SPATIAL CONCEPT OF HOUSING ENVIRONMENT BASED-ON SABB PRINCIPLE AS INDIGENOUS KNOWLEDGE ON COVID-19 DISASTER MITIGATION IN MANDAILING NATAL

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ABSTRACT

This study aims to develop an adaptive and responsive residential spatial planning concept based on Space Attachment of Bincar-Bonom (SABB). This qualitative research employs a mixedmethod that combines case studies, literature reviews, and brainstorming with deductive analysis based on prior research findings. The study's findings indicated that the COVID-19 pandemic's adaptive and responsive residential architecture could be observed in two SABB-based ideas, such as: 1) the notion of pangolat (border) and 2) the concept of inganan (place). The term pangolat (border) refers to two distinct components of COVID-19 prevention and control : social and physical distance. The notion of inganan (place) refers to the many locations where men and women can engage in everyday activities as part of the social protection system responsive to the COVID-19 pandemic.

Keywords: Spatial Planning, Residence, SABB, Mitigation, COVID-19

INTRODUCTION

Research Background

Numerous studies have been conducted on the characteristics of particular communities' residential area. Nonetheless, research on how residential spatial planning fits the community's ideology and is most likely to be adopted in the field, particularly those that are adaptable and sensitive to the COVID-19 pandemic, is limited. The ongoing COVID-19 pandemic, which impacts numerous parts of people's lives, undoubtedly deserves urgent attention. One method to do this is by developing a residence or residential area that is adaptable and responsive to the COVID-19 pandemic, particularly in terms of mitigating and preventing the spread of the virus

This study examines three key aspects: residential architecture, local philosophy, and mitigation disaster of COVID-19 pandemic. Prior research that is considered for this study must be examined on these three aspects to ensure the research's validity and originality. As a result, the following discussion will concentrate on the prior study that served as the foundation for this research. As previously said, research on residential spatial planning based on local philosophy and adaptive to the COVID-19 pandemic is scarce or even undiscovered. Numerous pieces of research on the COVID-19 pandemic, such as that was done conducted by Raissa et al. (2021), demonstrate how to transform COVID-19-related issues into the potential for inclusive urban development (Raissa et al., 2021: 72). The locus of Raissa et al. is cities or urban areas in Indonesia, but the location of our study is mountainous rural areas. Szotysek also performed a study (2020) titled *Mobility in Post-pandemic Cities*, which included subjective concerns based on observations and Albert Camus's *The Plague* (Szotysek, 2021: 301). Szotysek's research attempts to analyze previous post-pandemic city functions and describe how the post-pandemic urban population movement could evolve (Szotysek, 2021: 301). Szotysek's locus is also applicable to urban settings. Compared to Raissa et al.'s research, which focuses on spatial, social, and economic aspects, Szotysek's study concentrates on urban mobility. This research varies from Raissa et al. and Szotysek in that it is primarily concerned with space attachment in the context of social, symbolic, spiritual and physical aspects of residence in rural communities.

Numerous studies in planning and other architectural disciplines have been conducted in response to the COVID-19 pandemic, but none have focused onresidentialspatial planning. According to journal research conducted by the authors, from 2019 to 2021, there are four studies connected to the COVID-19 pandemic with administrative regions at the city level and four distinct loci. Three studies examine public spaces and urban landscapes; four investigate policies, development planning, and the Indonesian government's reaction to the COVID-19 pandemic; and six evaluate buildings and spaces. The whole study was conducted in urban locations throughout Indonesia.

Aprilia et al. (2021), Iswara et al. (2020), Elviana and Lesmana (2021), and Putra INGM conducted research at the city level on the subject of COVID-19 pandemic response (2021). Aprilia et al. (2021) performed a pandemic response study in the Waterfront City region, concentrating on open space settings. Iswara et al. (2020) conducted a similar study but focused on the application of the new-normal idea to the circulation and signage design of shopping centers. Meanwhile, Elviana and Lesmana (2021) demonstrated the survivability of urban villages amid the COVID-19 pandemic. Unlike the other three studies, Putra INGM (2021) performed an analysis of suggested built environment adaptations and an evaluation of the built environment, which underwent several changes throughout the COVID-19 pandemic. Bayu and Kurniadi (2021), Winarna et al. (2021), and Kurniawan et al. (2020) conducted research on public places and urban landscapes. Bayu and Kurniadi's research (2021) examined the readiness of public spaces to adapt to new normal conditions following COVID-19, while Winarna et al. (2021) redefined public spaces during the COVID-19 pandemic, and Kurniawan et al. (2020) disclosed serious opposition to public space in the midst of COVID-19 from an Islamic and multicultural communication perspective. Santoso and Setyabudi (2020) addressed another issue, revealing landscape architects' preferences for border elements in green open areas during the COVID-19 pandemic. Muhyiddin (2020), Putri (2020), Wahidah (2020), and Wardhana (2020) have previously conducted research on Indonesian government policies, development planning, and policies linked to the COVID-19 pandemic response. Muhyiddin (2020) discusses how Indonesian development planning has changed in response to COVID-19 and its economic consequences. Meanwhile, Putri (2020) performed an analysis of the literature review to ascertain Indonesia's preparedness for the COVID-19 pandemic. In contrast to Muhyiddin (2020) and Putri (2020), Wahidah (2020) conducted a study on collaborative efforts to break the chain of COVID-19 spread by evaluating government and community planning in various measures to prevent the COVID-19 pandemic

The description above shows that no study has been conducted on the spatial planning of the living environment based on local community values that are both adaptive and responsive to the COVID-19 pandemic. The necessity of this study is essential for two reasons: the first is to advance science and technology based on local potential, and the second is to contribute to development, particularly rural development. The novelty of this research is in three ways: 1) it takes place in mountainous rural residential areas; 2) it focuses on the substance of space attachment in terms of social, symbolic, spiritual, and physical dimensions; and 3) it contributes to preventing and overcoming the COVID-19 pandemic within the context of the residential areas for mountainous rural residents

Research Question

The findings of past studies and a number of issues discussed in the background formulate the following research question: How is the concept of residential spatial planning based on the *Space Attachment of Bincar-Bonom* (SABB) that is adaptive and responsive as indigenous knowledge in COVID-19 disaster mitigation?

Research Specific Purpose

This study aims to formulate a residential spatial planning concept based on the Space Attachment of Bincar-Bonom (SABB) that is adaptive and responsive as indigenous knowledge in COVID-19 disaster mitigation.

LITERATURE REVIEW

Prevention and Control of Coronavirus Disease (COVID-19)

According to the Ministry of Health of the Republic of Indonesia (Kemenkes RI, 2020: 17), Coronavirus Disease 2019 (COVID-19) is an infectious disease caused by Severe Acute Respiratory Syndrome Coronavirus 2 (SARS-CoV-2). SARS-CoV-2 is a novel coronavirus that has never been discovered in humans earlier. At least two types of coronavirus are believed to cause respiratory problems, including Middle East Respiratory Syndrome (MERS) and Severe Acute Respiratory Syndrome (SARS). COVID-19 infection is frequently associated with symptoms of acute respiratory failure such as fever, coughing, and shortness of breath. The typical duration of incubation is 5-6 days, with the longest duration being 14 days. COVID-19 can cause pneumonia, acute respiratory syndrome, kidney failure, and even death in extreme instances.

According to the Ministry of Health of the Republic of Indonesia (Kemenkes RI, 2020: 26), COVID-19 transmission has spread rapidly in Indonesia after the first case was disclosed on March 2, 2020. It necessitates a response strategy tailored to the mode of transmission at the national and provincial levels, with the objectives of 1) slowing down, halting, and delaying the rate of transmission/contagion; 2) providing optimal health services to patients, particularly those in critical condition; and 3) mitigating the impact of the COVID-19 pandemic on the health system, social service, economic activities, and other sectors. The preventative plan is implemented in order to expedite the management of COVID-19 throughout Indonesia, based on the four transmission scenarios according to WHO (Kemenkes RI, 2020: 26), namely:

1. Areas with no cases (*No Cases*)
2. Areas with a single or many cases, imported or domestic that are sporadic and have not yet formed a cluster (*Sporadic Cases*)
3. Areas form clusters in terms of time, geographic location, or general exposure (*Clusters of Cases*)
4. Areas with community transmission (*Community Transmission*)

The previously mentioned COVID-19 pandemic transmission zone encompasses both urban and rural areas. It is the position taken by the Directorate General of Village Community Development and Empowerment (Dirjen PPMD) of the Ministry of Villages, Development of Disadvantaged Regions, and Transmigration (Kemendes PDTT) on village readiness for the COVID-19 Pandemic (Ministry of Home Affairs, 2020). All whilst attempts to prevent the spread of the COVID-19 virus can be undertaken by controlling conditions that disrupt the balance, as Dr. Benny Purwanto, MARS explained (Purwanto, 2021: 11). According to Dr. Benny Purwanto, three factors might tip the balance:

1. *Host* (-): PPE, Immunity, vitamins, nutrition, OR, No Comorbid
2. *Agent* (+): Virus concentration, length of time of exposure, virulence (malignancy of the virus strain)
3. *Environment* (-): Source of transmission +, crowds, vaccinations, ventilation, clean air

This research is concerned with one of the factors that might tip the balance in attempts to control the COVID-19's transmission:the environment. The environment can function as the virus's outermost buffer, not only through active mechanisms such as transmission sources, crowds, vaccinations, ventilation, and clean air but also through passive mechanisms such as adaptive spatial planning patterns against pandemics, most particularly COVID-19.

Bincar-BonomTheory

Nuraini et al. (2014a) performed a study on the construction of houses in the residential area of Singengu village and discovered that the community constructed residences in a *marsiadopan* (face to face) method in an effort to conform to *bincar-bonom* concept. *Bincar* is associated with the new function, a space for children and adolescents, whereas *bonom* is associated with the old function, a space for elders and adults. Additionally, Nuraini et al. (2014b) demonstrated that *bincar-bonom* had formed the foundation for the planning and architectural design of Singengu village communities at all spatial scales (settlement, village and residence and residentialareas).*Bincar-bonom*organizes the arrangement of the 'old child's house' in *bonom* area with the 'young child's house' in *bincar* area at the village *meso*/residential area scale in Singengu village. The philosophy of life, a traditional ideology, also governs the spatial arrangement of Mandailing communal dwelling in mountainous villages and is naturally adaptive, as evidenced by attempts to control the spread of the COVID-19.

Additionally, *bincar-bonom* theory is critical for environmental management in the Mandailing area. Nuraini (2015) discovered that rural communities manage their environment in two ways: the first is through written regulations in the form of *uhumdohotugari* (customary rules/provisions made by ancestors), and the second is through the myth of *rarangan* (prohibition) or taboo (abstinence), as well as the myth of *roguk* (watchman), in order to make certain areas 'forbidden' for human activity (Nuraini, 2019b). Local notions that appear archaic and illogical appear to be the most 'contemporary' because they exhibit an excellent capacity for adaptation and responsiveness to changing circumstances, particularly in relation to pandemics.

The topography of Mandailing's mountain village was organically created by the Mandailing tribe's forefathers following a generational custom that has proved to endure to the present day. Nuraini (2016b) discovered three distinct systems of landscape management in Mandailing: 1) environmental, economic, and spiritual land management; 2) patterns of landscape components that correspond to social, cultural, and spiritual structures; and 3) spiritual application of local values. The sustainability of Singengu village's spatial planning and landscape to date is not only due to the three systems stated previously but also to the spiritual component, which relates to the symbolic pattern of *bincar-bonom*. This plan uses the binary principle to manage the village landscape areas in such a manner that they always face *bincar* (rising) and *bonom* (setting) of the sun (Nuraini, 2016b). *Bincar* means ‘young and new,’ but *bonom* means ‘old and ancient.’ Other continuing research has advanced the *bincar-bonom* theory, resulting in the formation of a novel theory of space attachment based on *bincar-bonom*.

Place-Space Attachment in the Community Residential Area

Previous research on the local philosophy of *bincar-bonom* by Nuraini et al. (2014a), Nuraini et al. (2014b), Nuraini (2019b) and recent follow-up research by Nuraini (2016a) and Nuraini and Suprayetno (2021) reveal that the attachment of place to the residential area is a structural concept that manifests concretely in the form of residential architecture at all spatial scales, particularly the residential area. Attachment to place is physically converted into three distinct scales of residential space. The focus is on context, on the word 'place' as 'location'. In comparison, place attachment based on *bincar-bonom* is a symbolic notion turned into a spiritual concept, emphasizing the context of 'place' as 'space' (Nuraini et al., 2014a; Nuraini et al., 2014b).

Based on *bincar-bonom*, place attachment theory creates a new substantive theory: space attachment as a type of attachment between awareness of a tangible 'place' and comprehension of an intangible spiritual 'space' (Nuraini, 2016a). These findings support the findings of Nuraini et al. (2014a) and Nuraini et al. (2014b) (2014b). The evolution of this

theory results in the formation of a new theory called the Space Attachment of Bincar-Bonom (SABB).

Adaptive and Responsive Space Attachment-based Residential Area Character

Nuraini and Suprayetno (2021) demonstrate the adaptive and responsive character of space-attachment-based residentialplanning in four aspects: 1) readability (easily identifiable places), 2) diversity elements (variations and differences in activity places), 3) temporal aspects (temporal spaces), and 4) place settings (in response to environmental conditions/contours).

These four characteristics exemplify the characteristics of a residential area based on space attachment. The rural residential area in Mandailing is not merely connected to a place that embodies the 'physical place', which is tangible, but it is more related to the notion of a space referring to the 'non-physical which is intangible. This investigation confirms the preliminary findings of Nuraini et al. (2014a) and Nuraini et al. (2014b). As such, it is fascinating to see how local philosophy shapes the adaptive and responsive notion towards COVID-19 throughout the pandemic period.

State of the Art

No study on residential architecture focuses mainly on the most recent occurrence, such as adaptiveand responsive architecture in response to the Covid-19 pandemic. Place attachment research, according to a series of prior studies, has three distinct focuses. This study is part of a larger body of current research on place attachment that focuses on social, symbolic, spiritual, and physical aspects and was conducted from 2016 to 2021 and resulted in the evolution of place attachment theory into a Space Attachment-of Bincar-Bonom (SABB). This research focuses on the notion of adaptive and responsive residential spatial planning based on the fundamental principles of SABB.

There is no standardized requirement on how the main content is organized. However, we expect the author to divide it into several sections indicating literature review and analytical results and discussions.

Figure 1. Place-Attachment Research Series
Source: Reprocessed by the author based on Nuraini, 2016a; Nuraini & Suprayetno, 2021

METHODS

It is qualitative research that employs a combination of methodologies (mixed-methods), including case studies, literature reviews, and brainstorming in accordance with Yin (2003), Groat & Wang (2002), and Howel (2013). Case studies and literature reviews (based on prior research) are employed to elicit physical and non-physical evidence pertaining to the adaptive and responsive nature of the COVID-19 pandemic in the residential sector. The

brainstorming session is utilized to develop an adaptive and responsive residential planning for the COVID-19 pandemic based on the local SABB philosophy.

RESULTS AND DISCUSSION

Overview of the Manambin Residential area

Manambin village's residential area is a contoured area with houses distributed along the roadside and constructing layers of houses. Each layer of the house has its own facilities, most notably complete religious facilities. Men's and women's worship facilities in Manambin village are distinct in terms of type and location. Men pray in the mosque, while women pray in the prayer room. Each mosque and prayer room is dispersed among residentialareas and is equipped with bathing and washing shower. The water supplies for mosques and prayer rooms originate straight from the hills outside the residential area. The location of these two worship facilities will thus be inextricably linked to the adaptive and responsive character of the COVID-19 pandemic, particularly if it is integrated with the process of communal life in a residential area.

Figure 2. (a) Landscape of Manambin Residential Area and (b) Singengu Residential Area
Source : Redrawn by the author based on Nuraini, 2004; Nuraini, 2017b; Nuraini, 2020

Overview of Singengu Residential area

Singengu village's residential area is less crowded than that of Manambin. The majority of residential land is very flat, albeit gently curved upstream or inward. As with Manambin, the houses in Singengu create layers of residential clusters with distinct facilities for men and women. In Mandailing, males have become customary to worship in mosques, while women worship in prayer rooms. Two mosques and two prayer rooms are scattered throughout Singengu residential area. Each mosque and prayer room is provided with shower facilities for bathing-washing-latrine use (*mandi-cuci-kakus*/MCK). As with Manambin, water supplies for mosques, prayer rooms, and permanent showers (in which water continues to flow without a faucet) are sourced straight from the hills to the north and south of the residential complex. The location of the two worship facilities and the water shower is also indicative of the COVID-19 pandemic's adaptive and responsive character.

SABB-Based Adaptive-Responsive Spatial Planning Concept for COVID-19 Pandemic

In the residential area of Manambin and Singengu villages, two ideas of adaptive-responsive spatial planning based on SABB is implemented, which are the concept of border/*pangolat* and the concept of place/*inganan*. The local term '*pangolat*' directly translates as 'border'. As seen in figure 3, certain locations function as 'borders' between areas within and outside the house, for example, *parik* or back part, outside the house and *pamispisan* (side). *Parik* serves as *pangolat* (border) between one house and another house behind it. Additionally, *parik* area serves as a temporary transit point for house occupants before entering their house. *Parik* can also be used as an alternative to entering a house during a pandemic, as it is immediately connected to the service area (bathroom). Before entering the house, occupants can clean themselves, as seen in figure 4 and figure 5.

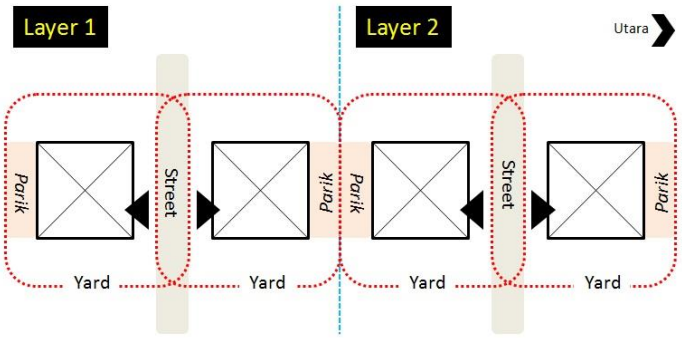

Figure 3. The concept of barrier (*Pangolat*) in the house group : *Parik*

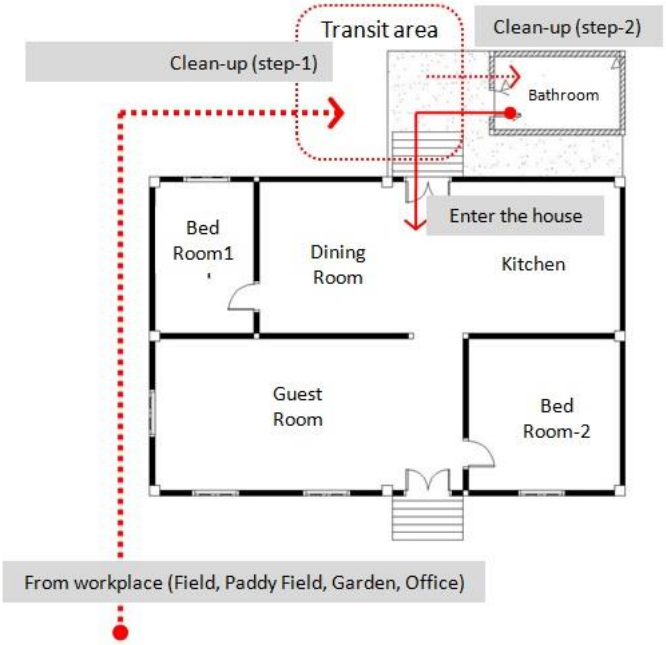

Figure 4. The concept of barrier (pangolat) as a transit area for self-cleaning in Manambin

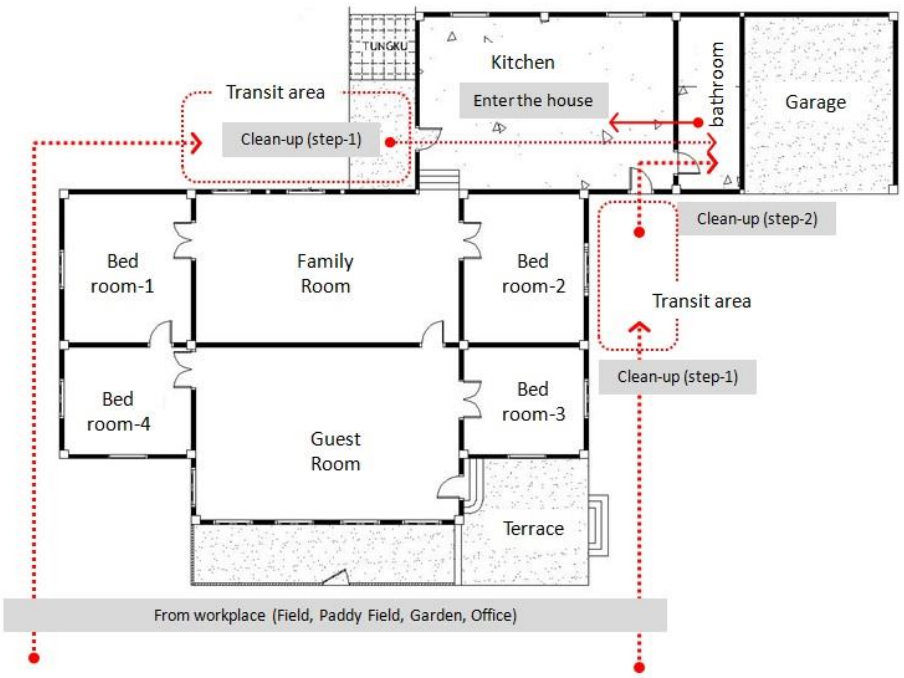

Figure 5. The concept of barrier (pangolat) as a transit area for self-cleaning in Singengu

On an environmental scale, prayer rooms and mosques are used as borders or *pangolat*. The people of Manambin and Singengu villages are accustomed to using the prayer room and mosque to self-purify after working outside the residential area. As is customary in the Mandailing area, prayer rooms and mosques are always provided with shower facilities for MCK. Water is collected straight from the hills surrounding the residential area via pipelines. Self-cleaning has been a long-standing practice. Women clean themselves in the mosque's shower, pray, and then return home. Men wash at the mosque's shower, pray, and then return home.

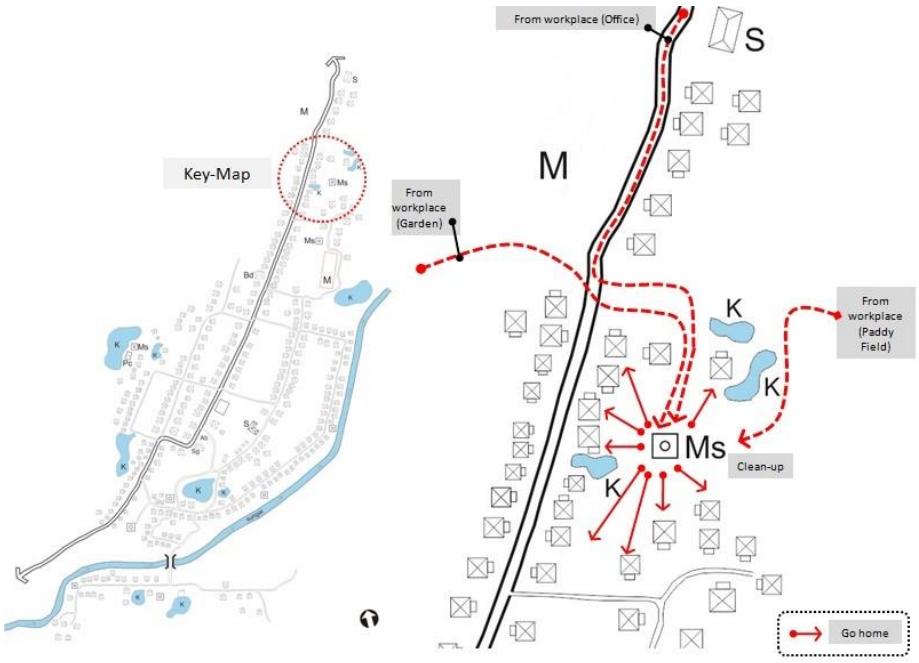

Figure 6. The Concept of a Barrier in Manambin Residential Neighborhood

On other environmental scales, the locations used as borders are at the outermost part of the residential area, specifically at the entry to the residence. Historically, the entry area of the residence had a sizable fish pond that functioned as a border between the residence and outdoor residential areas. Currently, most of the pools' area has been converted into shops, particularly in Singengu. However, remnants of several ponds remain, complete with fountains supplied from the nearby hills. The location of the pool in the past (and some remain today), together with a flowing water shower, has evolved into a place for local residents to clean themselves before entering the residential area.

The notion of a border in the spatial planning of Manambin and Singengu residential areas reflects a passive attempt on the part of the community to maintain social and physical distance, which is highly adaptive and responsive to the COVID-19 pandemic. The fact that Mandailing society has long recognized and implemented social and physical distance measures teaches us that traditional societies had their own passive response to pandemic situations, even before the pandemic reached the residential area. Until this research was conducted, only four persons were known to have died from COVID-19 infection in the Mandailing residential area, particularly in Kotanopan. Even then, all four had a history of other congenital diseases (comorbidity).

As announced by the Ministry of Health of the Republic of Indonesia, many strategies are required to prevent the COVID-19 pandemic, including slowing, stopping the transmission, and delaying the virus from spreading. Mandailing communities in Manambin and Singengu have already adopted processes or made steps to control the spread of the COVID-19 by addressing factors that might tip the balance that is the residential area. Throughout the pandemic, Mandailing community's good practices in adhering to health protocols, such as washing themselves in residential facilities before entering the house, have made them better equipped to deal with the spread of COVID-19. They have been proven to be capable of rapidly reducing the number of cases. The notion of a border and a place that is adaptive and responsive to the COVID-19 pandemic is illustrated in the following images within the residence and residential areascales:

The Mandailing community has a long history of staying at home while not working. Mandailing people' primary professions include farming and gardening. The majority of people's regular activities are spent at work when they finish working they simply return home. If we enter a residential area in Mandailing, we will be hard-pressed to locate groups of individuals conversing or gathering because everyone loves to stay at home, resulting in the residential areaappearing desolate. It is not because it is forbidden, but the established tradition considers conversing and gathering taboo. For young people, particularly women, gathering, sharing stories, and gossiping are regarded as non-productive activities, and these activitiesare strictly banned or generally referred to as taboo (abstinence).

If a number of previous studies on the COVID-19 pandemic demonstrate that numerous efforts have been made to adapt to the new normal conditions due to the pandemic, then the spatial planning of Mandailing's residences, particularly in Manambin and Singengu, has been adaptive to the pandemic and has proven to be highly resilient, particularly in terms of preventing and controlling the spread of COVID-19 at the level of the residential area. Two major concepts from the research findings demonstrate that present spatial planning does not require considerable change since the spatial arrangement is highly adaptive to current pandemic conditions.

Theoretical Dialogue: Adaptive-Responsive versus COVID-19 versus SABB

Previous study by Nuraini and Suprayetno (2021: 65) indicated that the adaptable and responsive character of the Manambin residential area is manifested in six components: permeability, variety, legibility, robustness, richness, and personalization. When it comes to

the adaptive-responsive context of COVID-19, three of the six components discovered by Nuraini and Suprayetno, namely permeability, robustness, and richness, support the adaptive-responsive character of COVID-19. The theoretical discussion can be summarized as follows:

Permeability is an adaptive-responsive concept characterized by easy accessibility and mobility. This concept is part of the menganan concept, or concept of place, which is demonstrated in the context of the residential area in Manambin and Singengu by a spatial planning that divides the mobility area for women (who are protected) from the mobility area for men (who protect). Previous research by Nuraini et al. (2014a), Nuraini et al. (2014b), Nuraini (2015), Nuraini (2016a), Nuraini (2016b), Nuraini et al. (2018), and Nuraini (2019b) revealed that the space setting for men's activities is always in the sunset area (*bonom*), whereas the space setting for women's activities is always in the sunrise area (*bincar*) (2019b). The following XY picture depicts the ease of access and movement that is adaptive-responsive to the COVID-19 pandemic based on the Space Attachment of Bincar-Bonom (SABB):

Robustness is an adaptive-responsive concept that is commonly depicted as temporal space or areas designated for various activities. This concept is part of the border concept (*pangolat*), which is demonstrated in the context of the residential area in Manambin and Singengu through a temporal, spatial planning that may alter its function at the same time. The parik region, which has no major purpose (non-activity) under normal conditions, is an example of temporal space in the Manambin and Singengi residential areas. Still, in the pandemic period, it serves as a transit room before accessing the house's bathroom. The following spatial scheme depicts temporal space as part of the COVID-19 pandemic's adaptive-responsive border concept:

Richness is an adaptive-responsive concept that generally refers to the richness of taste as a result of variations, resulting in diverse forms of the environment and surrounding buildings. This concept is related to the concept of place (*inganan*). Differences in spatial planning, routines, and activity sites, particularly for men and women, reveal the setting of the residential area in Manambin and Singengu. The contrast in space and activity between the Manambin and Singengu residential areas, which are laid out according to the SABB, demonstrates architectural richness that is extremely adaptive and responsive to the pandemic.

CONCLUSION

When not working, the Mandailing community has always preferred to stay at home. Mandailing's primary occupations include farming and gardening. The majority of people's daily activities are spent at work, after working, they go and stay at home. These daily routines make it relatively easy for the Mandailing population, particularly those in Singengu and Manambin, to acclimatize to the COVID-19 pandemic, particularly in terms of health standards pertaining to personal cleanliness. It will be difficult to discover groups of people conversing or gathering if we visit a neighborhood in Mandailing b because everyone wants to stay at home, the residential area appears desolate.

If previous research related to the COVID-19 pandemic revealed that many strategies were implemented in an effort to adjust to the new normal conditions caused by the COVID-19 pandemic, then the residential spatial planning in Mandailing, particularly in Manambin and Singengu, has actually been adaptive to the pandemic and proven to have very high resilience against the pandemic, especially in terms of preventing and controlling the spread of COVID-19 at the level of the residential area. It is clear from the findings' two key

principles that current spatial planning do not require considerable change since their spatial planning is extremely adaptive to the present pandemic conditions.

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