

RE-EVALUATING SPACE AND ENVIRONMENTAL DESIGN IN RESIDENTIAL BUILDINGS DURING PANDEMIC IN INDONESIA

Didit Novianto ^{1a}, Wardatut Toyyibah ^{1b}, Anastasia Evangelista Sumanti ^{1c}, Dian Sekartaji^{2d}

¹ Department of Architecture, Institut Teknologi Sepuluh Nopember, Surabaya, Indonesia

² Architecture Department, The University of Kitakyushu, Kitakyushu, Japan

^{1a} didit.novianto@its.ac.id, ^{1b} 25622013@mahasiswa.itb.ac.id, ^{1c} anastasiasumanti@gmail.com, ^{2d} d-sekartaji@kitakyu-u.ac.id

^{1a} 0000-0002-3728-8162, ^{1b} 0000-0002-6312-3388, ^{1c} 0000-0001-8789-1595, ^{2d} 0000-0001-8947-5659

ABSTRACT: The Covid-19 pandemic which happening for more than 2 years since its emergence in 2022 in Indonesia, has impacted civilization and people's way of living. In response, work from home (WFH) is implemented throughout the world, including in Indonesia, as an effort to prevent the transmission of the infectious virus which continues to develop its variants until now. This article is trying to discuss how the occupants deal with the sudden change of function of their living spaces. The survey was conducted targeting more than 240 household groups of young families in Indonesia, regarding their lifestyle pattern and changes of spaces function during the stay home period. Critical analysis is carried out based on the evidence obtained from the feedback. It was found that more than 90% of respondents implemented WFH, while more than 20% of households used their bedroom for workspace during the pandemic, and changes in daily lifestyle patterns resulted in the structure of consumption. Finally, this article contains the author's criticisms and views regarding the urgency for massive reformation in Indonesian residential housing space design and standards which has to be more responsive to the modern lifestyle and health issues.

KEYWORDS: living environment; space design; residential housing; lifestyle; covid-19

RESUMEN: La pandemia de Covid-19, que ha estado ocurriendo durante más de 2 años desde su aparición en 2022 en Indonesia, ha impactado la civilización y la forma de vida de las personas. En respuesta, el trabajo desde casa (WFH, por sus siglas en inglés) se implementa en todo el mundo, incluso en Indonesia, como un esfuerzo por prevenir la transmisión del virus infeccioso que continúa desarrollando sus variantes hasta ahora. Este artículo trata de discutir cómo los ocupantes lidian con el repentino cambio de función de sus espacios habitables. La encuesta se llevó a cabo en más de 240 grupos de hogares de familias jóvenes en Indonesia, con respecto a su patrón de estilo de vida y los cambios en la función de los espacios durante el periodo de permanencia en el hogar. El análisis crítico se lleva a cabo a partir de las evidencias obtenidas a partir de la retroalimentación. Se encontró que más del 90 % de los encuestados implementaron el trabajo desde casa, mientras que más del 20 % de los hogares usaron su dormitorio como espacio de trabajo durante la pandemia, y los cambios en los patrones de estilo de vida diarios dieron como resultado la estructura de consumo. Finalmente, este artículo contiene las críticas y puntos de vista del autor con respecto a la urgencia de una reforma masiva en el diseño y los estándares del espacio de vivienda residencial de Indonesia, que debe ser más sensible al estilo de vida moderno y a los problemas de salud.

PALABRAS CLAVES: entorno de vida; diseño de espacios; vivienda residencial; estilo de vida; COVID-19.

1. INTRODUCTION

Since the end of 2019, China has been surprised by the emergence of a new coronavirus called SARS-Cov-2 or Covid-19 which is gradually spreading in various countries. Thus, on March 11th, 2020, the World Health Organization (WHO) officially announced the Covid-19 outbreak as a global pandemic [1]. The virus, which can infect all ages, is

transmitted through droplets emitted by an infected person when coughing and sneezing. This transmission occurs between 2-14 days after someone has direct contact with the previous patient, both symptomatic and asymptomatic patients, hence, the spread becomes very fast and dynamic [2]. Not only is the pattern of distribution evenly distributed, but the impact caused by this pandemic is also massive and makes many

victims fall. Even as of December 31st, 2021, based on data from worldometers.info, the total number of Covid-19 virus infections in the world was recorded at 286,715,568 cases with 5.4 million deaths spread in almost all countries including Indonesia [3].

In Indonesia, positive cases of Covid-19 have been detected since March 2nd, 2020, where the patient previously made direct contact with a foreign citizen (WNA) from Japan while attending an event in Jakarta [4]. This was quite surprising for Indonesia considering that both the government and the people at that time did not take this virus seriously. As a result, there has been a sharp increase in the number of positive cases. According to the government's data, the peak of the Covid-19 wave in Indonesia occurred in January and July 2021 [5].

Of course, seeing the massive spread of this virus, the Indonesian government began to focus on continuing to develop, implement, and evaluate policies in dealing with the pandemic. Some of the policies that have been pursued are (1) Staying at home; (2) Implementing social restrictions; (3) Use of masks; (4) Diligent hand washing; (5) Postponing social activities that gather large crowds; (6) Work/Study from home; (7) Large-scale social restrictions (PSBB); and (8) the New Normal policy. As a result, these policies affect changes in people's lifestyles. All interactions between communities that were originally carried out directly outside the home face-to-face were forced to turn into virtual interactions and should only be done at home. These are impacting educational, office, business, socio-cultural, and religious activities (Tuwu, 2020).

One of the things that quite a lot affects people's lifestyles is the Work from Home (WFH) policy. The concept of WFH suddenly made people concentrate all their daily activities at home so they inevitably had to adapt to the new conditions. Supported by survey findings from the World Economic Forum states that 91.7 percent of companies apply the WFH concept. The application of this concept turned out to have an impact on longer working hours, an average of 48.5 minutes working hours [7]. On the other hand, several cases show that WFH affects the flexibility of working hours considering that employees can manage their own working time. Although in the end, it blurs the timeline between work life and personal affairs. As a result, mental fatigue occurs due to an unbalanced proportion of time in personal/family life and work.

Working from home or WFH is part of fulfilling an employee's obligations to meet work targets, so the house is only being a location [8]. Therefore, it is necessary to adapt and adjust to environmental conditions to suit work habits [9]. Adjusting this condition certainly needs to consider aspects of the facilities and resources owned by users at home, including the functional aspects of the dwelling. Considering that not all housing in Indonesia currently has a specific space for work. Because after all, WFH also requires someone to have enough

space and a supportive atmosphere so they can carry out work from home well [8].

To support shelter functions that are more adaptive to WFH conditions, it is necessary to investigate how Indonesian people adapt and adjust during WFH. However, the availability of data regarding this matter is still not widely found. Therefore, this study aims to collect survey data related to how the function of residential spaces has shifted during the Covid-19 pandemic in 34 provinces in Indonesia. So, it is hoped that it can be one of the considerations in designing adaptive housing after the pandemic.

2. METHODS

In this study, a combination research method is used, according to Cresswell (in Sugiyono, 2011), mixed methods include a combination of quantitative and qualitative methods. Cresswell also divides this method into two models, including (1) the Sequential Model in which the merging is done sequentially and the Concurrent model where the merging is done in a mixed manner [10]. This study focuses on concurrent models with embedded strategies or unbalanced mixed methods models. Where in terms of definition, this model combines the use of quantitative and qualitative research methods simultaneously or together, but the weight of the method is different and is divided into primary and secondary methods [10]. The primary method in this study relies on a quantitative approach, while the qualitative approach is carried out by observing the connection between the primary data that has been obtained so that it can be described more straightforwardly.

As a start, the data collection stage was carried out by distributing online questionnaires spread across 34 provinces in Indonesia from August-December 2021. Respondents on the questionnaire were limited only to those who had carried out WFH during the Covid-19 pandemic. The questions in the questionnaire were formulated according to the author's hypothesis regarding how the housing function shifted during the pandemic.

3. RESULT AND DISCUSSION

3.1 Data description respondents

In the process of collecting data, at first, the respondent boundaries were determined and the question categorization was carried out. In this study, respondents who can fill out the questionnaire are limited to Indonesians who have done WFH during the pandemic. While the questions are arranged based on three categories of questions. The first category relates to the respondent's general identity such as age, gender, domicile, and occupation. The second category relates to the description of the family and the dwelling occupied during WFH by looking at the type of family structure that occupies the

dwelling used during WFH. Considering that the movement of the respondent's activities while in the house is likely to be influenced by the factor of someone else activities in that house. This is due to the differences in needs and desires between one family structure and another so that their lifestyles can be different [11]. In addition, they were also asked about the range of family income they had before and after the pandemic. Regarding housing during WFH, it was asked from the physical aspect. The questions asked consisted of a type of occupancy, ownership status, orientation, estimated area, length of occupation, and building age. The next category relates to WFH activities at home during the pandemic, especially in the functional aspect. In this category, questions were asked about how the pattern of working during the pandemic, the types of space in the dwelling used, the changing and increasing functions, to the renovation of houses due to WFH.

From all data on respondents who were willing to fill out the questionnaire, 243 respondents were obtained with 88.5 percent or a total of 214 people having undergone WFH. While the rest, cannot undergo WFH. Various obstacles such as WFH were only applied at the beginning of the pandemic, respondents were field workers so it was not possible for WFH, different company strategies in responding to the pandemic, such as only reducing the number of working hours or employees, and the other business interests. As shown in the graph, 35 percent of respondents only did WFH at the beginning of the pandemic, which is also seen in the next reason because the work does not allow WFH (Figure 1).

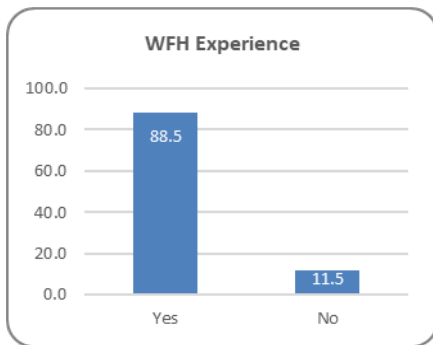


Figure 1. WFH percentage.

The questionnaire distribution was carried out for 5 months from August to December 2021 right after the second wave of Covid19 hit Indonesia. As can be seen in the map, these questionnaires are spread across all 34 provinces in Indonesia. Even though in percentage terms, the dominant area is still seen in the Java Island area with the highest respondent is from East Java as much as 31.3 percent, and the lowest at 0.2 percent spread across Bengkulu, Bangka Belitung, Riau, several provinces respectively. in Sulawesi and North Maluku (Figure 2)

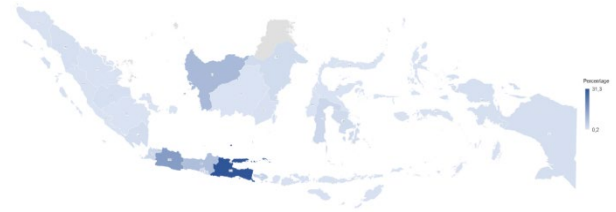


Figure 2. Geographical distribution of respondent..

Of the 214 respondents who have done it, it can be seen that 147 respondents are women and 68 others are men. In general, all respondents are in the productive age category from teenagers to adults. Meanwhile, the respondent's profession is dominated by students as many as 131 people or 60.9 percent. The leftovers come from quite diverse professional backgrounds such as ASN, teaching staff, employees, business people, to those who still do not have permanent jobs. Thus, the output of this questionnaire can still be generalized in terms of residential users. These are the graphs of respondents' characteristics in this study.

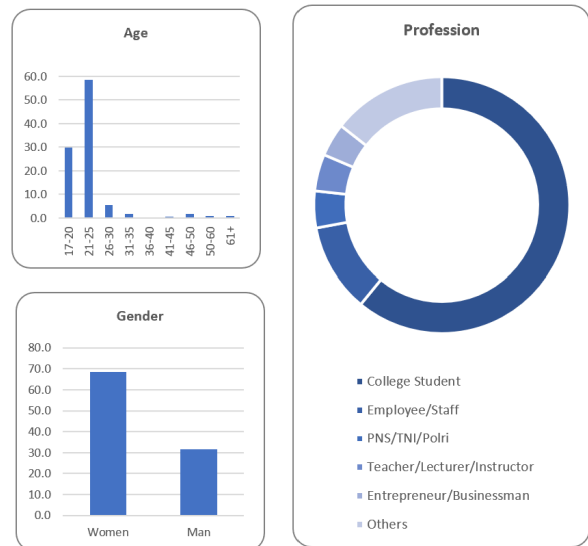


Figure 3. Respondents' characteristics.

3.2 Respondent's Family Description

The following table is a table for the respondent's family structure and kinship during WFH. Based on the table, it can be seen that family structure characteristics in Indonesia are quite diverse, starting from living alone, in pairs, parent-child, and others. As Rapoport has explained in the journal 'housing and society' that this variable is one of the specific aspects that are easily related to the housing lifestyle context [11].

Then, it can also be seen the trend of differences of income from before and during covid-19. The level of change in income is still dominated by constant changes or no change in income. However, income levels still rarely increase there have

been more declines during the pandemic with the most declining by 20-50 percent in 11.6 percent of the total respondents. This will later become a consideration for residents to decide how their home will adapt according to the level of residents' financial capabilities.

Table 1. Family structure of respondents.

No	Family Structure	N	Percentage
1	Alone	22	10,3
2	Husband and wife	5	2,3
3	Father-mother-1 child	26	12,1
4	Father-mother-1 child-uncle/grandma	2	0,9
5	Father-mother-2 children	63	29,4
6	Father-mother-2 children-uncle/grandma	4	1,9
7	Father-mother-2 children- 1 nephew	1	0,5
8	Father-mother-2-children-servant	5	2,3
9	Father-mother-2 children-grandpa-grandma-servant	4	1,9
10	Father-mother-3 children	32	15,0
11	Father-mother-3 children-servant	5	2,3
12	Father-mother-3 children-grandpa-grandma	1	0,5
13	Father-mother-4 children	13	6,1
14	Father-mother-4 children-grandma	3	1,4
15	Father-mother-5 children	3	1,4
16	Father-mother-5 children-grandpa-grandma	1	0,5
17	Father-mother-5 children-grandma	1	0,5
18	Mother-1 child	7	3,3
19	Mother-1 child-servant	1	0,5
20	Mother-2 children	2	0,9
21	Mother-3 children-grandma	1	0,5
22	Mother-6 children	1	0,5
23	Father-1 child-grandma-servant	1	0,5
24	Father-2 children	2	0,9
25	Father-2 children-grandpa/grandma-aunt	2	0,9
26	Father-2 children-grandma-2 servant	1	0,5
27	Grandpa-grandma-mother-3 servant	1	0,5
28	Grandma-3 children-servant	1	0,5
29	Uncle- 5 children	1	0,5
30	2 children	2	0,9
Total		214	100

Source: Questionnaire, 2021

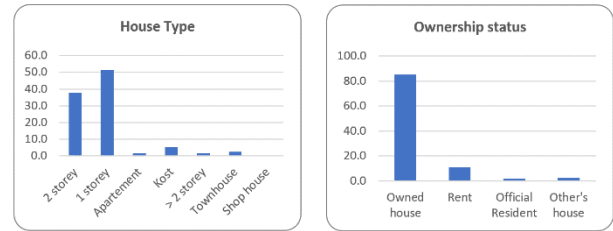


Figure 5. House type and ownership.

It can be seen that most of the respondent's residential types in this study are type 1-storey houses with 51.6 percent, followed by type 2 storey with 37.7 percent. Then, 85.1 percent of respondents admitted that they are the owner of the house. Meanwhile, the total area is quite diverse and evenly distributed, with a percentage above 15 percent in an area of 50-200 m2. While below 15 percent in an area of less than 30 m2 to 50 m2 and 200 m2 to more than 250 m2. With the most orientation towards East and North.

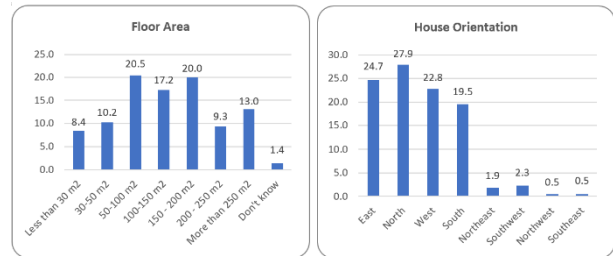


Figure 6. Floor area and building orientation.

For the estimated age of the building, the average dwelling was built in the 1990s to the 2000s, so it is classified as a residence that is not too old. Most of the residents have also lived in the house since birth, so they know very well the house they live in.

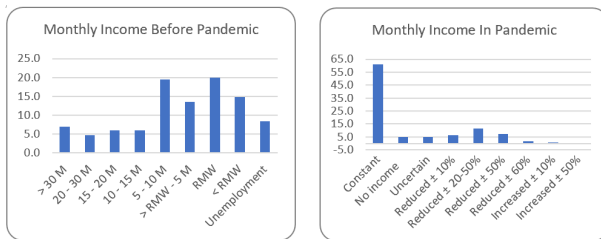


Figure 4. Monthly income before during pandemic.

3.3 Description of respondent's house

The description of the house used by the respondents during WFH is described in several ways, such as type of occupancy, ownership status, orientation, area, length of stay, and estimated year of building. Here are the resulting graphs.

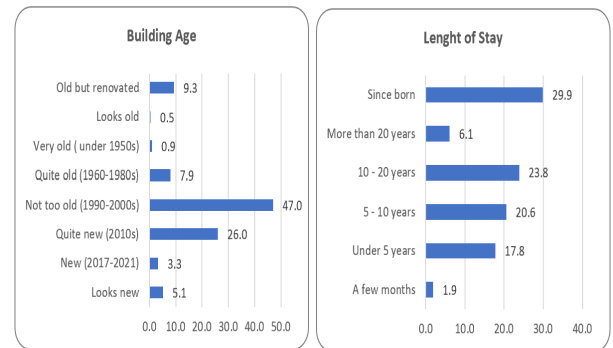


Figure 7. Building age and length of stay.

3.4 Identification of House and Occupant

During WFH, it is necessary to know how the condition of respondents and their occupancy when doing work at home, starting from whenever they undergo WFH, what is the comparison of work patterns before and during the pandemic, what types of rooms are in their homes and how their functional changes, how long is the comparison of the length of use before and during WFH, as well as regarding home renovations after the covid-19 pandemic. The following is a graph of the period of respondents undergoing WFH.

Starting from the onset of the COVID-19 pandemic, Indonesia has passed two peaks of positive cases of covid-19, the first wave peak occurred in January 2021, and the second peak in July 2021. It can be seen from the graph, almost all respondents were able to carry out WFH from the beginning of the pandemic until after the second wave occurred, several others underwent a system and work pattern transformation that adjusted to the company's needs, some were only able to carry out WFH until wave 1 of Covid-19 then implemented a Hybrid system, some were only able to carry out at the beginning of the pandemic. However, if we review it again, the trend of implementing WFH is more after the Covid-19 cases began to increase at the end of November 2020 (towards the first wave) and the end of May 2021 (towards the second wave). The decline in the implementation of WFH occurred in the range of June 2020 and March 2021, which saw the trend of COVID-19 cases which also declined at that time (Figure 8).

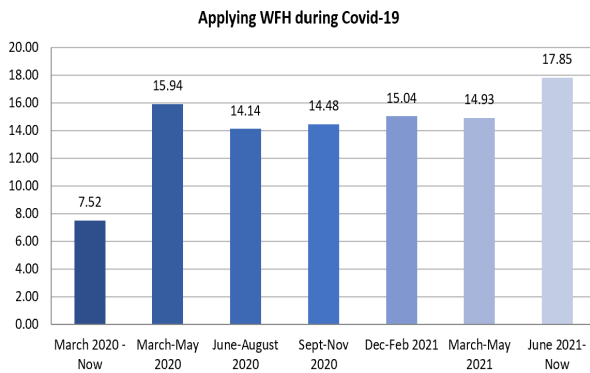


Figure 8. Timing for WFH.

As part of the impact of the WFH policy, the system and work patterns have changed. As can be seen in the graph above, a striking change to this system is the work location factor, which allows it to be done at home. Some of the other changes were a decrease in working hours, additional working hours, job losses, and even getting a new job after the pandemic (Figure 9). This change in work patterns can certainly be a consideration, especially the location factor that moves to

home reduced and increased working hours which could affect the level of comfort related to productivity at work.

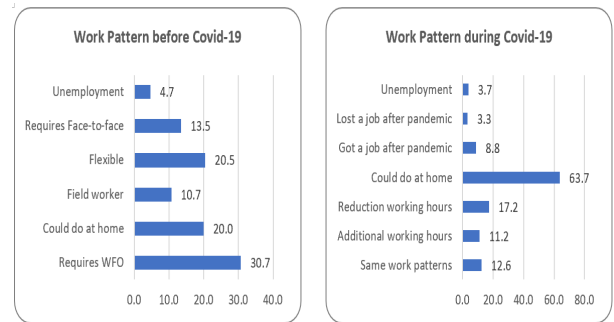


Figure 9. Work pattern before-during pandemic.

The following is data on the number of each room in the respondent's residence. The graph below shows the range of patterns in the existence of functional residential programs which can later be processed with data on their use during WFH, whether there will be spaces that change function, increase function, or are renovated during the respondent's WFH.

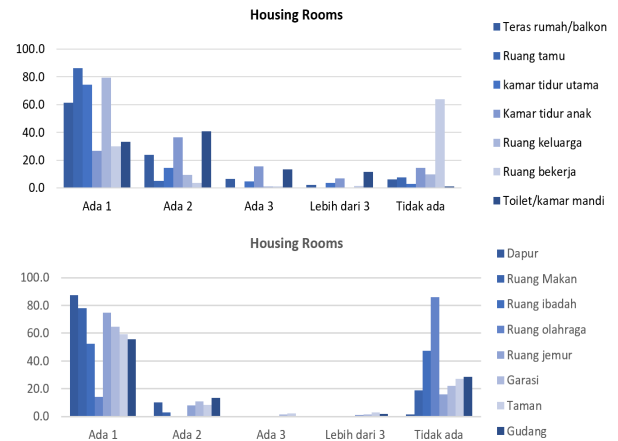


Figure 10. Housing Rooms

From some of the previously mentioned spaces, it was also identified how the respondents used these spaces. In the graph below, it can be seen that the most dominant changes are in the bedroom, both changing functions and adding functions. The pattern of adding space functions in the bedroom is the most dominant compared to no change. Bedrooms are predicted to experience this increase because WFH activities and sports are mostly centered in private bedrooms. This is especially the case for those who do not have a separate workspace. The following graph also shows what rooms have the potential to

turn into multifunctional spaces, such as bedrooms, work areas, terraces, balconies, family rooms, and living rooms.

In contrast to the change of function, where the space does not change its function to be the most dominant, followed by a change of function in the bedroom. Then, to support a comfortable work area, some spaces that are less frequently used are eventually converted into workspaces, such as the unused living room, family room, and bedroom (Figure 11).

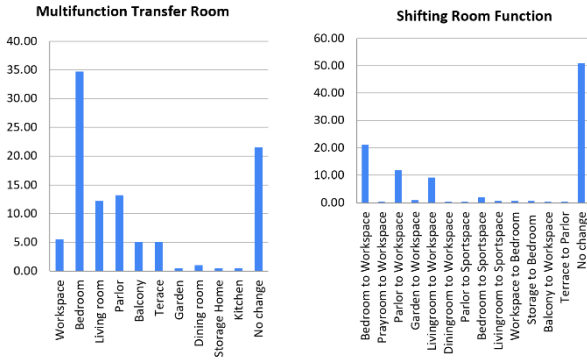


Figure 11. Function Shifting of the House.

Uniquely, it was also found to be related to the respondent's renovation pattern, in which quite a lot of renovations were carried out in the bedroom area. This renovation can be in the form of rearranging furniture to renovation in terms of shape and space. The bedroom is a fairly important aspect in supporting the WFH, considering that this space is also quite private and provides peace of mind at work. The question is, how will work productivity occur in the bedroom? Will it be necessary to separate again in the bedroom to maximize its function without disturbing productivity? This renovation activity also happened quite a lot during the pandemic, although many did not carry out renovations. The time range for respondents to carry out renovations is also seen more in the range of 3-6 months previously, which means that it shows in the period between the completion of wave 1 of Covid-19 and the beginning of wave 2 occurring or around the beginning of January-June 2021.

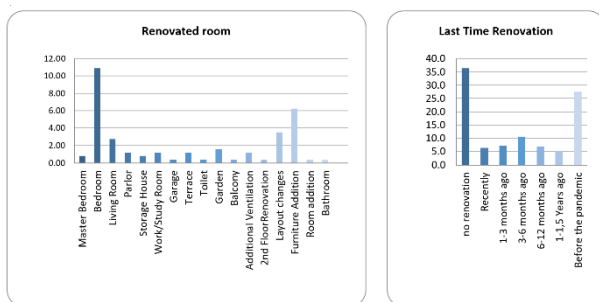


Figure 12. Renovated Room

The next graph shows how the changes in the duration of use of each respondent's residential space. The highest variable indeed appears in the absence of a change in the length of space used, but the selection of respondents in this option could be due to the absence of the room in question in the house. As in the sports room, not all respondents have a sports room at home, so sports activities are carried out in other rooms such as the living room, bedroom, and family room (Figure 11). Therefore, this also has an impact on changes in room renovation with the addition of complementary furniture in the room where the renovation type chart shows the second-highest (Figure 12). Meanwhile, the next highest change in length of use was in the bedroom area, where almost all respondents admitted to using the bedroom longer than before WFH starting from increasing 1-4 hours to increasing more than 7 hours a day in the bedroom. This is also in line with the impact on bedroom renovation which also shows a fairly high number. (Figure 13).



Figure 13. Lama Penggunaan Ruang

4. CONCLUSIONS

The Covid-19 pandemic that has spread in Indonesia has forced the government to implement a policy of working from home (Work from Home) or staying at home (Stay at Home). The house that was originally just a place to stop and rest to unwind after work, now has a wider meaning, becoming an endless part of everyday life. Home has become more meaningful to some people.

The concept of Work from Home is one aspect that has a significant impact on changing people's lifestyles. For this reason, adaptation and adjustment of space conditions need to be done so that habits and productivity in work are not disturbed [9]. The context of supporting facilities at home is also important because adaptation will work if it is supported by the right facilities and atmosphere at home. So as a result, there will be changes in the dwelling, both only by adding furniture, rearranging the layout of the room, to functional changes in potential spaces.

The results of the questionnaire show that there are functional changes in the dwelling, where the spaces that have the most potential to change are in private and semi-private

spaces such as bedrooms, family rooms, and workspaces. There are two categories of changes in the function of the space, the first can be in the form of adding functions so that it turns into a multifunctional room, the second is changing the function into a room for other activities. The change into a multifunctional room is most dominant in the bedroom so it has a significant impact on the length of use of the space. In the end, as a form of adaptation to the bedroom, renovations were carried out to improve the quality of the room so that it is more comfortable to use for other activities such as work and sports. The next potential room is in the living room considering that the Covid-19 condition can reduce the length of use of the living room, so this space also has the potential to increase its function into a work area and sports area. Meanwhile, a shift in the function of space also occurred in several spaces, and most of these changes in function were transferred to working spaces. This is triggered by the absence of working space in some residences in Indonesia. However, if the two categories of changes in function are juxtaposed, the changes are still more dominant in the first category, switching to a multifunctional space. This can be supported by the old pattern of space use in multifunctional areas where changes in the length of use can add up to more than 7 hours a day.

5. AUTHORS' CONTRIBUTIONS

The first author is the corresponding author who conducts the research, writes the article, and lays a platform for this article's production. The second author is a research collaborator who is also the first author's students. The third author is a research collaborator from the university that the first author was belonged, contributing to the questionnaire and data extraction.

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