Playground for Children: A Design Model of Playground for Children's Physical Activities in Ngemplak Simongan Kampong

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Abstract. Children need public space, especially playing space as a means of physical activity, developing themselves, forming friendships and getting to know their surroundings. However, the density of urban settlements made it difficult to provide such space so that children use spaces like road bodies and sidewalks. Ngemplak Simongan Kampong is one of the locations for the development of Child-Friendly Thematic Kampong, which are part of the Great Gate program by the Semarang City Government. It is necessary to examine the condition of existing playing space in the kampong and to look for the most suitable playground model for the needs of children’s physical activities. This study aims to determine the model of playground needed by the children of Ngemplak Simongan Kampong to fulfill their physical activities. Quantitative methods are used to identify and map the characteristics of users, activities, selection of alternative locations for children's playground sites, and to create the most suitable model for children's playground. The results showed that Child Friendly Thematic Playground (RT 05 / RW 01) were used more by children aged 6-14 years to play soccer, so the model need to add goals, nets, lighting, and shade trees for comfort. Whereas the playground in RT 03 / RW 01 is used more by children aged 0-5 years to run around and play sand so it is necessary to add sandbox and tunnels.

Keywords: playground, physical activities, child-friendly kampong, design model

1. Introduction
Children need to play in order to gain experience for their development. Playing in public spaces help children to get the opportunity to develop friendships and their relationship with their surroundings [1]. Playing in public space can be done through various activities, and one of it is physical activity [2-5]. Physical activity requires active movements such as playing soccer, running, climbing and jumping [1]. This physical activity helps children move actively so it support the sustainability of children's physical and mental health [2-7]. In addition, this activity is also able to support mental health and increase children's happiness [1,3,8]. But it turns out that children at this time spend more time playing in front of computers, smartphones or watching at home [9]. This supported by parents' fear of the safety of their children if they play in a play area that is far from home [5,9]. Therefore, the environment of settlement needs to provide play area so parents able to feel calm to let their children play outdoors [9]. Settlements in urban villages or kampons tend to not have adequate playing area...
due to limited and dense land conditions [9,10]. Provision of play area is usually provided in unused spaces such as plots in street corner or empty land [9]. Because of the unavailability of decent play area in the urban kampong, children usually play in spaces like roads and sidewalks [9–11]. This situation encourages planners or decision makers to make the settlement environment friendly for children [12]. In Indonesia, awards have been announced regarding child-worthy cities / regencies which are mandated by the Regulation on the Empowerment of Women and Child Protection Number 12 of 2011 concerning indicators of district / city eligible children. Semarang City as one of the major capitals in Indonesia also participated by initiating the development of Child-Friendly Thematic Kampong through the Great Gate program. Great Gate is a program to alleviate poverty by developing a thematic village in Semarang. One of the Child Friendly Thematic Kampong developed in Semarang is the Child-Friendly Kampong of Ngemplak Simongan in West Semarang sub-district which was promoted in 2018. However, the success of developing this child-friendly kampong needs to be studied as well as the solution to the playground model that meets the children’s physical activity demand in Ngemplak Simongan Kampong. Therefore, a research question arises "What is the model of children's playground that can accommodate their physical activities in the Ngemplak Simongan Children's Friendly Park?”. The purpose of this study is to determine the model of the playground needed by the children of Ngemplak Simongan Kampong to fulfill their physical activities.

2. Type of children’s physical activities in public space
Playground increase children's activeness and sharpen children's social, emotional and cognitive development [13]. Physical activity turns out to have positive impact to children's health because of the calories burned while playing [4,14]. The level of children's activity is different, not all of children like to exercise but all children will love playing [1].

Generally children who are actively playing in the playground are the age of growth or are in the category of children who have gone to school [15]. They also usually play in groups and actively move from one place to another [16]. In children, especially those aged five years and over, more smooth muscle movements increase. Thus, a higher level of skill causes them to play games that require greater control of the limbs. These physical activities include: children can run around, children can jump around, children can climb, children can climb stairs, children can play soccer, children can ride bicycles, children can play scooters / skateboards and children can use playground areas. For the example, see Figure 1.

![Figure 1. Examples of children’s physical activities](source: [17])

3. Type of children’s physical activities in public space
Children tend to spend more of their free time in outdoor playgrounds than indoor playgrounds [2,18,19]. Children's playground has several important points in the application of its design [20]. Some of the main points in the assessment of children's playground according to [21] are:

- Security: safe from various disturbances such as trade, crime and accidents. One of the example of this indicator is having a distance of approximately 200 m from the settlement and the visibility of the supervision of parents is 100 m.
- Safety: playgrounds should not harm children. There is no sharp cable as a park guardrail. In addition, there must be no physical material that can endanger children's activities.
- Leisure: there is no interference that makes them uncomfortable, such as scattered garbage, and there are shady seating and trees.
Accessibility: accessibility level is important in a space. Starting from the ease of accessing the playground. The existing fence is easily accessible, it is not located next to a highway or the existing path is clearly separated so that they feel safe and comfortable.

As for the needs of the design model, are also divided into several categories of physical and emotional characteristic [1]. The model is illustrated by several physical and emotional characteristics showed in Table 1 & Figure 2.

### Table 1. Physical and emotional criteria for children's play space

| Criteria                  | Characteristic                                                                 |
|---------------------------|-------------------------------------------------------------------------------|
| A sense of peace and tranquility | • Small ponds with large stones to be surrounded by grass make children feel more calm in the playroom   |
|                           | • Filters or tree fences in the form of shrubs or dry stone walls make the atmosphere of the room quieter but not tense |
|                           | • Observation point or space in creating a space perspective from above      |
|                           | • Shady trees or mini plazas or gazebos to enjoy the beauty of the sky       |
| Children's voices         | • Special rooms for children when discussing can be made with simple wood   |
|                           | • Meeting rooms can also be built with wood or tree house designs or sturdy table designs and accompanied by a large blackboard for discussion. |
| A construction site       | • Facilities that are important in space are able to accommodate their physical activities. If they are many who need a soccer gym providing a goal, a net and a few chairs to rest. If they need space to play sand, provide safe sand, buckets, shovels and toy sand carts. |
|                           | • Provide a sturdy area to be protected from several hazards or security threats. However, the design can be updated by adding accessories in the form of lights so that it does not become a scary room. |
|                           | • Give a space that does not need to be changed so that the child is not hampered in making chaos. |
| A fantastical backdrop    | • The design of the playroom is also important, such as the placement of trees and bushes |
|                           | • Garden lights that make the garden more comfortable                       |
|                           | • Other landscape features such as hills and boulders to explore            |

![Figure 2. Space to talk in groups with ancient designs at Zen Garden](source: [1])

### 4. Methodology

The research used quantitative method. The quantitative method in this study was used to identify and map the typology of user characteristics, user activity and selection of location alternatives for the children's playground site in Ngemplak Simongan Kampong. In addition, this method is also used in making of the children's playground model in Ngemplak Simongan Kampong. The stages carried out by identifying and analyzing the characteristics of users, activities and existing playing space in Ngemplak Simongan Kampong. Then proceed with the analysis of the design elements needed for the children's playground. The results of the analysis design element will be the basis for making the children's playroom model in Ngemplak Simongan Kampong. The technique of collecting data using questionnaires and field observations. The questionnaire was distributed to the children of Ngemplak Simongan Kampong. The sampling technique used in questionnaires is purposive sampling technique,
more specifically, accidental sampling. It means that respondents obtained based on accidental meeting at the observation location. Respondents are children in the age of 0-14 years. Field observations were conducted to observe the physical activities carried out in the playgrounds at Ngemplak Simongan Kampong.

5. Discussion

5.1. Ngemplak Simongan Kampong as Child-Friendly Kampong

The Thematic Kampong is one of the innovations from the Semarang City Government to overcome the problem of meeting basic needs, especially in improving the quality of the environment of poor homes and residential basic infrastructure. Thematic Kampong funded by the Semarang City Budget, which cost Rp. 200,000,000 per kampong and by CSR and community self-help. In 2018, Semarang City has 177 thematic kampong, one of which is Child-Friendly Kampong located in Ngemplak Simongan, West Semarang District.

Child-Friendly Kampong is located in RW 01, Ngemplak Simongan Kampong. One form of embodiment of the Child Friendly Kampong program is the establishment of Child Friendly Thematic Parks in RT 05 / RW 01 in 2018 (see Figure 4). The process of building Child-Friendly Thematic Parks is fully carried out by the Semarang City Government for 3 months. However, the maintenance of Child-Friendly Thematic Parks is handed over to the local authority, which then becomes the responsibility of the community and funded by community.

Some of the citizen previously proposed Field in RT 03 as a child-friendly thematic park, but with consideration of land ownership, then a child-friendly thematic park was established in RT 05. The location of Park in RT 05 and Field in RT 03 is approximately 200 m as shown in Figure 3.

![Child-Friendly Playground (RT 05/RW 01)](image1)

**Figure 3.** Distribution of playing area in Ngemplak Simongan Kampong

![Other playground (RT 03/RW 01 Field)](image2)

5.2. Characteristic of children in Ngemplak Simongan Kampong

The questionnaire respondent consist of 50 childs. Of the 50 people, 42 were male and 8 were female (Table 2 & Figure 5). If seen by age group, it is known that 29 people are in the age group 6-14 years
and 21 others are included in the age group 0 - 5 years (Table 3 & Figure 6). Based on the answers of 50 respondents, it is known that the characteristics of children who use the child-friendly park in RT 05 / RW 01 are majorly male aged 6-14 years. Whereas the user of field in RT 03 / RW 01 were dominated by male aged 0-5 years old.

Table 2. Number of children by gender

| Gender  | Total |
|---------|-------|
| Female  | 8     |
| Male    | 42    |

Figure 5. Chart showing number of children by gender

Table 3. Number of children by age group

| Age Group | Total |
|-----------|-------|
| 0 - 5     | 21    |
| 6 - 14    | 29    |

Figure 6. Chart showing number of children by age group

5.3. Characteristic of children’s physical activities in Ngemplak Simongan Kampong

Based on the findings, there are variations in physical activities carried out by 50 child respondents, namely running, playing soccer, jumping and playing with sand. Running is an activity carried out by all respondents. Then followed by jumping activity carried out by 36 respondents and playing soccer by 35 respondents (Table 4 & Figure 7).

If the data seen based on the gender and age group of respondents, it shows that children who do running are dominated by male and carried out by both of age group (Table 5). Playing soccer is only carried out by male and is mostly done by 6-14 age group (Table 6). Jumping is mostly done by male and 6-14 age group (Table 7). Whereas playing with sand is only carried out by one male toddler and one female toddler (Table 8).

Table 4. Number of children by physical activity

| Physical Activity     | Total | Percentage (%) |
|-----------------------|-------|----------------|
| Running               | 50    | 100            |
| Playing soccer        | 35    | 70             |
| Jumping               | 36    | 72             |
| Playing with sand     | 2     | 4              |

Figure 7. Chart showing number of children by PA

Table 5. Number of Children Conducting Running Activities Based on Gender and Age

| Gender  | Total |
|---------|-------|
| Female  | 8     |
| Male    | 42    |

Table 6. Number of Children Who Play Soccer Based on Gender and Age

| Gender  | Total |
|---------|-------|
| Female  | 0     |
| Male    | 35    |

| Age Group | Total |
|-----------|-------|
| 0 - 5     | 9     |
| 6 - 14    | 26    |
Table 7. Number of Children Conducting Jumping Activities Based on Gender and Age

| Gender | Total |
|--------|-------|
| Female | 4     |
| Male   | 32    |

| Age Group | Total |
|-----------|-------|
| 0 - 5     | 13    |
| 6 - 14    | 22    |

Table 8. Number of Children Who Play with Sand Based on Gender and Age

| Gender | Total |
|--------|-------|
| Female | 1     |
| Male   | 1     |

| Age Group | Total |
|-----------|-------|
| 0 - 5     | 2     |
| 6 - 14    | 0     |

5.4. Characteristic of playground space in Ngemplak Simongan Kampong

5.4.1 Characteristic of children friendly playground (Park in RT 05/RW 01). The condition of the site of the child-friendly playground in Ngeplak Simongan can be seen in Table 9 & Figure 8. These conditions are divided into several areas, including the entrance, the field, the seat, the game facilities, and the security post facing back to the field. This child-friendly park is located in RT 5 so that the users themselves are dominated by teenagers of RT 5 and some teenagers from RT 11 and 12. There is no toddlers in this playground. This is because the residents of RT 5 are mostly teenagers. The residents of RT 11 and 12 sometimes misuse the playground space. These spaces turn into negative space.

Table 9. Design element of children friendly playground in Ngemplak Simongan

| No | Design Element                      | Description                                                                 |
|----|-------------------------------------|-----------------------------------------------------------------------------|
| 1  | Entrance                            | The condition of the entrance itself is made of permanent doors, using iron and surrounded by walls. However, the iron gate itself has been damaged so the gate is missing one of its door. |
| 2  | Volleyball court                    | The condition of the volleyball court looks like a volleyball court in general. However, teens often use this court from evening to night to play soccer. Lighting in this field is very lacking because it only gets light from street lights at night. In addition, there are no other sports facilities to support soccer play. |
| 3  | Sitting chairs                      | The sitting chairs are arranged on the side of the field and made permanently using cement. Beside the sitting chairs, there is a trash can but it is not well-maintained. |
| 4  | Playing and sports facilities       | The condition of the playing facilities in the park is quite alarming. The facilities are damaged and lack of maintaining. In addition, the toilet provided in the playground cannot be used at all because there is no flow of water and there are no lights inside of it. There is sports facility, such as pull-up bar. |
| 5  | Security post                       | This space is an additional space near to the Ngemplak Simongan Child Friendly Playground. The security post is used by children to gather in the afternoon and night. |

Figure 8. Characteristic of children friendly playground in Ngemplak Simongan

5.4.2 Characteristic of other playground (Field in RT 03/RW 01). The conditions of field in RT 03 can be seen in Table 10 & Figure 9. There are lots of vacant land and moor. And this field is wider.
than the field in RT 5. There is a security post located in the middle of the field that faces right into the court. There is a community drill well that usually used when the water is dry. This field is a multi-purpose field so that it can be used for various activities, such as playing soccer, volleyball and badminton. The conditions of roads around the field are quite. So the toddlers are agile playing around this field ranging from running around, jumping and others. The observation shows that the toddlers used this field most.

5.4.3 Characteristic of playground space using. There are 2 playground in Ngemplak Simongan Kampong namely Child-Friendly Playground in RT 05 / RW 01 and Field in RT 03 / RW 01. The majority of the space using in RT 05 / RW 01 Child-Friendly Playground is as physical activity because the design of the playground is dominated by open spaces such as field (Figure 10). There are lots of social interaction carried out at the security post in RT 05 located next to the RT 05 / RW 01 Child-Friendly Playground. While the RT 03 / RW 01 Field is dominated by trees and seating area as a place for people to interact socially. The majority of physical activity occurred at the RT 03 / RW 01 Field is carried out by toddlers, such as running or playing with sand on the edge of the field (Figure 11).

Table 10. Design element of other playground in Ngemplak Simongan

| No | Design Element                              | Description                                                                                                                                 |
|----|---------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------|
| 1  | Entrance                                    | There are stairs to enter this field on several sides, namely the north, south and west sides. The stairs are used by the users as entrance and they feel safe to access the park. |
| 2  | “Taman Toga” and Moor                       | This toga park was created by residents of RT 3, which served to add greenery to the field. While the existing moorings are planned to be the location of RT hall building. |
| 3  | Security Post or Hall                       | There is a security post located in the middle of the field that faces right into the court. The security post is usually used by children to discuss, play and learn or even just enjoying the natural atmosphere. |
| 4  | Sports Facilities (Field and Completeness) | This field is a multi-purpose field so that it can be used for various activities, such as playing soccer, volleyball and badminton. The conditions of roads around the field are quite. So the toddlers are agile playing around this field ranging from running around, jumping and others. The observation shows that the toddlers used this field most. |
| 5  | Seating area                                | The seating area on the RT 3 pitch are permanently made from the walls and are formed in such a way that they are comfortable to use. Plus there are trees that make the chair more shady. |
| 6  | Well                                        | There is a community drill well that usually used when the water is dry. Located in a public space, the top of well is covered by strong iron to make it secure. |

Figure 9. Characteristic of other playground in Ngemplak Simongan Kampong
5.5. Design Model of Playground for Children’s Physical Activities in Ngemplak Simongan Kampong

Based on the assessment of the child’s playground model according to [21], there are 4 assessment criteria, namely the aspects of security, safety, leisure, and accessibility. These four aspects are used to assess the need for playground design elements according to the answers of children in Ngemplak Simongan Kampong. Assessment is carried out by grouping answers according to age groups, namely 0-5 years and 6-14 years (Table 11).

The needs of these 4 assessment criteria differ depending on the age group. In the 0-5 year age group of toddlers, the form of security and safety needed is a safe environment such as from motorized vehicles, physical and playground facilities safety, and accessibility that is close to home. To go to the playground, toddlers aged 0-5 years are still escorted by parents. The tendency of these parents is to choose a playground that is close to home and safer, compared to other parents who have teenagers aged 6-14 years.

While the form of security needed by the age group of 6-14 years is lighting because of the tendency to play at night. Children aged 6-14 years find it safer to play in a playground that has sufficient lighting compared to dim lighting. This is further supported by very high teenage play activities such as playing soccer, playing volleyball etc. Thus, leisure needed is adjusted to the physical activities of adolescents in the age of 6-14 years, like goals, toilets, chairs, and shade trees.

**Table 11.** Design element needed for the children's playground model in Ngemplak Simongan

| Age Group | Design Element                  | Children’s Answer | Percentage |
|-----------|---------------------------------|-------------------|------------|
|           | **Security**                    |                   |            |
|           | Safe environment                | 14                | 67%        |
|           | **Safety**                      |                   |            |
|           | Non-slippery base               | 6                 | 29%        |
|           | Base covered with grass         | 10                | 48%        |
|           | Toddler-friendly physical facilities | 10               | 48%        |
|           | **Leisure**                     |                   |            |
|           | Large                           | 20                | 95%        |
|           | Toy                             | 10                | 48%        |
|           | Chair                           | 10                | 48%        |
|           | Court/field                     | 10                | 48%        |
|           | Shade tree                      | 11                | 52%        |
|           | **Accessibility**               |                   |            |
|           | Close to home                   | 21                | 100%       |
|           | **Security**                    |                   |            |
|           | Lamp                            | 13                | 45%        |
|           | **Safety**                      |                   |            |
Field in RT 03 / RW 01 fulfills the criteria for the needs of children aged 0-5 year, namely wide and close to home, so this field is more suitable to be the playground for the 0-5 year age group. This also supported by the fact that the existing users are dominated by children aged 0-5 years. Whereas for child-friendly playground located in RT 05 / RW 01, is dominated by users aged 6-14 years. The addition of design elements will then be adjusted to the criteria according to the needs of each age group where the field RT 03 / RW 01 takes into account the needs of the 0-5 year age group and child friendly playground RT 05 / RW 01 adjusted to the needs of the 6-14 year age group.

The addition of design elements in the field RT 03 / RW 01 is in the form of providing tunnels and sand playing boxes (See Figure 12). This because of tunnels and sand box are one of the facilities or play facilities that can stimulate sensory and motoric development of children aged 0-5 years. Bases on the location of tunnels and sand box need to be supported by the provision of grass so that children's safety can be guaranteed. Toddlers aged 0-5 years tend to be more prone to fall and get injured so the provision of grass is expected to minimize this.

In addition to adding these elements, the RT 03 / RW 01 field has sufficiently fulfilled other elements such as the availability of shade trees, fields and seating area. The availability of shade trees supports comfort in doing the physical activity. While the field can be used to play ball, and seating area are used to rest by children when they are finished playing or for parents who are waiting for their children to play.

Figure 12. Design model of playground for children’s physical activity in RT 03/RW 01 Ngemplak Simongan Kampong

The addition of design elements in Park RT 05 / RW 01 is adjusted to the users of Park RT 05 / RW 01, namely teenagers aged 6-14 years. Activities of adolescents aged 6-14 years are very active in sports, namely playing soccer and playing volleyball, so the addition of design elements that are suitable is goals, nets, lighting, and shade trees (See Figure 13). The addition of goals and nets is suitable to physical activity that is often carried out by adolescents aged 6-14 years in Park RT 05 / RW 01, which is playing soccer. The addition of lighting is a form of security because children tend to play football at night. Because during the daytime these children are still in school, and also playing soccer in the afternoon is very hot. This is due to the absence of shade trees in Park RT 05 / RW 01, so that one of design elements that need to be added in park RT 05 / RW 01 is shade tree.
6. Conclusion

The Child-Friendly Playground located in RT 05 / RW 01 is majorly used by teenagers (6-14 years) to do physical activities such as playing soccer. While the field in RT 03 / RW 01 is majorly used by children aged 0-5 year. The playground model is designed according to the user needs of each playground. So the design elements that need to be added to the Child-Friendly Playground RT 05 / RW 01 are goals, nets, lighting, and shade trees in accordance with the most carried out physical activity, namely playing soccer. While the design elements that need to be added in Field RT 03 / RW 01 are sand box and tunnels to support the physical activities of children under five year who play a lot in Field RT 03 / RW 01.

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