Space Adaptations During Pandemic in Apartments

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Submission date: 25-May-2023 02:47PM (UTC+0700)
Submission ID: 2101468801
File name: Space_Adaptations_During_Pandemic_in_Apartments.pdf (2.23M)
Word count: 3716
Character count: 19586

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ABSTRACT
The impact of the Covid-19 pandemic has made us aware of the importance of nature in daily life, so there is a change in habits that apartment residents must carry out, similar to the Primitive Future theory, Sou Fujimoto with four principles: in-between, layering, artificial and randomness in the development of a spaces that involve nature as much as possible to create ambiguity between indoor and outdoor spaces in meeting the needs of apartment residents' hygienic spaces. This research was conducted to find out how the adaptation of apartment space can meet the hygienic needs of residents during the pandemic, which will affect changes in the meaning of apartment space. The method; 1) Apartment Space Widening Adaptation; 2) Apartment Open Space Adaptation; 3) Apartment Green Space Adaptation in creating a space reflects the hygienic needs of the residents of the pandemic. Then a space simulation will be made that aims to meet the residents' hygienic space during the pandemic. The correlation between space adaptation, primitive future theory, and health protocols will be a guide in designing apartment spaces. The results of this study are expected to provide guidelines and space simulations in adapting space for apartment hygiene during the pandemic.

Keywords: *Pandemic, Adaptation, Apartment's Space, Hygienic, Primitive Future*

1. INTRODUCTION

Recently, Indonesia experienced a pandemic period due to the emergence of the Covid-19 virus originating from China, which was the first virus to spread to all corners of the world, bringing many problems from the economic, social, and architectural sectors. The Indonesian government has emphasized that people are encouraged to carry out activities at home to avoid the increasing spread of the Covid-19 virus by operating social distancing [1]. This policy certainly raises new problems from various circles, especially areas with a high-density level, one of which is apartments. The impact of the pandemic reminds us of the importance of nature in life as if the earth asks us all to return and care for nature [2], just like Sou Fujimoto's theory, the primitive future which invites life together and involves nature as much as possible into human life to improve the health of apartment residents [3]. A good apartment design is born through a specific data program so that the building created follows the environmental and social conditions in which the building stands [4]. Behavior that is formed due to the need for proprietary space for personal activities that allow for social interaction between spaces [5], the tendency of residents to act based on their instincts to claim and defend the space presented through adaptation of the structural elements of space in the space. The context of distance widening, open space, green space, spatial configuration, and technology is a basic form of space's social structure and contributes to the understanding of hygienic space [6].

2. METHODS

In the context of a pandemic apartment, space in architecture consists of indoor and outdoor spaces, which can be defined as the embodiment of human existential space. The state of space originating from nature is incorporated into the building to eliminate space limitations and obtain space hygiene, thereby providing a transparency effect and bringing ambiguity to humans as connoisseurs by paying attention to the health protocols required by residents [7]. The concept of Primitive Future is then matured by treating it as inside-outside, unlimited, and where humans feel both and do not realize the different feelings between outside and inside. Architecture can create a balanced interior as well as exterior. When the interior is created, that is when the exterior is formed. His interest in blending interior and exterior created a concept he termed "in-between." The principle of space according to Primitive Future produces 4 (four) methods and applications of space (Figure 1):

1. *In Between Situation (Gradation, Inside - Outside, Ambiguity)*
   Sou Fujimoto tries to create a gradation of inside-outside to create a correlation between indoor and outdoor spaces. Creating Openness and Protectness space with depth, where the deeper you go, the safer.
2. *Layering (Horizontal - Vertical)*
   The method by eliminating the boundaries of space, with the layering method, for example, the material is replaced with glass material, allowing transparency to

be present and brings ambiguity that humans can experience as viewers. Creating a composition that has a relationship between each element is interpreted as inside-outside; and in between, so a person can be in two meaningful places simultaneously.

3. *Artificial*
   Imitating or creating conditions that come from nature or natural into the contemporary context through colours, materials, and shapes to create a timeless impression.
4. *Randomness*
   Creating multiple areas simultaneously but correlated, such as ruins, forests, and settlements at one time and various routes. The goal is to get random results to bring the impression of nature into his work.

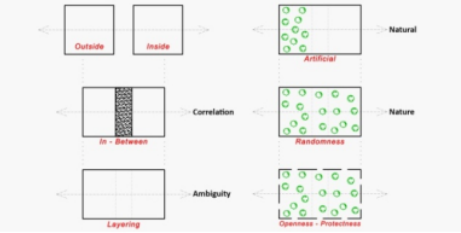

Figure 1 Sou Fujimoto's Thought Concept Diagram Primitive Future

This research will focus on identifying structural elements that can form a space adapted from the pattern of residents' activities in meeting hygienic needs by the health protocol that occurred during a pandemic using the space principle of primitive future theory. The essence of the Primitive Future method lies in the principle of involving nature as much as possible in every space to present a natural experience both visually and physically with the method; 1) Apartment Space Widening Adaptation; 2) Apartment Open Space Adaptation; 3) Apartment Green Space Adaptation.

3. RESULT AND DISCUSSION

The implementation of social distancing has made many residents isolate themselves from life outside the unit and spend more time inside the unit. Humans who are social creatures make social life one of the primary needs for humans, and circumstances that force residents not to socialize directly (meet) can affect mental health [8]. Apartments that prioritize the number of units and all areas that are public except for units are designed to organize many people in the same place/area, where health and hygiene are not paid too much attention at the beginning of the design to be a problem, because during a pandemic, they must reduce contact with anything that has been touched in a crowded area that unconsciously structure the micro-distance space between residents [9]. Space as a living thing that can adjust the wishes of the community according to the physical and social conditions around it, so that space by itself can provide an opportunity for him to immediately adjust to the current developments, namely the pandemic [10] (Figure 2).

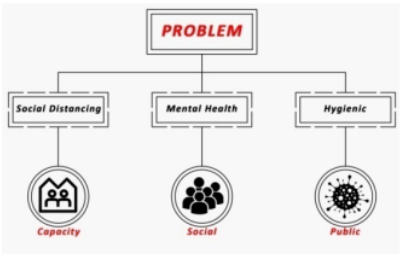

Figure 2 Adaptation Problems Apartment

There are three main problems in apartments during the pandemic, namely spatial, social, and hygienic capacity, which will be the main focus in this research to find space solutions based on the characteristics of the spread of the Covid-19 virus, which can be solved with primitive future theory in designing adaptations apartment.

3.1. Apartment Space Widening Adaptation

Based on the analysis of the personal space between each other, it widens to 1.80m. The widening personal distance will undoubtedly affect the capacity of the space in meeting the needs of residents and visitors. The widening of the comfortable distance between humans that widens to 1.80m creates a 90cm radius of personal space that surrounds every human being. The concept of widening physical distance by not reducing the closeness of social distance prioritizes design based on trust in fellow residents and visitors. Some rooms require distance adaptation which is affected by distance widening and activities.

3.1.1. Walking Space Adaptation

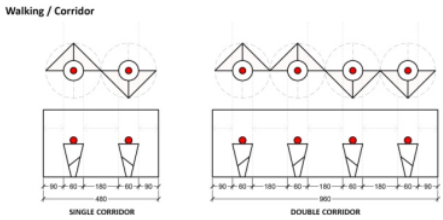

Figure 3 Walking Adaptation - Corridor

The comfortable distance that has been widened to 1.80m will affect walking activities, such as the minimum width of the corridor. The minimum width for single corridors is adjusted to 4.80m and for double corridors to 9.60m to meet the needs of comfortable distances during pandemic walks

(Figure 3). Corridors must have a 90 cm wide free-distance from the walls to prevent indirect transmission.

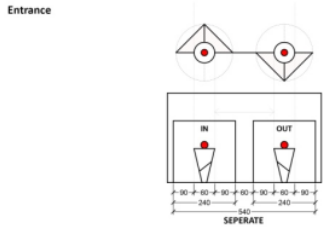

Figure 4 Walking Adaptation - Entrance

The addition of entrance openings to apartments due to the widening of the distance in walking activities, which aims to separate the entry and exit of residents/visitors, is standard during a pandemic. Therefore, the width of the entrance has been adapted to a minimum of 5.40m, with a minimum width of each opening of 2.40m to maintain a comfortable distance between residents and visitors to the apartment (Figure 4).

3.1.2. Standing Space Adaptation

The widening of the comfortable distance also affects standing activities, such as the capacity to use the elevator, which initially could be used by up to 12 users with very minimal personal distance, experiencing adaptation in terms of area to meet the comfort distance during the pandemic. The size of the lift based on the number of 12 passengers, which was initially 2.20m x 2.00m, can no longer serve the maximum, and there needs to be a reduction in passengers (Figure 5).

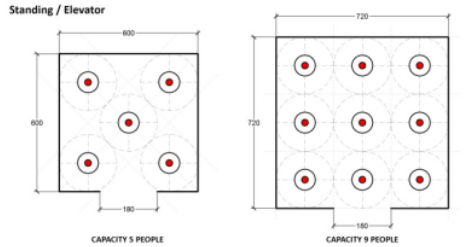

Figure 5 Standing Adaptation - Lift

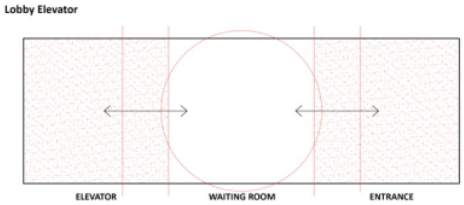

Figure 6 Standing Adaptation - Lobby Lift

This makes the standard width of the pandemic elevator adaptable based on the comfortable pandemic distance, which is 1.80m. For example, an elevator with a capacity of 5 users has a minimum area of 6.00m x 6.00m, and for a capacity of 9 users, it has a minimum area of 7.20m x 7.20m with a minimum opening width of 1.80m. The impact of widening the comfortable distance is evident in the elevator, which is a closed space and a gathering place for many people so that the comfortable distance needs to be paid more attention. The waiting room in the main lobby can serve residents who are interested in leaving the apartment and residents who are interested in going deeper, so the area of the waiting room will be more significant.

3.1.3. Sitting Space Adaptation

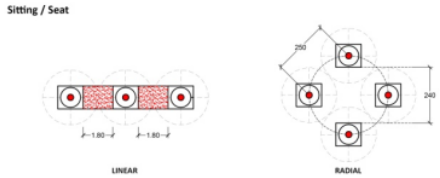

Figure 7 Sitting Adaptation - Seat

The need for a free distance between users of the seat is based on 1.80m so that the seats become alternate (not close together) (Figure 7). To optimize the free space that is formed, it can be used as a place to put things, green space, and so on. The clearance between seats that want to have circulation requires a minimum width of 6.60m for two circulations to maintain a comfortable distance for people who sit and walk (Figure 8).

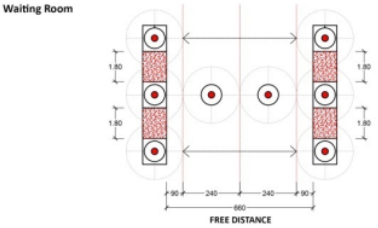

Figure 8 Sitting Adaptation - Circulation

The minimum distance has a modular, so if the required circulation is only for one circulation, the required width is 4.20m, so if you want to increase it to three circulations, it becomes 9.00m. The residents' comfortable distance is widened to 180cm as if there is a transparent barrier by the Primitive Future-Layering theory.

3.2. Apartment Open-Space Adaptation

Open space has a vital role in the lives of residents in the apartment. Health relations in open spaces have become even closer due to the nature of the transmission of the

Covid-19 virus, which can be resolved with natural lighting and natural air. The demand for open space as a social space that still provides a feeling of security and a source of lighting and fresh air will increase during the pandemic. The perception of open space aims to create a place where people feel welcome, comfortable, and safe, were not only as a general public space but as a space that is associated with their emotions and feelings according to Sou Fujimoto's theory who wants to create an open space that removes space restrictions.

3.2.1. Vestibule Adaptation

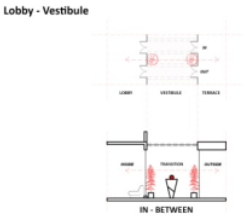

Figure 9 Vestibule Adaptation

The vestibule serves as the first point of contact when residents and visitors enter the apartment. The vestibule can be seen as a "transition space" to provide an intermediary between the lobby and the terrace that controls airflow, movement, and pandemic hygiene. A large enough vestibule is a requirement so that an automatic system can separate the entrance and exit to reduce the possibility of touching the plane (Figure 9).
The vestibule needs to be considered more than just a transitional space, but as a critical program element and provides an opportunity to improve the health of pandemic apartment buildings.

3.2.2. Unit Floor Adaptation

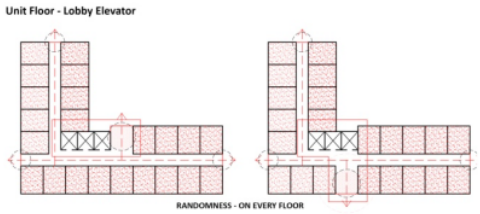

Figure 10 Unit Floor - Lobby Lift

The apartment unit floor does not have sufficient open space, where the source of natural lighting and natural air is only positioned at the end of the corridor. The typology of double-loaded apartments makes the source of open space not reach the corridor floor, and the open space becomes private. Reduction of apartment units whose function is changed to open spaces, although in terms of the reduced number of units, can improve the quality of the floor of the apartment units. An open space positioned close to the lift area can add to an open space like an elevator lobby. The unit's replacement into an open space can be positioned differently on each floor to create a suitable design aesthetic, thus creating a situation of randomness (Figure 10).

3.2.3. Balcony Adaptation

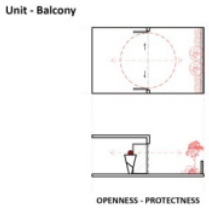

Figure 11 Unit - Balcony

The function of the balcony during the pandemic has developed into a space that can improve residents' physical and mental health. The balcony is a protected private, public space and has excellent potential to add to the current open space system (Figure 11). This need creates a new type of unit design, where the boundaries between rooms and balconies are blurred, and space programs can be distributed according to the wishes of the residents. The open space is wrapped in a flexible barrier to give the residents a connect with the outside world so that an open situation can be controlled for their safety and comfort.
Adaptation of the distributed **open space** of the apartment aims to get a situation where residents and visitors can feel the ambiguity between outdoor and indoor spaces that blend into an **in-between** and **layering** natural lighting and air sources, which can also be a transitional space for self-cleaning.

3.3. Apartment Green-Space Adaptation

Incorporating nature into scattered apartment buildings to create a natural feel and maximize the use of green space with direct contact with nature will be a selling point and essential for apartment design during a pandemic. The link between green spaces and health can improve air quality, physical activity, stress compensation, and greater social cohesion. The benefits of spending time in green spaces can significantly improve psychological and physical health and reconnect residents with nature as essential as their recreational value.

3.3.1. Terrace - Drop Off Adaptation

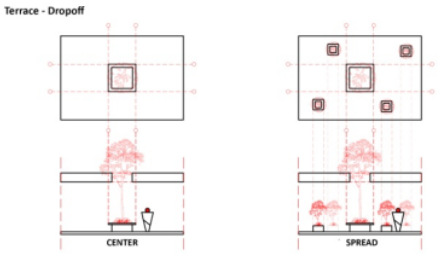

Figure 12 Terrace - Drop off

The link between green spaces and health can improve air quality, physical activity, stress compensation, and greater social cohesion. Many epidemiological studies have demonstrated various positive health effects of green spaces (Figure 12). The benefits of spending time in green spaces can significantly improve psychological and physical health and reconnect residents with nature as essential as their recreational value.

3.3.2. Lobby - Terrace Adaptation

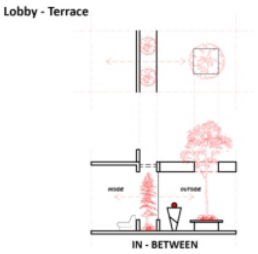

Figure 13 Lobby - Terrace

The apartment lobby, which accommodates many activities, from waiting, standing, walking in a closed room, makes it necessary to add elements that can increase the comfort of doing pandemic activities. The most efficient green space position in the lift lobby is on the side of the entrance area to still get the required lighting and maximize the use of existing land and create a situation between indoor and outdoor. The use of skylights in the lobby and functioning as a light intake for plants can also increase the natural lighting in the lobby area so that although the construction side will be more expensive in the long run, it can save energy used (Figure 13).

3.3.3. Corridor Adaptation

Green corridors can be created by planting trees and using different media, such as planter boxes, flower pots, etc. The availability of green corridors serves to balance the ecological conditions in the apartment area, which still considers access to roads so that the arrangement of vegetation can be adjusted to the needs and gives the impression of nature to eliminate boredom and add beauty to residents and corridor users (Figure 14).

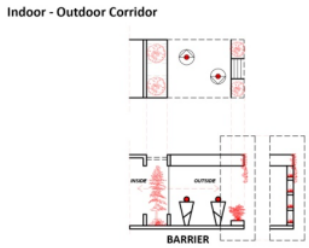

Figure 14 Corridor Indoor - Outdoor

3.3.4. Unit - Stacking Adaptation

The typology of apartment buildings makes the balcony into a private green space that can only be used for residents of each apartment unit. However, the typology of arranging apartment units using the step back method can provide a new social space for apartment units in the balcony area that has open and green elements but is still controlled for residents to establish social activities that can occur between residents and units above, below, or sideways so that the balcony of the apartment unit turns into a private - public nature.

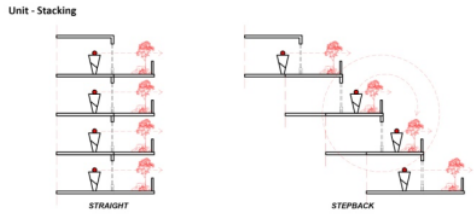

Figure 15 Unit - Stacking

The step back concept is a way to create a high-density apartment that allows residents to get more green space, open space, and social space by utilizing a cantilever to create an extension where residents can place a private terrace (Figure 15).

3.3.5. Balcony - Railing Adaptation

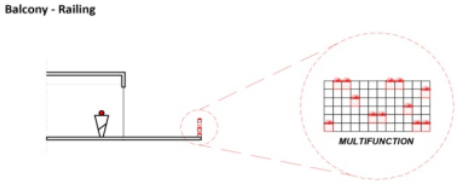

Figure 16 Balcony - Railing

Creative use of railings on the balcony can create a new garden for plant lovers in farming activities. Railing design that creates a garden by placing pots on the balcony safety railing, besides making the balcony more comfortable. Hanging plant pots on railings is the simplest way to create a balcony garden (Figure 16). The limited area of the apartment makes residents do not want to provide a washing machine in their unit because the space that is not possible makes residents turn into balcony railings as a place to dry the clothes they have washed. The railing design will also undergo adaptation, where the railing must accommodate hanging plant pots. A box structure can be one example, where flower pots can be placed in boxes while maintaining the security and comfort of the residents' privacy.

3.3.6. Unit - Window Adaptation

The bedroom is an essential space in apartment units that need green space because before going to bed and waking up, seeing green plants can increase the memory and creativity of residents. Bedrooms that are designed consistently to have windows can be optimized by adding green space. Bedroom windows adapt to three layers during the pandemic; 1. a glass window that serves as the initial layer to get views and lighting; 2. planter box as a second layer for placing plants as green space; 3. flexible window (pivot/folding) as the third layer with a design that has a lattice to maximize lighting, ventilation, and views while maintaining the privacy of residents (Figure 17).

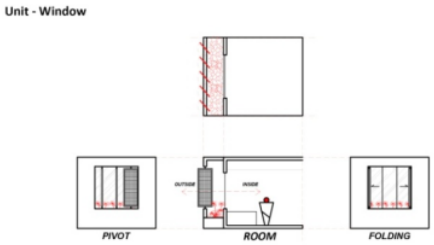

Figure 17 Unit - Window

Adaptation of green apartment spaces distributed with the principle of **randomness** increases the opportunities for residents and visitors to interact with the surrounding nature to improve health. Nature is inserted into the apartment space with an open **artificial** principle to get a more natural impression so that residents can be in a green room that has a public-private nature during a pandemic.

4. CONCLUSIONS

1. **Adaptation of space widening**, which becomes very sensitive during this pandemic, will affect the adaptation time depending on the activities of residents and visitors. Distance adaptation makes the occupant's comfortable distance widen to 90cm, so there is **layering** around the individual.
2. **Adaptation of open spaces** is increasing during the pandemic because nature can destroy the virus. The spread of open space can be outdoors, indoors, or mixed, where the adaptation of open space aims to get a situation where residents and visitors can feel ambiguity so that outdoor and indoor blend into an **in-between**. Open space can also be a **layering** transition space that can accommodate self-cleaning activities.
3. **Green space adaptation** provides a new typology of space in apartments, where green space will be increasingly spread with the principle of **randomness** in spaces that have potential while still paying attention to natural lighting sources for plants. Nature is entered into the apartment space with an **artificial** principle that eliminate feelings of anxiety when in a green room that has a public - private nature during a pandemic, according to the theory of the primitive future

The design of a pandemic apartment space indirectly forces the behavior of residents to live hygienically. The new life of the residents will result in a new standard in apartment space design that will prioritize distance widening, open space, and green space during the pandemic.

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