complex; 12%, schools; 6%, kindergarten. The result indicates that people think of playgrounds as not just for children but also a place where both children and adults can have fun. Sixth, when asked what should be considered first when building playgrounds in the city: 38% said risk of traffic accident and securing safe entry way; 29%, maintaining distance from hazardous facilities; 25%, smooth line of movements around nearby facilities; 8%, consideration for illumination level. The result indicates that children's safety comes first in consideration.

Table 6. Analysis of eco-friendly playground Awareness



2) Preference to elements of eco-friendly playgrounds

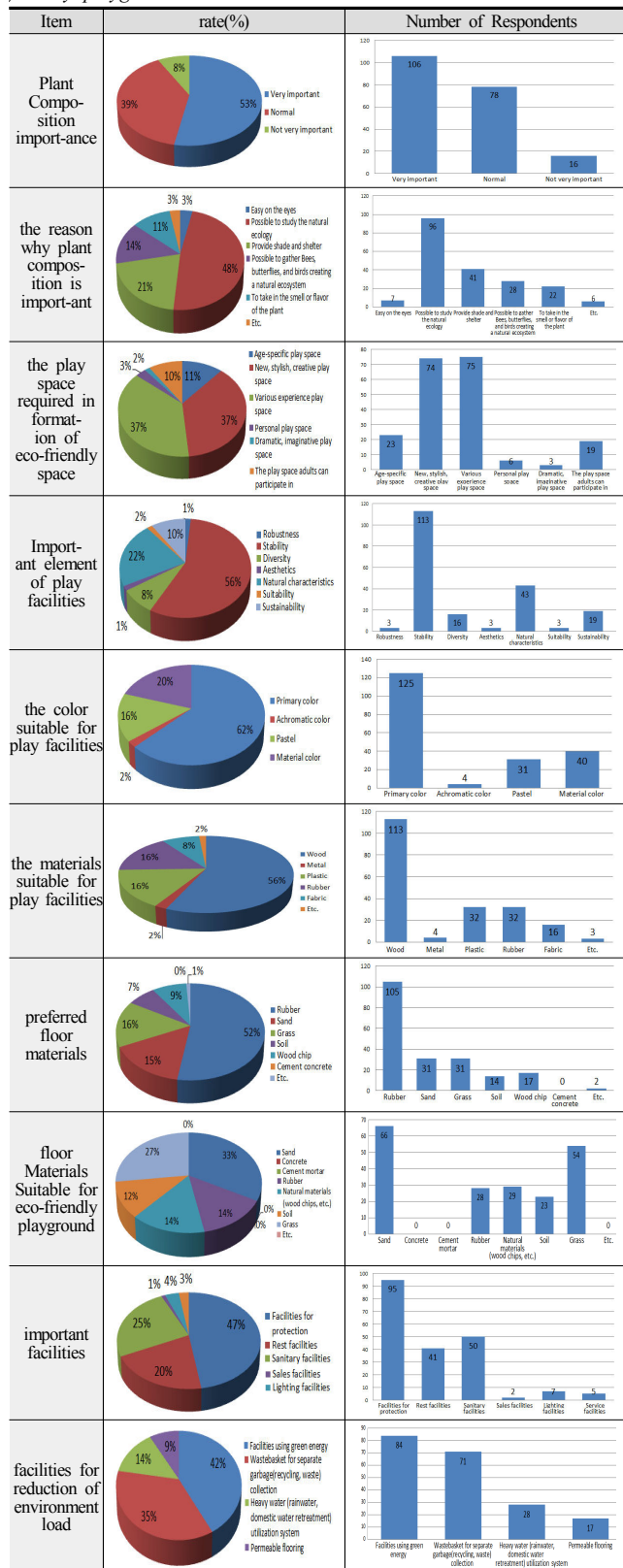
In terms of preferences of urban residents in planning elements of eco-friendly playgrounds, 10 questions, including questions on plants, playground space, playground facilities, finishing materials, additional facilities, were asked. The results are shown in Table 7.

In terms of growing plants, 53% said it is very important to grow plants in eco-friendly playgrounds; 39%, average; 8%, not that important. To the question why they think it is important to grow plants: 48% said it is possible to touch and learn about natural ecology; 21, it provides shades and rest place; 14%, it creates ecological system that attracts bees and butterflies; 11%, to smell the scent of plants; 3%, it is good to look at; 3%, others. To the question what kinds of playground space is needed: 37% said playground that is new, flash and creative; 37%, diverse experiences; 11%, playground space by age; 10%, playground in which adults can also participate; 3%, personal playground; 2%, pictures and imagination play.

To the question what they consider most important in eco-friendly playground facilities: 56% said safety; 22%, naturalness; 10%, sustainability; 8%, diversity; 2%, appropriateness; 1%, sturdiness; 1%, aesthetics. This could be understood in the same context as general perception on eco-friendly playgrounds stressing chemical and physical safety as most important as shown earlier. In terms of the color most appropriate for playground facilities, 62% said raw colors; 20%, materials colors; 16%, pastel colors; 2%, no colors. The result shows that most people prefer raw colors for playground facilities for children. On the other hand, to the question what materials are appropriate for playground facilities, 56% said wood; 16%, plastics; 16%, rubber; 8%, fabric; 2%, metal; 2%, others. The result implies that people prefer playground facilities made of wood and painted in raw colors.

To the question on floor materials in playgrounds, 52% said they preferred rubber; 16%, grass; 15%, sand; 9%, wood chips; 7%, padded earth; 1%, others. When asked what materials are best for floor materials for eco-friendly playgrounds, 33% said sand; 27%, grass; 14%, wood chips; 14%, rubber; 12%, padded earth. The result implies that, although respondents prefer rubber floor on account of safety, they switched to sand and grass based on consideration for both safety and naturalness when asked to consider eco-friendliness. Also, to the question what facilities are important in eco-friendly playgrounds, 47% said protective fence or CCTV; 25% said hygienic facilities such as washing bowl, dresser, trash can; 20%, rest facilities such as shade, shelter, bench, etc.; 4% said green lighting equipment such as street lamps, security light, etc.; 3%, service facilities such as resident exercise facilities, bicycle parking space;

Table 7. The analysis of the preference on the elements of eco-friendly playground



1%, sales facilities such as vending machines. Finally, to the question what facilities should be installed in order to reduce environmental problems, 42% said green energy facilities; 35%,

recyclable waste materials separate removal trash can; 14%, waste water reuse system that reuses rain water and living water; 9%, water permeable floor packaging materials.

5. Conclusion

In this research, we studied perception of and preferences for eco-friendly playgrounds by people who actually use them in order to promote spread of eco-friendly playgrounds in Korea based on systematic plan. In particular, in order to study direction, characteristics and preference of playgrounds that actual users want, we visited urban residential areas in Seoul, Gyeonggi and Incheon areas to conduct a questionnaire survey to discover user feedback that can be reflected in planning of building eco-friendly playgrounds. The following is the summary of the results.

First, in terms of status on general use of playgrounds, 65% of respondents said they use playground services at least once a week consistently and 20% said 1~2 times a month. Overall, 84% of respondents were using the playgrounds. They used the playgrounds during weekend (45%) more than weekdays. The use hours were 30 minutes to 1 hour (45%). They used the playgrounds from 4 pm to 6 pm most frequently. In terms of the reasons for visiting playgrounds, 42% said they wanted to have a chance to socialize with their friends. The result indicates that respondents are freer during the weekend than weekdays and visit playgrounds after lunch to do physical exercise and socialize with friends.

Second, 52% of respondents were satisfied with current playgrounds, which meant that they were more satisfied than dissatisfied but only a little difference. Also, the reason for satisfaction and dissatisfaction was the same, which was the variety of playground facilities. That is, 41% of respondents were satisfied with playgrounds because of "variety of playground facilities" and 36% of respondents were dissatisfied with playgrounds because "playground facilities were too simple". From this we can conclude that "variety of playground facilities" in playground planning was the most important factor affecting degree of satisfaction. However, the reason the difference between the degree of satisfaction and dissatisfaction came out small in this research was because the degree of satisfaction was affected more by the composition of playground facilities that respondents used than other factors such as gender and age group of respondents. The second most important factor affecting the degree of satisfaction was composition of additional facilities such as rest facilities. In terms of playground facilities, basic assembly frame was used most frequently, which implies that this must be considered carefully in order to increase degree of satisfaction. Moreover, the result shows that attention must be paid to facilities for water play space, adventure plays and

experience-based plays in order to increase degree of satisfaction in current playgrounds. This is a planning element that is not only important to general outdoor playgrounds but especially so eco-friendly outdoor playgrounds. In conclusion, it is crucial that diversity of rest playground facilities and creation of rest facilities and experience-based plays such as water play and adventure plays be considered from the perspective of eco-friendliness.

Third, in terms of general understanding of eco-friendly playgrounds, 34% of respondents said that eco-friendly playground was a "playground made of eco-friendly and non-toxic materials"; the most important factor in selecting a playground in which they played with children was safety; eco-friendly playgrounds must be located in urban areas; 38% of respondents through it was most important to remove risks of traffic accident and secure safe entry; 29% of respondents said hazardous facilities must be kept away; from the perspective of parents, respondents thought of chemical and physical safety for children was the most critical keyword for eco-friendly playgrounds. Moreover, 46% of respondents considered nature friendly type playgrounds as most eco-friendly, which indicates that they prefer public playgrounds in urban setting. In conclusion, in constructing an eco-friendly playground, people think of eco-friendly playgrounds a nature-friendly type playground that is chemically/ physically safety; safe from traffic accidents; secured safe entry; far from hazardous facilities; and located in a local community in urban areas as most eco-friendly and were most satisfied.

Fourth, in the planning elements of eco-friendly playgrounds, 45% prefer growing plants and having space in which they could perform ecological study. Also, they prefer safe facilities the most among eco-friendly playground facilities. The preferred color was raw color (62%), which enables them to monitor children better. In terms of materials for facilities, they preferred wood (56%). Also, although they prefer rubber floor for floor materials on account of safety, they prefer sand (33%) and grass (27%) as finishing materials for eco-friendly playgrounds, which satisfy both eco-friendliness and satisfaction level. In addition, the facilities that they thought most important were protective facilities such as fence, CCTV, etc. For environmental load facilities, 42% prefer green energy use facilities. Thus, we were able to verify eco-friendly planning elements urban residents preferred.

In this research, we studied the status on use of playgrounds by urban residents, the level of their satisfaction, understanding of eco-friendly outdoor playgrounds and their preference of planning elements. As results, we derived the following conclusions to enhance actual usage rate of eco-friendly outdoor playgrounds in the future: in order to increase satisfaction, attention must be paid to safety of children from chemical and physical hazards, which is the most important factor in planning space arrangement,

playground and other facilities; green space that allows nature study, the most preferred planning element in eco-friendliness, must be constructed; sand and grass must be used as floor materials; wood and other materials that do not emit hazardous materials must be used for constructing playground facilities; and facilities that use green energy must be installed. However, since this research is a questionnaire survey for general adults, lack of understanding of actual eco-friendly playgrounds and associated bias and errors could lead to erroneous conclusion. Also, relative importance of eco-friendly planning elements is excluded. Therefore, in order to derive main planning elements of eco-friendliness that are appropriate for Korea, differences in perception and preferences between experts and general users must be compared, from which main preferences can be extracted based on cross-analysis. We believe that this will result in better and more accurate results in terms of deriving selective elements for eco-friendly planning. We intend to further our researches in the future. The significance of this work lies in the fact that it has identified perception of eco-friendly outdoor playgrounds by general urban resident users and their preferences in planning elements, which can be used as data for deriving planning elements that can enhance use rate of playground and satisfaction of users. If the result of and method used in this research can be used to assist planning of eco-friendly playgrounds by investigating and reflecting detailed opinions of residents and local culture along with their preferred planning elements, it will be possible to build an ideal local-friendly and eco-friendly outdoor playgrounds.

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