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Implementation of Equitable and Flexibility of Use in the Design of Public Housings in Jakarta, Indonesia

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Abstract. Population growth happens in Indonesia, especially in Jakarta. With reduced land due to infrastructure development, population growth does not parallel the need for housing. One solution is to make the construction of residential houses arranged vertically called public housing. It can reduce land use and create urban open spaces. Public housing should be based on a community-based and inclusive design approach considering human diversity with any ethnicity, religion, race, and more. The design of public housing in Indonesia has not met the needs of all humans, especially regarding all ages and disabilities. In the design, it is expected that the use is carried out fairly, which is fair for users and flexibility in space. Aspects of equitable use by pedestrian access and facilities, along with space flexibility based on expandability, convertibility, and versatility. The method used is a qualitative method with the exploration of three cases of public housings. The variables used are inclusive design aspects related to equitable use and flexibility in use. The results reveal that public housing is recommended according to equitable use aspects, inclusive design factors with pedestrian access that is easy to understand and accessible to elderly users and wheelchairs, and affordable facilities. Spaces can be built in the long term with space flexibility, such as multifunctional communal spaces, expansion of spaces near public spaces for unexpected uses, as well as shared use for all users.

Keywords: settlement, public housing, inclusive design, human, Jakarta.

1. Introduction

The Special Capital Region of Jakarta is a city that is the centre of government, economy, and services at this time and makes low-income immigrants from outside the city of Jakarta seek and continue their lives by creating a life by making housing that has the character of each culture by crowding the city of Jakarta, which are often found on illegal land and government land. (Nurdiani, 2015). The problem of limited land for residential houses continues to be a topic that continues to grow and has not been completely resolved. Following the 1945 State Constitution of the Republic of Indonesia clause 17 verse 2, which states that the people of the state have the right to work, and a decent life based on humanity, including housing. The feasibility of housing built for low-income communities includes various factors such as economic, social, and cultural factors of the community in election preferences. (Irfiyanti & Widjonarko, 2014). The construction of public housing is one big step toward solving the problem of the high demand for housing.

The basis for the construction of public housing has been regulated in Law Number 20 of 2011 concerning public housing. Procurement of public housing has been discussed regarding explanations, efforts, and the reasons for forming public housing. The implementation of public housing is also regulated by Government Regulation Number 13 of 2021 concerning the implementation of public housing, which is directly related to the things that have been determined in Article 51 and Article 185 letter b of Law Number 11 of 2020 concerning Job Creation. Based on data from the Central Statistics Agency of the Special Capital Territory of Jakarta (Daerah Khusus Ibukota Jakarta) Province, the number of towers in Jakarta, especially

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North Jakarta, in 2021 is 21 towers out of 51 towers in the Special Capital Territory of Jakarta (Daerah Khusus Ibukota Jakarta). The construction of public housing is feasible and meets the current needs. However, the construction of public housing is still unable to revive the community's characteristics based on the needs of all residents without exception. Designs created for special needs become a necessity, not based on rights (Hanson, 2004). The development of public housing in Indonesia still relies on public housing with the concept of “special needs” (Hanson, 2004) that makes users with disabilities and elderly people different, and the design tells users what they need. The concept can create stigmas and barriers for people with special needs and ordinary people even though all humans have the same rights and status. The linkages or connections can see characteristics of a village into a unified building. With that, the activities carried out are identical to togetherness (Sutantio & Prayogi, 2021). The community's lifestyle in neighbouring villages where the location in the communal area is very flexible, one location can change functions and adaptation results from daily activities (Gunawan & Sunaryo, 2015). Public housing design based on diverse community life needs to pay attention to the aspects of fairness and flexibility in the use of space contained in the inclusive design approach (Center for Universal Design, 1995). The inclusive design aspect can be related by comparing several existing public housings in Indonesia and comparing back between the existing context in Indonesian public housing and the application of the inclusive design aspect. This paper describes the findings of the context of inclusive design in public housing according to the characteristics of Indonesian society.

The indicators for liveability are the criteria for the adequacy of a floor area of at least 7.2 square meters, having access to proper drinking water, sanitation, and building resilience. Efforts have been made to provide public housing for the community as stated in the Presidential Regulation of the Republic of Indonesia Number 7 of 2005 concerning the National Medium-Term Development Plan, which explains that low-income communities must be provided with adequate and healthy housing (Putra & Yana, 2007). Inclusive design is a form of responsibility for everyone, including architects. Designs should be assessed for achievement in an inclusive environment. A good design should reflect the diversity of people who use a design without imposing boundaries on many people, including people with disabilities, the elderly, and small children. (Fletcher, 2006).

In Australia, housing projects have demonstrated to the public and private housing market that they can better respond to the complex needs of people with disabilities and lead to the company's main objectives (Zeeman *et al.*, 2016). In Indonesia, the focus is still on the economic or investment in residential construction without prioritizing access for all users (Manaf *et al.*, 2016). Providing inclusive housing emphasizes security and accessibility issues. It should also emphasize broader elements such as housing location, environmental quality, and overall design. The provision of inclusive housing should also be linked to how users or building design can contribute to housing solutions for people needing health care and support. The location of the building or housing must be close to available resources, and the nature of the surrounding environment can be relevant to people with special needs in their health needs (Wright *et al.* 2017).

Inclusive design aims to meet the internal use of buildings that support persons with disabilities. Supporting designs include providing an open lobby, configured elevators, and knobs installed at reasonable heights. Space is also needed to open its doors, making way for wheelchair users. The lighting quality in the building can affect the perception of accessibility of users with disabilities and includes common area spaces for the use of facilities and their welfare and convenience (Attakora-Amaniampong & Appau, 2021). The principle of inclusive design has been developed to produce seven aspects (Center for Universal Design, 1995). Two aspects were chosen to be discussed further as limitations of the approach in public housing: equitable use and flexibility in use.

House construction has an inclusive design concept that everyone with a long-term building can use (Anisa *et al.*, 2021). The main aspect that must be met in equalizing users is the aspect of equitable use. Fair use is closely related to users who have various abilities and limitations (Preiser & Smith, 2011). This aspect is divided into two: pedestrian access and provision of facilities. Pedestrian access related to the principle of accessibility based on the Regulation of the Minister of Public Works Number 30/PRT/M/2006 concerning Technical Guidelines for Facilities and Accessibility in Buildings and the Environment includes access to ramps, stairs, lifts, pedestrian paths, and guide lanes. Provision of facilities such as educational facilities, health, worship, social development, sports, government services, and shopping (Sunoto, 2020). Facilities are carried out for various age groups and different types of needs or various types of users. Circulation access for wheelchair users and people using trolleys can help with ramps or curb cuts, but for visually impaired users, it causes problems because it is difficult to detect the edge of the pavement. Fair design considerations in the design of inclusive designs must pay attention to the considerations of the community, not only individuals. Justice should aim at the broadest possible audience and not focus on considering treatment in terms of utility. (Bianchin & Heylighen, 2017).

Flexibility in use can also be detailed with three flexible concepts that can be implemented in public housing design (Sutantio & Prayogi, 2021). This aspect is divided into three: expansibility, convertibility, and versatility. Expansibility regarding space changes that can be made to expand or modify space. The convertibility of the atmosphere that can change and the orientation of the building in the future is based on the user's needs. Versatility regarding the use of multifunctional spaces. The design must be flexible, which goes hand in hand with how the design accommodates the space program. Even though multipurpose spaces have been around for years, there is still the kind of flexibility that needs to be implemented to allow spaces to transform spaces and accommodate novelty-related programs and designs. (Burlo', 2019). The main aspects, such as equitable use and flexibility, have been represented in each derivative aspect with linkages to existing regulations and laws in Indonesia. With this connection, it is hoped that the design of public housing can bring justice and comfort to user activities in Indonesia for the diversity and character of users who respond to the inclusive design itself.

2. Methods

The method used is a descriptive qualitative method with analysis from several sources and a combination of data (Nafiq & Firmandhani, 2021). Data collection was carried out by studying literature to find elements that refer to the community regarding inclusive design. This study was used to guide the analysis. After that, primary data collection was carried out, such as site surveys of existing public housing to determine the advantages and disadvantages of inclusive design. In addition, secondary data complement the primary data found from journals and books about public housing that discuss circulation, the area of space and its use, and the activities of the occupants of the public housing. Secondary data also looks for the design of public housing built in Indonesia to be compared. In addition, regarding the inclusive design, the application abroad and in Indonesia itself is also considered related to the aspect of fair use and flexibility that has been applied to the form of the building. In readings in Indonesia, it is stated in regulations that discuss disabilities and the use of disabilities.

Data analysis was carried out after the data was collected and then analysed and compared with the established guidelines. The method used is a case study comparison method to find patterns of implementation forms (Wicaksono *et al.*, 2022). The comparison is made by comparing three public housing in Indonesia, especially in one area to facilitate the comparison, namely North Jakarta, the Special Capital Region of Jakarta, with an inclusive design aspect. In the aspect of inclusive design, two main aspects are determined, namely

equitable use and flexibility in use (Center for Universal Design, 1995). This is described as fairness which leads to accessibility, and flexibility can lead to expansibility, convertibility, and versatility (Sutantio & Prayogi, 2021). After being analysed, it can be concluded and evaluated regarding case studies of public housing to produce public housing designs that match the inclusive design aspects and characteristics of the Indonesian people.

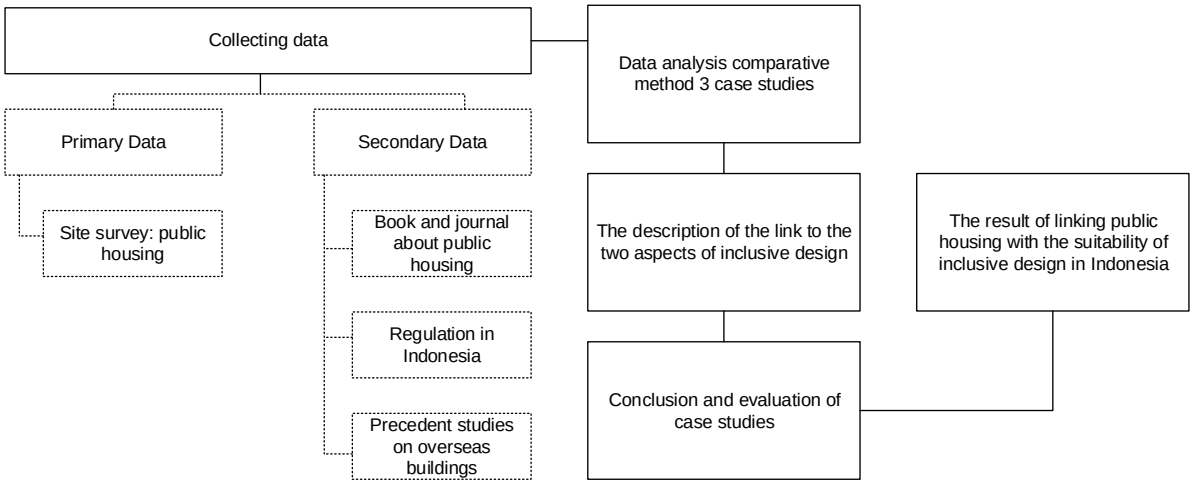

Figure 2.1. – Schematic method (Author, 2022)

3. Discussion

This discussion is divided into two: comparing three public housings built in North Jakarta with inclusive design aspects and findings that can be applied to the design of public housing according to the characteristics of public housing users in Indonesia.

3.1. Comparison of public housings in North Jakarta, Indonesia

A comparison of public housing is carried out in the North Jakarta area to compare the surrounding sites. North Jakarta has 51 towers for public housing with a total of 283 blocks and 28,766 units in 2021 in 42 locations based on data from the Central Statistics Agency for DKI Jakarta Province (2019-2021). The comparison is made by comparing three public housings in North Jakarta, namely the Nagrak Public Housing (case 1) in Marunda Village, Cilincing District, Aquarium Village Public Housing (case 2) in Penjaringan, Penjaringan District, and Marunda Public Housing (case 3) Kelurahan Marunda, Cilincing District. Comparison with the inclusive design aspect, namely equitable use with pedestrian access variables and the provision of facilities. In addition, there is an aspect of flexibility of use that uses three variables: expansibility, convertibility, and versatility. These variables will later find findings that are compared with the ideal criteria for inclusive design in public housing.

Figure 3. 1. Three public housing in Jakarta (Author, 2022)

In the aspect of equitable use, pedestrian access must be considered. Ramps and lifts are only owned by case 1, and ramps should be an essential aspect of inclusiveness and lifts to cater to wheelchair users and make it easier for children to feel more secure. Safety in 3 cases is not paid attention to and limiting the pedestrian aspect with railings and plant barriers should be possible. However, case 2 has implemented an inclusive design by facilitating access from all sides for pedestrians that incorporates an inclusive element. The corridor also needs to be considered for its expanse because it must accommodate access for wheelchair users, which is not the case in case 1. The provision of space is also considered for fair use of rooms in cases 1 and 2; rooms with disabilities are only on the ground floor, while case 3 has not done this at all. The rooms should not be differentiated because, just like the users on the upper floors, they will also age and may be inhabited by people with disabilities without restrictions. The health centre is fulfilled, but in case 1, the children's play area is still not fulfilled even though, for an inclusive design, all users must be accommodated for all ages. In the health area, cases 2 and 3 do not yet exist, and they should have accommodated a clinic. Educational facilities are also not available in cases 1 and 2, and case 3 still has a distance to facilities that should have been accommodated in public housing. Parking is still not close to the apartment, which will make it difficult for wheelchair users. The area of worship has been accommodated in cases 2 and 3 but not yet in case 1, which should have been accommodated for the inclusiveness of religious communities. In cases 1 and 3, there is no shopping area yet. It should have been accommodated because some of the residents are traders who can sell for the needs of the residents of the public housing.

In terms of flexibility as an inclusive design aspect, the first is that expansiveness can be applied in the worship area by providing a communal area that can be converted to widening the congregation area, but in all three, it has not been fulfilled. Convertibility can also be implemented with units that can change the front area as a trade area that has not been fulfilled, case 2 already exists, but there are no buildings that can be returned, only ideas from residents. On the element of versatility, communal space can be applied for the gathering area for residents of public housing with various activities. This has been implemented, but still, on the ground floor, there is not daily or weekly small communal space that can facilitate occupant interaction for inclusiveness.

Table 3. 1. Comparison of Aspects of Public Housing in Indonesia to the ideal of Inclusive Design (Author, 2022)

Aspect	Nagrak Public Housing	Akuarium Village Public Housing	Marunda Public Housing	Finding
Equitable Use				
Pedestrian access	There is a ramp to the lobby	No ramp for circulation	No ramp for circulation	Public housing has not implemented ramp for disabilities or heavy goods assistance.
	Each tower has a lift with 16 floors.	No elevator with 5 floors.	No lift with 6 floors.	Cases 2 and 3 that do not use the lift will make it difficult for wheelchair users
	No circulation side protector	Easy pedestrian access from all sides	No known safety of pedestrian circulation	Lack of attention to safety on each pedestrian path
	The corridor has sufficient stretch, but for wheelchairs, it still needs additional	The corridor between the rooms is sufficient and can be used as a gathering area	The stretch of the corridor is enough to have a void in the middle to interact	The corridor has not thought about the use of wheelchairs throughout the area
Providing Space and Facilities	Disabled rooms are on the ground floor	Disabled rooms are on the ground floor	Not yet accommodate disabled rooms on any floor	Public housing still accommodates disabled rooms only on the lower floor

Aspect	Nagrak Public Housing	Akuarium Village Public Housing	Marunda Public Housing	Finding
	The community hall is fulfilled, but there is no children's play area	There is a community hall and a play area.	Available RPTRA (*Ruang Publik Terpadu Ramah Anak*)[1]	Community halls and public spaces are accommodated but not child-friendly in case 1
	Area/health center fulfilled	No health area	There is no permanent place, and there is a temporary post	Still need permanent health area in cases 2 and 3
	The car park is quite far and only at one point	Parking will later be accommodated on the edge of the building, and it has not been appropriately accommodated for now	Parking is not sufficient, there are still many who park on public roads, but there are feeder buses	Parking is still far from accessibility between parking spaces to flats and does not match the estimated number
	No educational facilities	No educational facilities	The distance between junior high and high school is 3 km, not integrated with public housing	Educational facilities have not been accommodated properly, especially for PAUD *(Pendidikan Anak Usia Dini)*[2] or SD *(Sekolah Dasar)*[3]
	No prayer room	No prayer room	There are facilities of worship (Masjid Marunda) which are quite large	Some are not there yet, but some have filled the worship area
	There is a shop on the ground floor and a business area	There is a place to shop or stall in each tower	There is a shopping area on the ground floor, and there is a market	The shop area is essential in the user's economy
Flexibility in use				
Expansibility	No area for space expansion	Musala does not think about crowding out congregations	Around the mosque area can be used if the congregation is overflowing	Worship facilities have not considered the abundance of visitors or mosque congregations
Convertibility	Permanent unit, no convertibility	The front of the unit is used as a business area	Permanent unit, no convertibility	Many 'rigid' space developments still cannot be changed for the unit
Versatility	There is a community hall that can be used/a community garden	There is a hall in each tower, as well as a playground area, futsal field	There is green land outside the flat that can be used for various activities	The placement of the community hall is good, but cases 2 and 3 are only located on the ground floor.

Based on a comparison of three public housings in Indonesia, public housing is still classified under special needs by indicating that elderly users and users with disabilities have "special needs" (Hanson, 2004). In contrast, in an inclusive design, users share generic needs. By making it a scope of the village, public housing can accommodate the characteristics of the patterns, behaviour, habits, customs, culture, and social methods in the village by themselves (Sutantio & Prayogi, 2021).

3.2. The application of inclusive design to public housing's design

[1] RPTRA (Ruang Publik Terpadu Ramah Anak) or Child-friendly Integrated Public Space is a public space in the form of a child-friendly green open space equipped with various facilities in Indonesia..
[2] PAUD (Pendidikan Anak Usia Dini) is early childhood education, also known as nursery education through formal, non-formal, and/or informal education in Indonesia.
[3] SD (Sekolah Dasar) or primary school or elementary school is a 6-year learning school from 6-12 years old in Indonesia.

The implementation based on the gap that occurs in Indonesian public housing can be compared with what should be applied and linked to the characteristics of the residents of the public housing.

The inclusive design concept for equitable use aspect

The response that will be applied in the main building results from the findings of the comparison of public housing, namely pedestrian circulation access and supporting vehicles. In building design, it is easier for pedestrians to walk straight, not winding or in a zig-zag shape. Simple layout and circulation patterns are easy to remember without confusing children or other users (Kartika *et al.*, 2018). The entrance access door can also accommodate the feeder bus drop-off area, entrance lobby, and northern access for areas outside the public housing who want to use social and public facilities together by making the range of facilities more comprehensive and a solution for residents and nearby visitors. Circulation is also assisted by signs explaining space and access for public housing users.

Public housing must also use the help of vertical elevator access if it is from 5 floors based on the Regulation of the Minister of Public Works and Housing of the Republic of Indonesia Number 14/PRT/M/2017 concerning Requirements for Building Ease of Building, as well as assisting the circulation of the elderly and disabled. The disabled unit applies to all without division between units so that there are no difficulties if the occupants of the public housing are getting old and experiencing changes in circumstances. Making ramps and lifts a standard for people with disabilities on pedestrian paths (Ikhsani & Setyowati, 2021). The construction of public housing with access can be observed from the proximity of residents' units to visual views and physical proximity, free of circulation by not cutting the circulation flow and simple for users of public housing (Darmiwati, 2000). Following the use of doors for persons with disabilities, the width of the door for the entire space requires a door of at least 80 cm so that wheelchair users can use it with a friendly door handle with a height of no more than 75 cm (Wibawa & Widiastuti, 2019).

Figure 3.2. - Illustration of pedestrian access perspective with the help of water pools and residential corridors (Author, 2022)

For ease of circulation, several waterways have also been placed that function as guides for users with visual limitations, and the sound of gurgling pool water will help to hear in addition to being the aesthetics of the building (Hamraie, 2017). The water area is located along the pedestrian entrance. Building corridors can have a width of about 3 meters that accommodate wheelchair users and as a gathering area for residents. Corridor paths for inside and outside the building that is limited by two walls must pay attention to the dimensions of the space related to wheelchair circulation (Wibawa & Widiastuti, 2019).

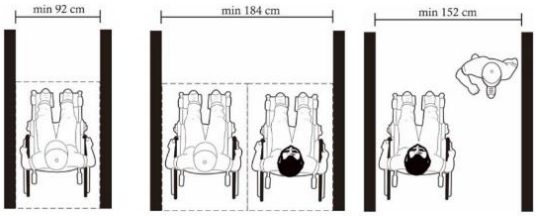

Figure 3.3. – Ideal standard corridor for wheelchairs (Wibawa, 2019)

Facilities can be in the public housings of the public zoning section. Facilities must be based entirely on the needs of residents, such as children to adults. Profession residents also feel comfortable. The parking facility must be easily accessible to the apartment building. Parking can also be provided for carts for residents who have jobs as garbage collectors or trade (Darmiwati, 2000). Service and educational and commercial facilities can be located on the ground floor for building zoning and gathering close to access. The built facilities can also be used for those who do not live in the public housings or are newcomers. The diverse community in Indonesia makes public housing must be able to accommodate all in a physical, religious, social, and cultural context. Accommodate facilities, for it is helpful to establish justice for users.

The inclusive design concept for flexibility in use aspect

The flexibility of use lies in the spaces in the design of the public housings. Linkages as a unitary diversity of citizens such as objects of user relations such as plazas, and halls, can also be determined with a sufficient proportion of open space (Sutantio & Prayogi, 2021). Placing public facilities close to green open spaces for land use if expanded. Space flexibility is formed and can be used for various activities. If there is a mosque with a separate building, the lower part of the mosque can be used as a multipurpose area that can be used for Koran lessons, recitations, as well as religious activities, and libraries that do not disturb the peace in the mosque. To add an education area for early childhood can also be used in the morning and not every day. Other uses can be used as an empowerment area for residents for small classes of residents, such as ways of processing waste, handicraft workshops, and other productive activities. Communal space can also be used for more than one activity simultaneously.

Plaza, which is an open space, can be an additional area if other space functions are not fulfilled. The very close component of the village is the atmosphere created that has the same fate and provides high family-oriented or kinship, which is synonymous with communal life (Gunawan & Sunaryo, 2015). The pattern of using open space can accommodate the activities of housewives. Activities carried out such as talking, raising children, spiritual activities, and social gathering (Mariana, 2011). Besides that, it can also be used for the needs of museum events held on plazas and other activities. The green space around the building for the green belt and water catchment area can be used as a public space for the village as a children's playground and areas for other public housings (Karima *et al.*, 2018). Green open space can also be used to grow crops with the concept of family medicinal plants and urban farming. Households that implement urban farming in their area will have better food security (Anggrayni *et al.*, 2015). Handling after harvest can be given a place to store and increase marketability and help the economy of the residents of the apartment.

Figure 3.4. - Flexibility perspective on plazas and communal spaces for each residential floor (Author, 2022)

Each residential floor has a communal space that functions as a meeting area and performs activities needed to live alongside other residents for versaility. The public housing residents are full of togetherness with social conditions, which are marked by event activities such as feasts, proposals,cultural and religious events such as *tahlilan, selametan, sunatan*, and more. (Darmiwati, 2000). There are large and small communal spaces on each floor, which are used as functions for *Rukun Warga (RW)*[4] and *Rukun Tetangga (RT)*[5] events. According to Gunawan & Sunaryo (2015), communal space can be divided based on the period from the largest to the smallest. For the largest, it can be a monthly communal area, medium for weekly communal areas, and small for daily communal areas whose capacity is shrinking. Communal spaces spread across all floors will make it easier for users to interact. (Gunawan & Sunaryo, 2015).

Figure 3.5. Unit type (Author, 2022)

Designing a space that can become a space for growth in each unit as an economic area or increase the space for activity needs. There are alternatives from various unit types with the use of growing space created as a need for residents' activities and economic support for each family in one unit. The growing space can be developed into a shop for buying, selling, and others. Aspects that can be taken and applied from inclusive design is the convertibility of the public housing's unit space. If the space wants to turn into a closed and private space, the unit can use modular panels instead of walls that can be disassembled and reassembled (Ariyani & Hidayat, 2016). Insulating walls can use materials that are easy to install, such as iron connectors and Kalsi board or woven bamboo (Sutantio & Prayogi, 2021).

[4] Rukun Warga (RW) or pillar residents, is the management department in Indonesia under the village or kelurahan (or under dusun or village), which is still above RT.
[5] Rukun Tetangga (RT) or pillar of neighbors is the lowest management department in Indonesia that works for the village under a pillar of the citizen.

4. Conclusion

The main inclusive design aspects that can be applied to public housings are equitable use and flexibility of use. Each variable can lead to a design concept that is expected to answer the lack of concern for fellow users, including elderly users or those with special needs, for the design of public housings by maintaining the atmosphere and characteristics of the village. According to the aspect of fair use, pedestrian access variables are easy to understand. Pedestrian access can also be easily accessed by public or private transportation that is considered wheelchair users, as well as additional signs, to assist paths and spaces such as door sizes and room maneuver sizes. Pedestrians also consider the distance between buildings and outside areas, such as parking, lobbies, shelters, and more. The existence of facilities is also essential for users who vary in conditions of age range, activities, and beliefs. Facilities also need to facilitate, such as service and educational facilities. This can explain justice for users of all ages and physical conditions. Elements of user characteristics will also appear by being able to greet and communicate without restrictions because access is made more accessible. Community elements will develop and can be helpful to each other in each community.

Flexibility can also be characterized by convertibility, expansibility, and versatility in the use of existing space in public housings. Its application can be made in communal spaces and public spaces that all users in versatility can use. Expansion is also needed as well as a plaza space close to the area of worship that can be utilized if there is an increase in congregations. The apartment unit can be a growing area or unit expansion. Growth space can be characterized by changes in the space for the user's economy, which is called convertibility. The growing space can be used as an expansion area for disabled units, used as a place of business for residents, such as opening a stall, or as temporary lodgings such as boarding units or homestays. The flexibility of open space also helps the community to be able to make the best use of it according to their needs. Use at events can be helpful for public housing with inclusive design hooks.

Public housings will affect the character and quality of the occupants, so the design of the building must follow the factors applied in the inclusive design. Indirectly, inclusive design helps the community movement to be more comprehensive and without boundaries that interfere with activity and togetherness for apartment users. This paper is a complement that details the two aspects of inclusive design and becomes a comparison of what has happened in public housings in Indonesia and its improvements. The results of this paper are expected to be a reference for both the government and the private sector in designing and developing public housings in Indonesia, especially for the Special Capital Territory of Jakarta (Daerah Khusus Ibukota Jakarta). Hopefully, there will be further research on applying other aspects of inclusive design in public housing and comparative studies.

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