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Quality of Child-friendly Spaces in City Parks of Trunojoyo Smart Park and Singha Merjosari Park Malang, Indonesia

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Abstract*—Influence of the urban environment on fulfilling children's playgrounds can be seen based on the quality aspects of public open spaces in the city. This study aims to study the criteria, perceptions and alternatives for developing the quality of child-friendly spaces in city parks of Trunojoyo Smart Park and Singha Merjosari Park, Malang City. Method used in determining the quality of child – friendly criteria using Analysis Hierarchy Process, while in evaluating the quality of child-friendly spaces using Importance-Performance Analysis (IPA) and through interviews with experts for alternative development. The results indicate the main criteria for child-friendly space according to the experts is security criteria with a value of 0.541 and the highest sub-criteria are safe spaces with a value of 0.105. Visitor perceptions on the quality of chil-friendly spaces in Trunojoyo Smart Park and Singha Merjosari Park can be seen by the distribution of park attributes related to performance quality and importance rate according to respondents who are associated with their position in IPA quadrant. Attributes distribution in IPA quadrant for Trunojoyo Smart Park that have good and important service quality are: distance and roads; pathway lane; signage; seating; fences; and garden. Attributes distribution in IPA quadrant for Singha Merjosari Park that have good and important service quality are:distance from the pathway; safe spaces; entrance; pathway lane; and garden. Alternative development in Singha Merjosari Park according to experts is considering designs with those that are influenced by total area, number of playgroud equipments and visitors heterogeneity. The highest development priority of Trunojoyo Smart Park is the play elements of children.*

***Keywords*—** *Child-friendly space, child-friendly criteria, performance quality, alternative development.*

I. INTRODUCTION

The rapid development of cities is not accompanied by the increasing in service quality for all ages. Children as part of the city population should receive good and quality services through a child-friendly city program. Basically, a child-friendly city has a child-based development system through the integration of commitment and government resources, communities and business area that are planned in a comprehesive and sustainable manner in policies, programs and activities to ensure the fulfillment of children's rights [1-3].

Attention to the influence of urban environment on children has been initiated from 1971-1975 through reserach about "Children's Perception of the Environment" by Kevin Lynch. Cities public open spaces become the place where children learn independently, love the natural environment and have strong social relations. Model of child-friendly open spaces in the city is very varied and is a combination of policies and social conditions of the community.

Malang City seeks to always support child-friendly city programs (*Kota Layak Anak*). Malang City received the child-friendly city (KLA) award in 2015 and 2017. This can be seen from the development and revitalization of public parks in Malang City, such as Trunojoyo Smart Park, Singha Merjosari Park, Malabar City Forest, Ijen Boulevard Park and so forth. Along with addition of thematic city parks, it is necessary to study deeper whether city parks have criteria for child-friendly space such as accessbility, comfort and safety, integration, social interaction and so forth. This research conducted a study about the criteria for quality of child-friendly spaces in Malang city parks with the case study of Trunojoyo Smart Park and Singha Merjosari Park Malang.

There are six concepts of child-friendly spaces, namely: policies; encvironmental security; fulfillment of basic rights; environment; residence and planning. The concept of child-friendly city policies as stated by Corsi [4], that there are two supporting models of child-friendly city policies, first, model with an orientation of education, cognition and normative, and second, a promotion model of social participation. The concept of environmental security as formulated by Tranter and Sharpe [5] that the danger of traffic causes parents to pay attention to their children. The study by Tranter and Parson [5] states that the children's world is to play, therefore it is very important for children to get their world through the acquisition of access to play. The concept of fulfilling basic rights was conveyed by Wilks [2] that the fulfillment of children's basic rights to obtain all basic services and security as well as protection from exploitation efforts is also a concern in realizing a child-friendly city. Fulfillment of basic rights also includes the avoidance of children from symptoms of obesity, get sick easily and sadness as stated by Gleeson (2005) in Wilks [2]. The concept of environment is confirmed by Riggio [1] that children have the right to obtain a pollution-free environment and various basic rights. The concept of residence according to Wilks [2] is a child-friendly city that emphasizes the fulfillment of basic needs, one of which is a place to live. The concept of planning provides an overview of the importance in child-support planning in the form of child involvement in predicting the future of the city.

Sub criteria for child-friendly spaces include aspects of location and size; safe spaces; easy access to entrances; circulation path; signage; seating; fence; playground

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equipments; toilet facilities; trees and plants; garden; sand and water playgrounds. The location of child-friendly open spaces should be far from roads, noise and harmful pollution, and should be in areas that are easily accessible to children and have visual views from all directions [6]. Child-friendly open spaces must be easily reached by walking from surrounding environment and schools, also easily accessible to everyone, particularly for parents in supervising. Supporting components such as statues, trees with historical characteristics and structures need to be identified and incorporated into the design [7]. Inspiration in creating unique spaces can be achieved through historical backgrounds and natural panoramas where open spaces are located [6]. The total area and dimensions of open spaces to play vary according to the characteristic of playground environment and relationship between the playground spaces.

Criteria for a safe space include adequate lighting facilities, particularly in all lanes and entrances, emergency telepohones must be placed at the entrance and the fence precisely surrounds and protects the space. Circulation in the space must be clear with the signage provided throughout the space, especially information about the entrance and exit. [8].

Criteria for easy access to entrances for child-friendly open spaces include aspects of functionality, access, dropoff zones and waiting zones. In order for functionality to be achieved, the entrance must be close to accessible paths, dropoff zones, roads and parking areas. Entrance access must encourage a feeling of friendliness and provide quite extensive pedestrian pathways for people and those with special needs. Dropoff zones as a place for parents to queue and pick up their children become an area that must be close to the entrance. Waiting zones in the form of seating area, bicycle parking area and shelter are provided close to the entrance, the entrance must be visual and attract visitors and notify them of information about the space and give them maps and signage [8].

Criteria for circulation path provide accessbility to a space and separate different area functions. The circulation path helps visitors to move between different elements [7], [9]. The main aspects in creating circulation paths in child-friendly open spaces include dimensions, slope levels, lane separation, intersections and surface characters [7], [9].

Criteria for appropriate signage are in the form of important information about the space and provide direction of traffic inside the open spaces [7]. The same style of signage placed in open spaces creates intimacy and eliminates confusion. Two aspects that must be considered when placing a nameplate in a child's open space are the type of signage and design considerations. The type of signage can be divided into three main types, namely: first, information signage such as regulations, closing times and background information that is usually placed at the entrance. Second, the direction signage that serves to give direction to various facilities, routes and playground areas. Third, identification signage that show spesific features such as water facilities or bathrooms. Design considerations in city open spaces signage are logically placed and free form destruction. Signage must have an appropriate height for children with attractive colors and symbols. Signage must be easy to understand using words, letters, images and languages that match the location of the area [7].

Criteria for variations in seating choices, seating can be used to encourage interaction between humans. Seating arrangements can support or hinder social interaction. Stools grouped face to face provide opportunities for conversation and social interaction, while benches back to each other give opportunity for more personal activities [8]. In child-friendly open spaces, a variety of comfortable seating is very important for various tasks such as oberving, privacy, interaction and waiting. Providing various types of seating also creates an attractive aesthetic atmosphere.

Criteria for barriers and fences, fences are used in child-friendly open spaces to protect, separate and make arrangements for activities. Fences can also be used to direct the movement of pedestrians and protect the surrounding vegetation. According to Shackell [6] the following design considerations must be considered when giving a fence in a child-friendlly space, which is barrier, protector, aesthetic. The barrier is designed to protect vegetation and provide plaground elements. The main purpose of barrier is not to keep children out of open space, but instead reduce the impact so the plants can recover and survive. Fences are also used to determine intimate social areas and provide privacy. Protective weather conditions can be used to protect children from sunlight and strong winds [7]. Aesthetic appearance on fences and barriers must be attractive and not obstruct vision. Interesting performance can be produced through fences that have peep holes and have attractive colors and textures that are interesting for children to play.

Criteria for playground equipments, criteria for playground equipments must be able to stimulate muscle development and support movements of the children, a medium for social interaction and fantasy games that stimulate mental development of the children. Playground equipments are multipurpose and support the creativity development and coordination [6]. A well-designed playground ensures equipments can be used by normal children and those with special needs. Playground equipments must have an attractive, aesthetic layout and provoke children's imagination. Criteria for playground equipments for children include challenges, age groups, game choices, sensory variations and the equipment relevance. Dangers or challenges are considered in designing equipment with aspects of safety, eliminating hazards and providing different challenges. Setting a good play allows children to take risks and through a challenge, such as swinging, jumping and climbing [10]. Separate playgrounds must be provided for different age groups, particularly for children less than three years old. This is given to protect smaller and younger children. Well-designed playgrounds have different levels of challenges, which allow the integration of various age groups. Choice of plays must be available to stimulate various activities and ensure that the playground is often used, such as climbing, swinging, crawling, bouncing, jumping, balancing and sliding [7], [10]. Sensory variations in playground equipment aim to stimulate all the senses of children by providing touch opportunities, such as sand, water and different vegetation textures, fragrant

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plant material for fragrance equipment and visually stimulating colored playground equipment. Children usually respons to bright and vivid primary colors [6], [7]. The movement and interconnection of playground equipments that supports the movement nad interrelationshop of different equipment. Therefore, it gives a different level of play. Playground equipments must be visually understanndable for children in many ways to get it on and off. Orientation can be supported through various colors, textures and shapes [6]. Children with special needs must be able to access playground equipments through provision of wheelchair entrances or arrangements for the play [8]. Thematic elements provide opportunities and encourage fantasies of the children, such as riding a rocket or climbing a palace [7], [8]. Access for children with special needs can be made through provision of ram, also variations dan challenges such as wave form, spirals and tunnels. Swings must be placed away from other equipments and tire swings make it easily accessible fro children with special needs. Furthermore, swings must include a safety rope to accommodate all children. Climbing and balancing equipments include a form of climbing games to develop upper body strenght and create challenge. Balancing equipments such as rock, logs and chains can be used to connect playground equipments and areas that are different from each other and very important for the balance and coordination development in children [6], [7].

Lighting and toilet facilities, in child-friendly open spaces, provision of supporting facilities is very important, such as toilet provision and protective facilities for rainfall and strong winds. Other facilities may include storage areas for playground equipments and managers. Adequate lighting is an important factor in creating efficient child-friendly spaces. Lighting can be used as follows: first, lighting for security needed by people at night to aboid crime. Second, lighting for protection against vandalism and crime. Third, aesthetic lighting is used to enhance the beauty of visual elements such as fountains or statues [9].

Criteria for trees and plants, people interaction with vegetation is important in creating child-friendly open spaces where visitors can make a direct contact with vegetation such as cover crops, shrubs and trees. Trees create a variety of play activiities such as climbing, hiding and searching, exploring, discovering, imaginative playing, gathering and touching plants. Leaces, flowers, fruits, seeds, stems and nuts stimulate senses and responses of children [6], [7], [10]. Plants are used as a barrier from wind and shade of light and rain, also attract wildlife and birds [6]. Vegetation marks the passing of the season and develops feelings of the children through pleasant texture, aroma and color. The selected plants must be fast growing, easy to care for, springy and comfortable to touch, and also do not irritate the skin [6]. Child-friendly spaces include plants that eliminate poisoning and injury, and trees that can survive in tree climbing activites. Trees are chosen according to their roots, water requirements, endurance and growing behavior [11]. Vegetation can be used for the following in child-friendly opoen spaces [8] to form space and shape; direct circulation; give special attention; provide shade and protection against the weather; ward off odors and noise; provide sensory stimulation and provide opportunities for learning.

Criteria for setting a garden or kitchen garden, setting a garden or kitchen garden is the best way to allow children for interacting with each other and with nature. They learn about ecological cycles, how to preserve environment and foster cooperation between children. Children can experience different tastes and learn more about various types of fruits and vegetables, thus encouraging them to eat healthy. Kitchen gardens are an effective way to encourage community involvement and encourage interaction between humans [6].

Criteria for environmental sustainability, a good plaground can be designed using recycled materials and combining natural environment as far as possible to ensure sustainability. Integration between trees and vegetation supports environmental sustainability and provision of kitchen garden. Dry leaves, twigs and grass can be repaired back into environment to preserve ecological cycle and provide additional playing opportunities. Furthermore, playground must provide appropriate recycling bins for plastic, cans and paper to create awareness of sustainability in a pleasant manner. Recycle bins can be designed in an attractive way and unique colors to attract children attention [9]. In that way, open spaces of the city are not only a playground, but also support environmental awareness in children for a long term [6].

Criteria for setting a sand playground, sand playground can be functioned as playing materials and safety coatings, also improve the quality of playground. Sand area in child-friendly spaces must be close to a pathway that is easily accessible to children with disabilities [6], [7]. Furthermore, san playground is best located near or under a tree for sun protection and for wind protection. The following criteria are taken into consideration when creating a sand playground in a child-friendly open space, namely the feasibility of sand type, design considerations and water-vegetation. Feasibility of sand type that contains a small grain size facilitates mold making and sculpture and has a low dust content to prevent unwanted allergies. Design considerations include the consideration of sand area must be close to water playground and separated from the active playground equipment, then the access points for children with special needs must be provided. Another consideration is the availability if tables in the sand playground to sculpt and form prints that are easier [8]. Vegetation and water need to be included to increase the range of game and add fantasy to children [7].

Criteria for setting a water playground, playing water will generate multi sensory functions such as sound, texture and aesthetic dimension in children. This water playground equipment allows them to have physical contact with water which can be combined with sand playground to provide a more interesting play [6], [7]. A shallow pool equipped with spray is used in open spaces of the city for children to be able to cool themselves, particularly during the dry season. Children can interact and experiment with playing water through observing sinking and floating materials, thus supporting the development of their intellectual skills. Water playground can be integrated into child-friendly spaces

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through various shapes such as rivers, fountains, spray pools, sprinklers and water tables [8]. The following criteria are used to create a water playground that includes design considerations; circulation, spray and fountain. Design considerations in setting water playground are the proximity between water and sand playgrounds with active playground equipments, and located under the trees for shade and protected from the wind. Seats must be provided for adult supervision and water playgrounds are easily visible from all directions. Water depth must be considered carefully to eliminate drowning risk, for the reason, spray pools and fountains are recommended. Shallow ponds can be integrated with stepping stones and bridges for close contact with water and in the same are very attractive for children [6]. Circulation in setting a water playground is the circulation of water must flow smoothly and not cause health risks, in the same time also provide a relaxed atmosphere. This can be achieved through good water pipelines, water pumps and water treatment. The setting of wtar playground must consider the existing water supply, particularly if there is insufficient rainfall in the area [9]. Spray in water playground settings, the spray area is preferred by children and uses a little water. The smoothest spray is most comfortable for all weather conditions. The spray area must contain a non-slippery surface and different types of sprays can be used to create attractive water bursts. Ideally fountains can be combined as the main aesthetic feature in child-friendly spaces and provide drinking water for visitors. Fountains must be placed in a comfortable place for most children and in appropriate height. Eaach drinkable fountain must be equipped with an equipment that ensures that water is suitable for drinking [9].

TABLE I. Criteria for child-friendly space.

Sub-criteria	**Linkages between sub-criteria and criteria**			
Location & size	Children must feel safe and want to play the area	Within walking distance from the surrounding residences	Improve local character	It appears from all directions
safe space	Improve health and well-being	Promote mobility of independent children	Connected and accessible from the roads	Fences, barriers and lighting increase security
Entrance	Social meeting space	Located close to transportation facilities	Arrival and return points become a space for people interaction	In the form of signage and direction boards visually
Pathway lane	Various types of paths that support a variety of different activities	Pathways can be used by all visitors, including those with special needs	Pathways improve circulation	Pathway lanes are placed closed to arrival area and are always bright
Signage	Designed for playing purposes	Accuracy in height, color, image and for all visitors	Supports the image of “open to all people”	Improve visitors security and provide information and equuipment safety tips
Seating	Encourage interaction between children	Variety of seating options for disabled and non-disabled	Seating integration for obervation, privacy and interaction functions	Comfortable and in a right height
Fences	Provide a sense of security, closure and support for activities	Determine the open space for the entrance	Support integration between disabled and non-disabled	Important security device to protect the space and visitors against vandalism and crime
Playground equipments	Supporting body muscle development, social interaction and fantasy play	Accessible to children of al ages and disabled	Support integration between disabled and non-disabled	Designed to protect children as far as possible
Facilities and toilet	Provide a safe and aesthetic atmosphere	Access to toilet facilities and supporting facilities	Improve the environment beauty and focus points in playground	Safety at night and ensure peace of mind
Trees and plants	Stimulate behavior to explore, discover, and also encourage fantasy and imaginativ eplay. Climbing trees develop upper body strength	Low trees can be accessed for children in wheelchairs. Vegetation can be combined for the settings to be easily accessible for all	Trees create interactive play opportunities between children, while plants are an important element to be shared and loved by everyone	The right tree must be chosen to support tree climbing activities. All dangerous and toxic vegetation must be removed
Setting garden and kitchen garden	Increase social interaction, develop fine motor skills and stimulate sensory	Always updated and accessible to all visitors	Gardening is a group activity that increases community integration and involvement	Gardens need to be elevated or closed where the immediate impact is minimized
Sand playground	A very good media for creative play and social interaction	A variety of sand plays can be accessed by visitors with diasbilities	Support and motivate children to play interactively	The presence of safety coating material
Water playground	Multisensory characters include sounds and textures that make children interested and relaxed	A variety of water plays can be accessed by visitors with disablities	Support and motivate children to play interactively	The water level is shallow, the spray is easily accessible and safe, the water circulation is good for the maintained water quality

II. METHOD

Reseach method used is descriptive method with a quantitative approach to obtain the results of IPA evaluation to visitors of the park as well as AHP to experts related to child-friendly city parks. The research object is thematic parks in Malang City which are managed by the city government, especially by the Park and Cemetery Office. Chosen objects are Trunojoyo Smart Park and Singha Merjosari Park, each park represents a child-friendly park in the middle of the city and a child-friendly park in a residential area.

Questionnaire design of IPA and AHP was focused on quality factors of child-friendly space in city parks. Criteria

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for child-friendly spaces can be grouped into four basic principles, there are play values, safety, accessibility and design integration. Each criteria has the same sub-criteria, there are: location(distance from dangerous road) and size; safe space; entrance; pathway lane; signage; seating; fence; playground equipments; toilet; trees and plants; setting garden and kitchen garden; sand playground; water playground. Evaluative analysis of IPA is used to analyze importance level and service quality according to visitor perceptions. Variables and sub-variables that will be evaluated in this research are child-friendly space variables accroding to the Concept Framework as well as IPA attributes.

Criteria used in AHP analysis consist of four parts as follows:

K1 : Play values
K2 : Security
K3 : Integration
K4 : Accessbility

Meanwhile, there are thirteen aspects in sub-criteria, there are distance from dangerous road and size (A), safe space (B), entrance (C), pathway lane (D), signage (E), seating (F), fence (G), playground equipments (H), toilet (I), garden (J), vegetation (K), sand playground (L) and water playground (M). Furthermore, alternative development in this research is the development based on the elements of the play or game, considered design development and development based on the stage of child development.

Importance-Performance Analysis (IPA) in this research aims to determine visitor perceptions in Singha Merjosari Park and Trunjoyo Smart Park. The perceptions are related to the park attributes performance and visitor satisfaction with the park performance. Visitors will judge from thirteen aspects, whether Trunojoyo Smart Park has been child-friendly or still needs a lot of improvement. Therefore, IPA is very synonymous with qualitative descriptive methods. The analysis of visitor perceptions in Trunojoyo Smart Park and Singha Merjosari Park used input data from questionnaires distributed to 80 respondents, where as many as 39 respondents in Singha Merjosari Park and 41 respondents in Trunojoyo Smart Park. The following is the attribute table used in this research.

TABLE III. Research attributes.

No.	Attributes
1	Distance from dangeroud road
2	Safe space
3	Entrance
4	Pathway lane
5	Signage
6	Seating
7	Fence
8	Playground equipments
9	Toilet
10	Garden
11	Vegetation
12	Sand playground
13	Water playground

The first step carried out in Importance-Performance Analysis (IPA) method is to determine the compatibility level between the importance level and the performance level. This is done through a comparison of performance scores with importance scores, then calculating the average for each perceived attribute. The average of all attributes of importance (Y) and performance (X) are the limits in Cartesian diagram by consumers. The following are IPA calculation results with 80 respondents based on the perceptions result and weighting of all respondents that will be discussed in each park.

III. Result and Discusion

Based on the weighting results of all experts, it can be seen that the highest value of the experts average geometry is the K2 criteria, which is in the form of security with a value of 0.541 (Figure 1). This is because there are three experts who argue that security is a priority in the development of child-friendly parks. The security has been explained, can be in the form of security of playground equipments, security in interacting with each other, security in absorbing information and security in consuming food available in the park. This is in accordance with a research conducted by Munoz [12] which states that playing space of children must avoid danger without reducing the child's motivation to be more courageous through providing safe facilities.

Meanwhile, the highest sub-criteria is sub-criteria B which is in the form of a safe space sub-criteria with a value of 0.105. Sub-criteria for safe space are the highest because of the need to maintain child safety in using all elements of the park. It aims to minimize the dangers that occur in children, therefore a child-friendly park concept is created. The sub-criteria for safe space are also stated by Parson [10] that the creation of safe open spaces refers to the health and well-being of all children protected from all danger conditions.

The lowest sub-criteria value based on the weighting calculation of all experts is the entrance or sub-criteria C with a value of 0.045. This is because the entrance is a very important thing, but less significant since there is enough one gate entrance without having many entrances for a child-friendly park. The importance of one gate entrance system is also used to maintain safety of children in playing in the park. This evaluation is in harmony with the statement by Parson [10] said that the entrance to child-friendly open spaces mainly includes aspects of cuntionality, access, dropoff zones and waiting zones.

Respondents from Singha Merjosari Park had the most visits in the late afternoon, which was as much as 58.97% or as many as 23 respondents from 39 respondents. Meanwhile, the visit time in the morning is between 07.00-10.00 WIB with 14 respondents or 41.03%. The attribute that has the highest satisfaction is garden with a total score of 154. This is because of garden varieties found in Singha Merjosari Park, there are fruit gardens, flower gardens and several other gardens. Meanwhile, the attribute that has the lowest satisfaction is the water playground, which is equal to a score of 95. This is because of the absence of water playground facilities in Singha Merjosari Park.

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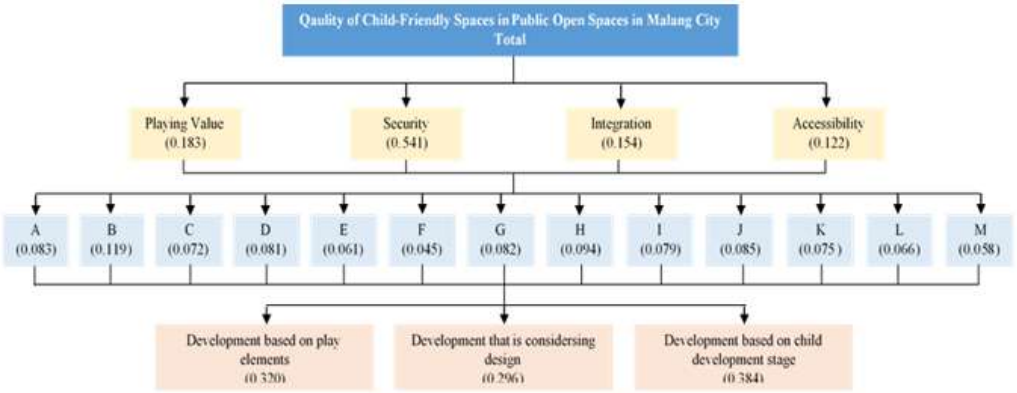

Fig. 1. AHP calculation results.

The attribute that has the highest performance value is safety with a value of 164. This is due to Singha Merjosari Park is considered to have safety for children, they are in the form of location that is quite safe from dangerous roads, fences that limit actvities inside and outside the park and many gazebos that make it easire for adults to monitor their children. Meanwhile, the attribute that has the lowest performance value is sand playground. This is due to sand playground is considered less safe for children. In addition, there are some playground equipments that are less child-friendly, for example in swings. Pavement in the swings area is soil, therefore it is quite hard and able to encdanger children when they fall.

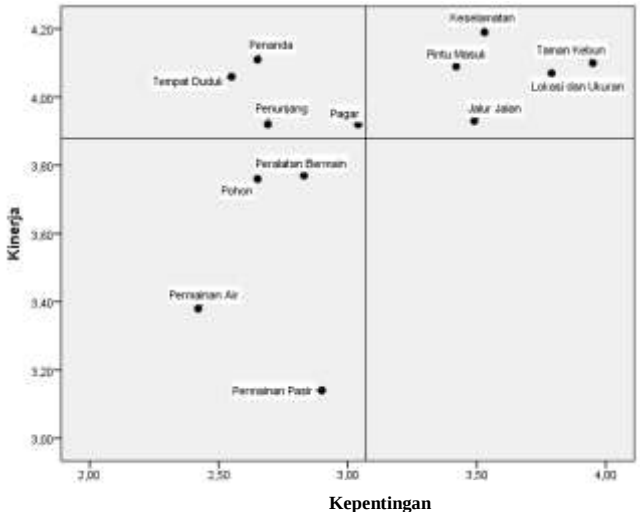

Fig. 2. IPA quadrant of visitor respondents in Singha Merjosari Park.

Figure 2 shows that thirteen attributes used to have a distribution in three quadrants, they are quadrant I, quadrant III and quadrant IV. There are no attributes spread in quadrant II. This is because of no attributes that have low performance and high satisfaction in Singha Merjosari Park. The distribution of attributes in each quadrant is as follows:

A. Quadrant I (Keep Up the Good Work)

a. Attributes in quadrant I are attributes that deserve to be maintained. This is due to quadrant I attributes are considereed to have good and important service quality to serve as the basis for setting a park.
b. Distance and dangerous roads. Distance and roads have been considered appropriate because they are located in a strategic location in terms of settlements and there is no busy traffic, therefore it is not dangerous for children.
c. Safe space, it is considered appropriate because there are fences that limit the activities inside and ooutside the park area. However, the fence is still low and not maximal. In addition, there are paving which starts to break, they must be repaired immediately so it can improve the visitors safety, especially children.
d. Entrance, it has been considered appropriate because it is located in a lane that is not crowded with vehicles and it also has a signage. However, signage is less visible from road in the East side of the park.
e. Pathway lane, which is considered appropriate bacause the pathway lane in Singha Merjosari Park connects each area inside the park, namely playing area, sports area, garden, and so forth.
f. Gardens, it have been considered appropriate because there are several variaties of gardens to increase the visitors insight, especially children.

B. Quadrant III (Low Priority)

Attributes in quadrant III are considered to have low satisfaction and performance values among the average. This causes the attributes in quadrant III to be ignored.

a. Playground equipments, considered to be fulfilling because there are various kinds of plays and are still in good condition.
b. Trees, they are considered fulfilling because there are many types of vegetation in Singha Merjosari Park. In addition, Singha Merjosari Park has many shady areas and there are a lot of garden plants variety and shrubs.
c. Sand playground, it is considered still fulfilling because sand playground is also available in Singha Merjosari Park and in good condition.
d. Water playground, is not available in Singha Merjosari Park area. However, due to the many types of plays and activities in Singha Merjosari Park, the water playground

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was not priotized in the construction of Singha Merjosari Park.

C. Quadrant IV (Concentrate Here)

Attributes in quadrant IV are considered to have poor quality, but are very important. Therefore, the are priotized in the arrangement setting of Singha Merjosari Park.

a. Signage, is considered important, but it is still minimal in Singha Merjosari Park. Particularly, for the entrance sign. The entrance is located in the north of Singha Merjosari Park so it is not visible from the main road around Singha Merjosari Park.
b. Seating, is considered inportant and it is necessary to add, especially in sand playground area inside Singha Merjosari Park.
c. Fence is considered very important because the fence in Singha Merjosari Park is still low and in the shape of shrubs. In addition, it is important for having fences in the parking area.
d. Toilet, is considered very important because of the needs of public infrastructure. Toiltes are a basic need for everyone, it is very important to clean the body after playing or to urinate when playing in the park for children.

Respondents from Trunojoyo Park consisted of 41 respondents. The most visit time from 41 respondents is on the weekend morning, which is as many as 31 respondents or equal to 75.61%. This is because the Trunojoyo Park location is far from school environment. Whereas on weekday, high visits are in the late afternoon, which is as many as 10 respondents or 24.39%. Attributes that have the highest satisfaction value are found in two attributes, they are pathway lane attributes and signage with a value of 156.

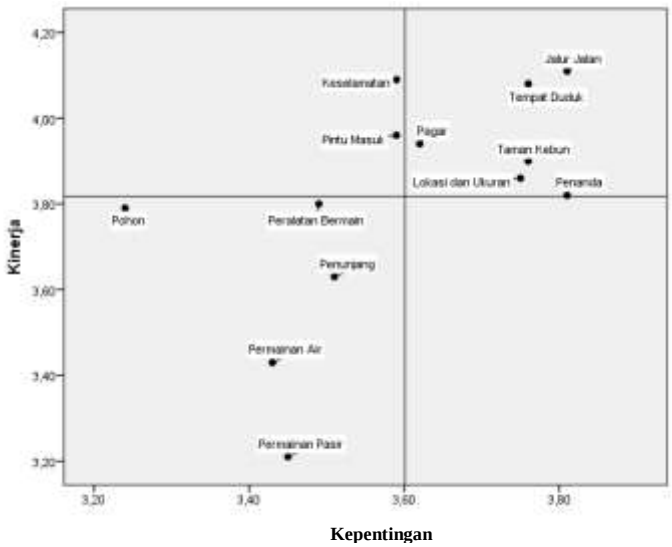

Fig. 3. IPA quadrant of visitor respondents in Trunojoyo Smart Park.

This is because the pathway has been organized and uses paving pavements with good conditions. Whereas the condition for signage, Trunojoyo Park have a sufficient signage, there is a map of Trunojoyo Park near the park entrance. However, there are some unattractive signage, such as the sign at the entrance. The attribute that has the highest performance value is the pathway lane, which has a value of 169. This is because of the regularity in the design and pathway settings inside Trunojoyo Park.

The following is an explanation of the attributes distriibution in three quadrants in Trunojoyo Smart Park:

A. Quadrant I

Quadrant I is an equitable quadrant to maintain the performance of its attributes. This is because quadrant I attributes are considered for haing good and important service quality to serve as the basis for setting a park.

a. Distance and dangerous roads. Distance and road are considered appropriate and should be maintained because the location is in the city center and the size itself is also appropriate. The location is close to Train Station and there is *Singo* Statue as one of city landmarks, therefore the park can be an attraction for Train Station visitors both from within Malang City or outside of Malang City.
b. Pathway lane, is considered appropriate and can be maintained because the pathway lane has been organized in accordance with the needs in Trunojoyo Park. The use of paving pavements is also appropriate because it can provide space to become water absorption.
c. Signage, is considered appropriate and can be maintained because the signage is in a form of a map / site plan of Trunojoyo Park area, there is also an entrance sign. However, the entrance sign is less attractive.
d. Seating, is considered appropriate because the designa nd function are adequate.
e. Fences, are considered appropriate and can be maintained because it has covered the entire area of Trunojoyo Park. In addition, the fence has also been covered with shrubs. The fence can improve safety due to the location of the park area is around the main road and is crowded with vehicles.
f. Garden, is considered suitable and equitable to keep because there is a flower garden and is in accordance with the area of Trunojoyo Park.

B. Quadrant III

Quadrant III is considered to have low satisfaction and performance values among the average. This causes the attributes in quadrant III to be ignored.

a. Playground equipments, are classified as quadrant III because the type of play is less varied, but there are several areas that are often used by children, they are water playground area at certain times.
b. Toilet, is classified as quadrant III due to inadequate and not in accordance with standards for children, therefore they can not be used independently by children.
c. Trees, can be ignored because there are already shady trees and visitors also feel comfortable with conditions in Trunojoyo Park.
d. Sand playground, is classified as quadrant III because it has been classified as adequate.
e. Water playground, can be ignored because they are classified as sufficient and visitors rarely use them at any time.

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C. Quadrant IV

Attributes in quadrant IV are considered to have poor quality, but are very important. Therefore, they are priotized in setting Trunojoyo Smart Park.

a. Entrance, is included as very important because the entrance location is on the West side of Trunojoyo Park area, which is the opposite of a non-formal education institution in Malang City. The location is in accordance with the drop zone which is not in the crowded area of vehicles. This is safe for children because it reduces the danger level. However, the entrance is too small, therefore it is inadequate for visitors who have large postures. In addition, the entrance gate design is less attractive, reducing the aesthetic of Trunojoyo Park.
b. Safe space, is included as very important for children. Safety needs to be improved due to its strategic location can lead to criminal actions. Pavements and materials in some playground areas must be considered so it would not cause serious injury when children fall while playing.

IV. RECOMMENDATIONS

Trunojoyo Smart Park Recommendations

Recommendations for Trunojoyo Smart Park development is carried out by considering the weighting values of attributes in AHP. Priority recommendations are used in order to attributes that must be addressed first in quadrant III and IV from IPA analysis in Trunojoyo Smart Park are known. This is done for the handling of Trunojoyo Smart Park development is right on target according to the needs and visitors satisfaction by taking the considerations of child-friendly space experts into account. Recommendations are made based on attributes found in quadrant III and IV because in those quadrants there is a low satisfaction level of community, but it has a high importance value. Based on these attributes, the strategy for developing child-friendly parks is based on AHP calculation (Table III).

The highest development alternative for Trunojoyo Smart Park is development based on play elements of children. This is because in designing a child-friendly park, it needs to play attention to the park elements based on play elements that are appropriate for children. However, it is necessary to adjust what plays or games that have a good influence on the growth and developmeny of children in order to children can explore their games and motor skills according to the development stages. A broader aspect can be added, as stated by Parson [10], there are type of play that increases the level of attention for concentrating and self-discipline; motor skills development-balance skills and coordination according to the development stages of children.

TABLE IIIII. Trunojoyo smart park recommendations.

Quadrant	Attribute	Priority Score	Development Strategy Based on Child Development Stage
IV	Safe space	0.117	Setting public space area that is visible from all directions. Setting playground that can be reached easily from waiting area for parents.
			Installation of interaction map that can be understood by children in order to make it easy to go to and return to the playground/waiting area for parents independently.
			Setting fences, barriers and lighting that can improve security. Setting pathway lane that connects all directions in order to make children independent. Setting entrance sign that is easily recognized by children, so they are able to be self-sufficient safely.
	Entrance	0.043	
			Provision of post and officers in order to make it easy for monitoring children going in and going out of the park.
III			Improved access to toilet facilities.
	Toilet	0.088	Improved toilet design to be used for children > 5 years old independently.
			Pavements repairment in toilet to support children safety.
	Playground Equipments	0.083	Provision of playground equipments that can provide muscle development, social interaction and fantasy play.
			Provision of age signage that can access child-friendly playground equipments and can be used by children with disabilities. Designing plays or games that can improve sensory and motoric of children in a safe way.
	Trees	0.073	Setting trees and plants to stimulate children behavior in exploring and discovering. Setting trees and plants to encourage children to play in fantasy and imaginative.
			Low trees procurement to be accessed by children in wheelchairs.
			Safe tree planting as a climbing area and is not dangerous and toxic. Setting sand playground that can be accessed by children with disabilities.
	Sand Playground	0.067	
			Setting sand playground that can improve creativity and social interaction of children. Setting water playground that can be accessed by children with disabilities.
	Water Playground	0.055	
			Setting water level, spray quality and water circulation to stimulate multisensory characters (sounds and textures) in children.

Singha Merjosari Park Recommendations

Recommendations for Singha Merjosari Park are based on two considerations, they are the results consideration of AHP analysis and the results consideration of IPA analysis in satisfaction section. Results of IPA analysis are then grouped based on quadrants, then priotized based on AHP analysis.

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This is done in order to the analysis produced is on target according to visitors satisfaction that are considered based on priorities of park experts and children. Recommendations are made based on attributes found in quadrant III and IV because those quadrants are quadrant with a low satisfaction level. Based on these attributes, the strategy for developing a child-friendly park is based on AHP calculation (Table IV).

The highest development alternative for Singha Merjosari Park is in development considering the design. This is because there are four experts who state that the development priority in Singha Merjosari Park is in development considering the design. This is due to the needs to improve the design of Singha Merjosari Park which is influenced by its total area, number of playground equipments, visitors heterogeneity, and so forth. The alternative development can be expanded according to the research results of Parson [10] that stated the elements of design development are mainly those that play a role in development of motion skills and basic skills; building play, creative thinking, problem solving skills; symbolic playing, role playing and fantasy play.

TABLE IVV. Singha Merjosari Park recommendations.

Quadrant	Attribute	Priority Score	Development Strategy Based on Child Development Stage
IV	Fences	0.111	Setting of appropriate height and fence material to support safety of children activities.
			Setting fences that support integration between visitors with disabilities and not.
			Setting fences between basketball playground area to other area in order to control the ball for not leading to other children.
	Toilet	0.088	Improved access to toilet facilities.
			Improved toilet design to be used for children > 5 years old independently.
			Pavements repairment in toilet to support children safety.
	Signage	0.055	Provision of informative map as a part of signage for children so they will not get lost.
			Provision of playground equipments manual as a part of signage that is informative and easy for children to understand.
	Seating	0.050	Setting the sign for entrance that can be easily recognized by children. Setting the seating area that encourage interaction between children. Provision of integrated seating that functions to observe and interact. Setting the seating height that is suitable for children.
III	Playground Equipments	0.083	Provision of playground equipments that can provide muscle development, social interaction and fantasy play. Provision of age signage that can access child-friendly playground equipments and can be used by children with disabilities.
			Designing plays or games that can improve sensory and motoric of children in a safe way.
	Trees	0.073	Setting trees and plants to stimulate children behavior in exploring and discovering.
			Setting trees and plants to encourage children to play in fantasy and imaginative.
			Low trees procurement to be accessed by children in wheelchairs.
			Safe tree planting as a climbing area and is not dangerous and toxic.
	Sand Playground	0.067	Setting sand playground that can be accessed by children with disabilities.
			Setting sand playground that can improve creativity and social interaction of children.
	Water Playground	0.055	Setting water playground that can be accessed by children with disabilities.
			Setting water level, spray quality and water circulation to stimulate multisensory characters (sounds and textures) in children.

V. CONCLUSION

Several conclusions related to the research problem can be formulated based on the results and discussion above, there are: visitors perception of child-friendly spaces quality in Trunojoyo Smart Park and Singha Merjosari Park; the most influential criteria for child-friendly spaces quality in Trunojoyo Smart Park and Singha Merjosari Park, and also the alternative developments according to experts to improve the child-friendly spaces quality in Trunojoyo Smart Park and Singha Merjosari Park.

Visitors perception of child-friendly spaces quality in Trunojoyo Smart Park and Singha Merjosari Park can be seen by looking at park attributes distribution related to service quality and importance level according to respondents who are associated with IPA quadrant. Distribution of each attribute in IPA quadrant for Trunojoyo Smart Park which has good and important service quality is: distance and dangerous roads; pathway lane; signage; seating; fences; and garden. Attributes that are included in IPA quadrant which have low satisfaction and performance values than the average value are: playground equipments; toilet; trees or vegetation; sand playground; and water playground. Attributes included in IPA quadrant that have poor quality, but are very important, therefore they are priotized in setting Trunojoyo Smart Park are: safe entrance and space.

Attributes distribution in IPA quadrant for Singha Merjosari Park which has good and important service quality is: distance from the road; safe space; entrance; pathway lane; and garden. Attributes that are included in IPA quadrant which have low satisfaction and performance values than the average value are: playground equipments; trees and vegetation; sand playground; and water playground. Attributes included in IPA quadrant that have poor quality, but are very important, therefore they are priotized in setting Singha Merjosari Park are: signage; seating; fences and toilet.

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The most influential criteria for child-friendly spaces quality in Trunojoyo Smart Park and Singha Merjosari Park are determined by the weighting results from all experts in AHP. The highest value from the average geometry of the experts is the K2 criteria, which is in the form of security with a value of 0.541. Three experts argue that security is a top priority in child-friendly spaces in the shape of playground security, security in interacting with others, security in absorbing information, and security in consuming food available in the park. The highest sub-criteria is sub-criteria B, which is a safe space sub-criteria with a value of 0.105. This sub-criteria is considered as the main priority to maintain safety of children in using all park elements and to minimize the dangers that occur.

Alternative development for child-friendly spaces in Singha Merjosari Park is based on IPA analysis of attributes that have low performance levels in the following order: fences, toilet, signage, seating, playground equipments, trees, sand playground and water playground. In each of these attributes, a development strategi is carried out, particularly the attribute with the highest priority with a value of 0.111 (fences) such as: appropriate height and fences material to support the safety of children activities; fence arrangement support integration between visitors with disabilities and not.

Alternative development for child-friendly spaces in Trunojoyo Smart Park is based on IPA analysis of attributes that have low performance level in the following order: safe space, entrance, toilet, playground equipments, trees, sand playground and water playground. The development strategy for each attribute is carried out mainly on attribute with the highest priority, which has a value of 0.117 (safe space) such as: setting the are of public space that appears and can be seen from all directions; setting playground that can be reached easily from waiting area for parents; installation of interactive map that can be understood by children in order to make it easy to go to and return to the playground / waiting area for parents independently; setting fences, barriers and lighting that can improve security; and setting the pathway lane that connects all directions for children to be able to be independent.

The highest development priority in Singha Merjosari Park according to experts is the development that is considering the design. Four experts stated that the needs to improve the design of Singha Merjosari Park is influenced by its total area, the amount of playground equipments and visitors heterogeneity. The highest development priority in Trunojoyo Smart Park according to experts is the development based on play elements of children. This is because in designing a child-friendly park, it should pay attention to the elements of the park based on the play elements in accordance with the growth and development of the child.

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