

## Design Criteria of Vertical Housing for Social Communities

Rizka Tiara Maharani<sup>1</sup>, Yusvika Ratri Harmunisa<sup>2</sup>, Almahmudah<sup>3</sup>, Cindy Octavianti<sup>4</sup>

<sup>1,2,3,4</sup> Program Studi Arsitektur, Fakultas Arsitektur dan Desain, UPN Veteran Jawa Timur, Surabaya 60294, Indonesia

| ARTICLE INFO   | ABSTRACT  |
|--|---|
| <p><i>Article History:</i><br/>                     Received: August 24, 2022<br/>                     Received in revised form: June, 27, 2023<br/>                     Accepted on: June 25, 2023<br/>                     Available Online: June 2023</p>   | <p><i>Population growth, increased housing requirements, and a lack of available land in urban areas motivate developers to construct vertical housing. Vertical occupancy reduces social interaction between occupants, leading to the development of individualistic characteristics. This is due to the fact that the design does not encourage inhabitants to interact with one another. This research seeks to identify the design criteria necessary to construct a social structure in a vertical residence. This study's methodology consisted of three stages: data collection, data analysis, and data synthesis. Where quantitative and qualitative data are collected using a combined research methodology. Retrieve quantitative data through questionnaires to ascertain the social interaction habits of vertical occupancy users. While qualitative methods, such as literature and precedent studies, such as Home Farm Singapore and The Rosebay Surabaya, are used to identify existing issues. The analysis phase consists of descriptive statistics to interpret the questionnaire results, as well as a description of the analysis based on the research variables used, such as accessibility, users, individuality, adaptability, and others. The results of the synthesis phase will be design criteria that can enhance the social value of vertical housing.</i></p>                                 |
| <p><i>Keywords: apartment, communities, social interactions, vertical housing (apartemen, komunitas, interaksi sosial, hunian vertikal)</i></p>  | <p>Pertumbuhan penduduk, peningkatan kebutuhan rumah tinggal, dan keterbatasan lahan di kota besar mendorong para pengembang membangun hunian vertikal. Hunian vertikal membuat berkurangnya interaksi sosial antar penghuni yang berdampak pada munculnya sifat individualis. Hal tersebut karena desain yang diciptakan tidak memaksa penghuni untuk mudah berinteraksi dengan sesama. Studi ini bertujuan untuk menentukan kriteria desain yang mampu membangun struktur sosial di dalam hunian vertikal. Tahapan metode pada penelitian ini terdiri dari 3 tahap yaitu <i>data collection</i>, analisis, dan sintesis. Di mana pada data collection menggunakan <i>mixed method research</i> yaitu menggabungkan data kuantitatif dan kualitatif. Pengambilan data kuantitatif melalui kuesioner untuk mengetahui kebiasaan pengguna hunian vertikal dalam melakukan interaksi sosial. Sedangkan kualitatif dengan melalui studi literatur dan preseden yaitu Home Farm Singapore dan The Rosebay Surabaya untuk mengidentifikasi permasalahan yang ada. Tahap analisis berupa statistik deskriptif untuk membaca hasil kuisisioner dan juga deksripsi analisis melalui variabel penelitian yang dipakai berupa aksesibilitas, pengguna, individualitas, adaptabilitas, dan lain-lain. Tahap sintesis akan diperoleh hasil berupa kriteria desain yang mampu membantu meningkatkan nilai sosial di dalam hunian vertikal.</p> |
| <p><b>Corresponding Author:</b><br/>                     Rizka Tiara Maharani<br/>                     Program Studi Arsitektur,<br/>                     Fakultas Arsitektur dan<br/>                     Desain, UPN Veteran Jawa<br/>                     Timur<br/>                     rizka.tiara.ar@upnjatim.ac.id<br/>                     ORCID ID:</p> |   |

## 1. Introduction

Nowadays, the increment in population will be directly linked to the need for housing. Moreover, land prices are getting more expensive, and on the other side, the demand for housing needs continues which will have an impact on the tendency of developers to build housing on a large scale. This causes the availability of land to decrease and become limited because population dynamics have a direct relationship with the production and reproduction of urban space (Rosembach et al., 2017). In the previous study stated that to keep up with population development projections through 2030, an annual average of 34,000 new dwellings would be required and vertical housing is a novel innovation for minimizing land conversion for housing purposes (Conefrey & Staunton, 2019; Melinda et al., 2021).

Residential land located in areas that have an activity intensity with high economic value is increasingly being displaced, resulting in reduced residential land and more density. Existing residential land cannot support/accommodate the development of horizontal settlements. To meet the housing needs of the community, a transition from horizontal housing (landed houses) to vertical housing is needed. Housing Developers are vying to build vertical housing, including apartments and for the urban professional community, living in residential vertical buildings is becoming a lifestyle or trend (Musa et al., 2015).

The vertical housing culture in Indonesia is distinct. However, if we lived in a flat, there would be a clash of cultures as a result of their vastly distinct aesthetics. Typical of Indonesian society is the formation of social relationships, whereas the flat layout is a driving factor for individualistic living. The lack of quality social interaction among its residents leads to the emergence of an individualistic attitude. According to previous research, many dwellings are irritating due to their isolation (Abrams et al., 2019). However, the dwellings in high-rises have less satisfaction than other housing and they feel that is not optimal for growing children (Gifford, 2007). Children's growth is greatly influenced by social interaction because children can improve their cognitive abilities and social skills when interacting with friends in their neighborhood (bin Abu Bakar & King, 2018). Nevertheless, the development of vertical housing provides few shared housing facilities or communal spaces as a forum for interaction. In building a vertical residence, it is necessary to pay attention to cultural activities because it's related to social, economic, and environmental aspects which are a reflection of efforts to realize the sociocultural values adopted by the prospective occupants, and not merely to build a shelter (Melinda et al., 2021).

The social interaction itself is important for people as the needs of social beings. The decrease in opportunities people make face to face is affect human development either physical or mental health (Orben et al., 2020). So, the social system should be adapted to the vertical house to avoid negative impacts like that. Furthermore, in vertical housing, there are so many aspects for fulfilling the satisfaction like behavior problems, crime, fear of crime, pro-social behavior, interaction social, and the kids' growth. All

factors are shown that building with low altitude can give better quality, fewer behavior problems, less criminality, and better interaction with a neighbor (Landry et al., 2018). However, currently, social interaction can be replaced with technology but this condition is can't replace the physical world (Modi, 2014). Nevertheless, there are seven categories of positive, neutral, and negative social interactions, including close relationships, acquaintance relationships, formal relationships, accommodation relationships, competitive relationships, conflict relationships, and dominance relationships (Sakina & Kusuma, 2016).

A social system is a system of action formed by individuals, social groups, and social norms that apply in people's lives (Wirawan, 2012). Regarding Parsons's theory inside (Ritzer, George; Goodman, J Douglass, 2010). There are four functions that are needed in a whole system, for instance, firstly, adaptation means that the system must address external situational needs. He must adapt to his surroundings and the surroundings to his needs. Secondly, goal attainment refers to the system's ability to define and achieve its primary objectives. Thirdly, Integration is the process of transforming a system's interface into a component. It must also change the relationship between the three most powerful people in the world. Lastly, latency (Maintenance Patterns) is a system that must create and renew individual motivation as well as the cultural patterns that create and sustain motivation.

This study selects two objects, located in The Rosebay Surabaya and Home Farm Singapore. The Rosebay is chosen because the floor is not too high and people can make social connections. Consequently, the purpose of this investigation is to determine its efficacy. In addition, the design from Home Farm Singapore is proposed to create a social life, therefore to determine how effective this design is at establishing social relationships. The previous research is investigating locations where dwellings will interact with one another, such as in landscape or outdoor settings (Coley et al., 1997). The main factors are accessibility and secure spaces, both of which will play important roles in social interaction (Alahmed et al., 2014). The vertical houses need to provide interactive spaces to replace the house front garden that opens onto streets and also need to optimize the open and communal spaces such as that social contact is possible (Marzaman & Fisu, 2020; Modi, 2014). So, the novelty of this research is to find the criteria design based on typology studies from two objects that is observed.

## **2. Methods**

The design thinking is started from issue that is happened nowadays in vertical housing especially for highlighting how the interaction can be realized there because usually have a limited interactive space. It is making that people will rarely to get social contact because the vertical housing design is boring due to monotonous. So that, through this research, the design approach is for improving social quality inside the vertical housing design. This study is composed of three phases as illustrated in Figure 1: data collection, analysis, and synthesis (Cross, 2021). In the data collection stage, quantitative

and qualitative mixed-method research is employed (Creswell, 2014) by questioner and precedent analysis through questionnaires and analysis of prior cases, we were able to identify the crucial issues that arose. The questionnaire was shown to determine the behaviors of the building's occupants, while the precedents were used to determine the layout of tall buildings in order to evaluate the effectiveness of the existing design for facilitating social interaction. In the quantitative method, 40 respondents completed a Google form questionnaire based on the assumption that they are flat dwellers with typical routines, including the manner in which they engage in social interactions. As for precedent studies, namely Home Farm Singapore and The Rosebay Surabaya, study vertical housing typologies to identify problems regarding to social interaction inside.

The second stage is the analysis stage, which is needed to identify what problems are found. The results of the questionnaire will be analyzed through descriptive statistics to summarize and explain the characteristics of the data obtained (Kaur et al., 2018). As for the precedent study, the data obtained will be analyzed using descriptive analysis variables consisting of accessibility, participant, individuality, adaptability, Hierarchy Spaces, Footprint, Views, Security, and Pollution (Cross, 2021; Modi, 2014; Ramdhan, 2021). The last stage is synthesis, where at that stage several design criteria will emerge which will be obtained as an outline of the design proposal.

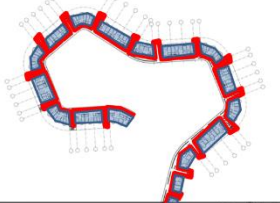

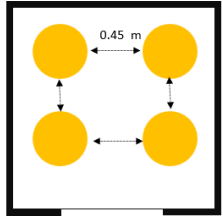


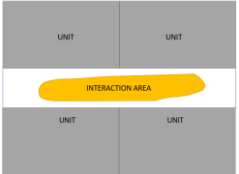
### **3. Result and Discussion**

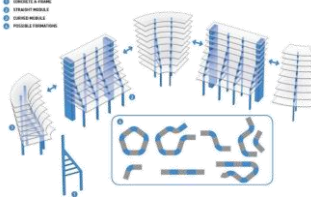

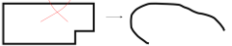
The research begins with the distribution of a questionnaire to vertical housing residents in order to ascertain the actual condition of vertical housing dwellings. The results of a Google Form sent to 40 respondents in which the total correspondence already valid and reliable (Amalia & Dianingati, 2022). The result indicates that 72 percent of households do not know their neighbors due to their responsibilities and the absence of the need to do so. 22% of those surveyed indicate that their relationship is still strong. 85% of respondents say that there is no social activity in their building, while the remaining 15% say that sport activities can still provide opportunities for greeting. Furthermore, social interaction occurs in public facilities such as parking lots, pools and gyms, shops, and food courts. Nonetheless, public facilities do not guarantee that people will participate in activities together because they each have their own territory or personal space. Interaction and the availability of personal data will raise a number of ethical and privacy issues (Buck & Bodenheimer, 2021). For instance, in this situation, a large space will make it difficult for people to make eye contact if they do not feel the need to interact. So, the tiny space might be willing a possibility to people make a social exchange here.

From this situation above, the next step is choosing the precedent for making precedent analysis. The precedents that selected are Home Farm Singapore and The Rosebay Surabaya. Home Farm in Singapore is purposed to retirement people and The Rosebay Surabaya is to productive age. So, based on the background of residents is very different but the social requirement is a need for every human. Nevertheless, basically,

the typical of social space in vertical house are like access, participant, individuality, adaptability, and hierarchy of spaces (Modi, 2014). In addition, from their public access, programmers, hybridization, and periscopes, one can observe social interactions in the vertical house (Wie & Dewi, 2019). Furthermore, the purpose of study precedents is to find a social system in those buildings. Furthermore, the footprint, views, security, pollution, and safety are also is considered in high rises development building (Modi, 2014). This precedent analysis is purposing to identified the design problem in the vertical building, how the design effectiveness to maintain the social activity inside as illustrated in Table 1. However, the physical setting is important in design to force the people get a 'contact' to each other.

**Table 1. Precedent Analysis**

| Item        | Home Farm Singapore  | The Rosebay  | Synthesis   |
|-------------|--|--|---|
| Access      |  <p>Figure 1 Layout Design<br/>Source: modified from sparkarchitects.com, 2022</p> <p>The building access is located in a single loaded corridor for horizontal movement and vertical access is commonly using lift.</p>                  |  <p>Figure 2. Typical Layout<br/>Source: intiland.com, 2022</p> <p>The apartment is using a double loaded corridor. People can have a possibility to meet in corridor or in lift.</p>                      |  <p>Figure 3. Analysis Lift Area<br/>Source: Authors, 2022</p> <p>The lift area can be a meeting point for people to meet each other. The size of lift area is quite small so it can maintain the people for getting intime social contact.</p>        |
| Participant |  <p>Figure 4. Corridor Area<br/>Source: sparkarchitects.com, 2022</p> <p>In this building, people have a possibility as participants through farm activities in their corridor. This relates to the building concept for gardening.</p> |  <p>Figure 5. Balcony Area<br/>Source: intiland.com, 2022</p> <p>This building is design for private area to each unit. The design is unable to provide a room for interacting people in each floor.</p> |  <p>Figure 6. Interaction room<br/>Source: Authors, 2022</p> <p>For making people to be as a participant, the building design should provide a space to make residents make an activity together such as in public space (Wie &amp; Dewi, 2019).</p> |

| Item             | Home Farm Singapore   | The Rosebay   | Synthesis  |
|------------------|---|---|--|
| Individuality    |  <p data-bbox="443 443 730 488">Figure 7. The Modul of Home Farm<br/>Source: sparkarchitect.com. 2022</p>                                  |  <p data-bbox="778 465 1082 510">Figure 8. The Rosebay Floorplate<br/>Source: Authors, 2022</p>   |  <p data-bbox="1129 353 1425 432">Figure 9. The Recommendation floor plate<br/>Source: Authors, 2022</p>  |
|                  | <p data-bbox="419 539 746 790">because the layout is formed by several modular, so the building shape is unique and give an impact to the social environment in which gardening is very dominant here.</p>                  | <p data-bbox="754 539 1098 790">The design is very monotonous and boring due to the typical floor repetition. From the 1<sup>st</sup> until top floor, the layout is similar. So, make people only getting together in predicted area such as corridor, lift, or public facilities.</p> | <p data-bbox="1106 539 1437 790">Design layout can influence the habit of social environment. Through unique design can help the people for socializing even though in vertical building.</p>  |
| Adaptability     | <p data-bbox="419 815 746 969">This building is designing for the elderly people. So, through the farm activity, they can be adaptable to this environment.</p>   | <p data-bbox="754 815 1098 969">The floor space is usually fixed. So, the environment is less adaptive to the dwellings.</p>  | <p data-bbox="1106 815 1437 969">The activity together can make an adaptable space and environment.</p>  |
| Hierarchy Spaces | <p data-bbox="419 972 746 1126">In vertical, the service area is underground. Then, the public area is in the ground. Last, the service area in typical floor above.</p>  | <p data-bbox="754 972 1098 1126">As vertical, the service area is underground. Then, the public area is in the ground. Last, the service area in typical floor above.</p>   | <p data-bbox="1106 972 1437 1126">The public area is usually found on the ground. the hierarchy space is divided by vertical zone not as horizontal area. There are three zones, including the public zone, the service zone, and the private zone (Pramudito et al., 2019).</p> |
| Footprint        | <p data-bbox="419 1240 746 1491">The footprint in Home Farm is bigger than above. So, it will influence the communal spaces in the ground. Nevertheless, the interactive room is provided in each floor in the balcony.</p> | <p data-bbox="754 1240 1098 1491">The footprint is similar with the stores above. The space for communal space in the ground is limited by the footprint shape of each tower.</p>   | <p data-bbox="1106 1240 1437 1491">The footprint shape will influence the activities social in the ground. Nevertheless, it's not being a limitation because the area in typical floor can be utilized to be an interactive room.</p>  |
| Views            | <p data-bbox="419 1494 746 1597">The main view orientation is to city and gardening view.</p>   | <p data-bbox="754 1494 1098 1597">City view is the main orientation here.</p>   | <p data-bbox="1106 1494 1437 1597">View can be directing in good area either in gardening or view city.</p>  |
| Security         | <p data-bbox="419 1599 746 1814">Tower shapes, particularly curve shapes, create a secure environment.</p>  | <p data-bbox="754 1599 1098 1814">The public facilities in the centre. So, the secure environment is formed by tower blocks and more controlled.</p>  | <p data-bbox="1106 1599 1437 1814">This view should be directed into communal space such as in pool, sport area, or garden, etc. The central tower can provide a secure environment.</p>   |
| Pollution        | <p data-bbox="419 1816 746 1998">The park in building facilities can reduce the air pollution here. The green</p>   | <p data-bbox="754 1816 1098 1998">The green zone can be found on the ground. The area itself could be used to reduce pollution.</p>   | <p data-bbox="1106 1816 1437 1998">Green area has a main role either for pollution or social zone. Natural element can give an</p>   |

| Item | Home Farm Singapore            | The Rosebay | Synthesis  |
|------|--------------------------------|-------------|--|
|      | area is located in each floor. |             | opportunity for people for interacting (Coley et al., 1997). The green space can also contribute to a home's comfort (Maharani & Fitriyanto, 2022) |

Source: Authors, 2022

From the comparison studies above, it can be seen that in House Farm Singapore, the architect has designed that human activity as a focus. So that, from the condition the social interaction can come true. In the previous research, Spatial design based on existing local knowledge, such as physical, economic, social, and cultural components of village life, in order to preserve the memory of the place/existence of the former village (Pramudito et al., 2019). This condition can also be applied to newer structures such as apartments. Additionally, this illness is distinct from The Rosebay condition. Regarding the property's economic worth, social contact is concentrated in a single space, such as a gym or pool area. It occurred as a result of restricted space in urban areas and the influence of urban city culture (Syahwara, 2015).

From the items that is studied, the close distance can make people to start an introduction relationship. It occurs at the start of a friendship and is an example of adaptive behavior (Sakina & Kusuma, 2016). In addition, the design should create multiple locations for individuals to interact and engage with group activities, as was the case in Home Farm Singapore through Gardening activity.

In addition to influencing social interaction, apartment and building layout, particularly the positioning of rooms in a hierarchical order, also affect apartment and building layout. When designing the outside and interior space layout of a building, including the positioning of views, architects must be inventive. The layout of the floor design influences the adaptability of every occupant. In addition, security and pollution should be considered because social contact is equally concerned with safety and security.

From the analysis above, there are several recommendations or design criteria that should be implemented. People will have an attachment with place if they have a closed activity relationship (Anggiani & Ghassani, 2022). So that, all of those criterias can be measured by layout configuration for forcing all dwellings to meet up each other as described below:

1. In terms of layout, the layout should be condensed. Figure 10 is an illustration of a layout containing suggestions for enhancing the communal nature of vertical housing. This will enhance interpersonal communication. To facilitate social activities, the majority of the structure must be compact. This layout may provide an opportunity to compel interaction between individuals. The inclusive living environment in vertical housing could commence immediately adjacent to the residential unit and expand outwards (Pandelaki & Firmandhani, 2022). Consequences include the potential for disruption, necessitating a special noise reduction treatment.

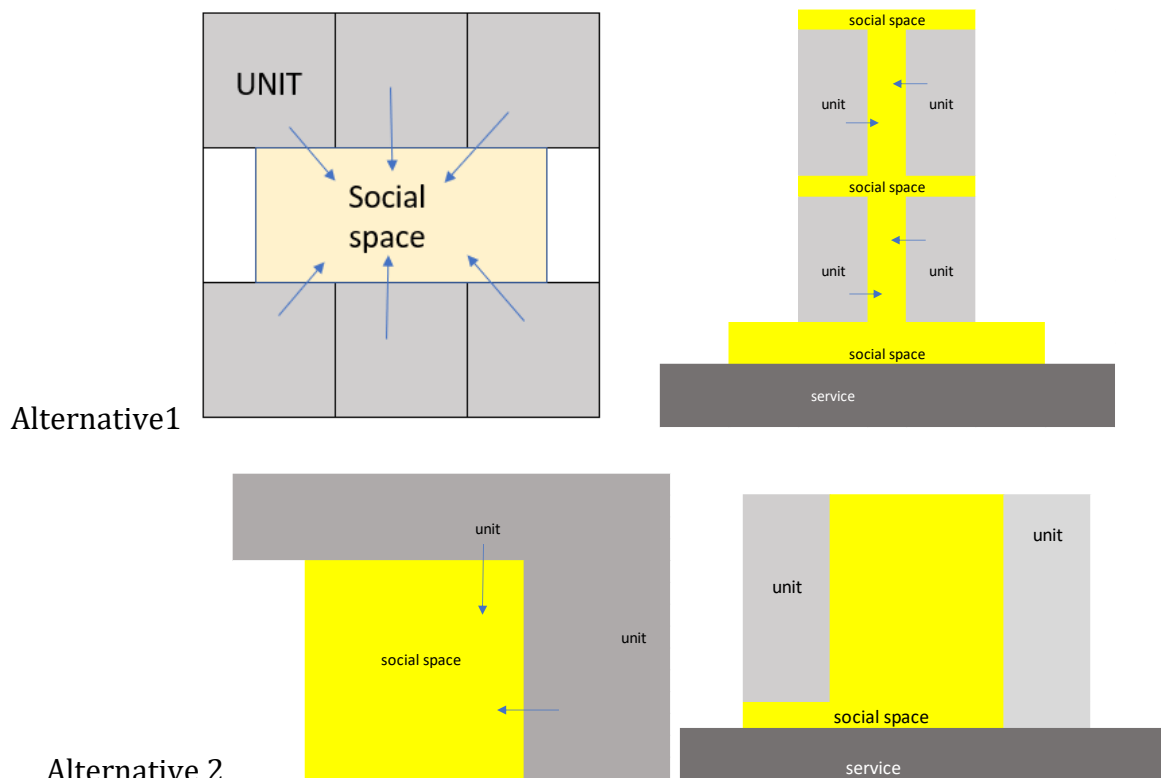


Figure 10. Layout Recommendation

Source: Authors, 2022

2. The common area, such as an elevator or stairwell, should be cognizant of the spacing between individuals in order to facilitate interaction.
3. A social space should accommodate societal activities, such as gardening and sports, and help people adapt to their environment.
4. The neighborhood should be safeguarded to provide a sense of safety for all residences so that people can enjoy participating in activities together. architecturally, the design can provide a sense of security through the placement of the layout arrangement for public zones must be monitored from all directions and it would be better if it is in the middle.
5. A comforting feeling can be enhanced by a green space. It also aids in preventing public area pollution.

#### 4. Conclusion

The conclusion emphasizes the need for housing layouts that foster social interaction and a sense of community. It suggests condensing the layout in order to maximize space and encourage interpersonal interaction. There are given examples, including compact buildings and designated social spaces for activities. In addition, the statement emphasizes the importance of ensuring neighborhood safety and incorporating green spaces for a calming environment and pollution prevention.



## Acknowledgements

This research is funded by Dana Penelitian Internal Fakultas Arsitektur dan Desain, UPN Veteran Jawa Timur 2022.

## Reference

- Abrams, L., Fleming, L., Hazley, B., Wright, V., & Kearns, A. (2019). Isolated and dependent: Women and children in high-rise social housing in post-war Glasgow. *Women's History Review*, 28(5), 794–813.
- Alahmed, H., Alaghbari, W., Ibrahim, R., & Salim, A. (2014). The influence of spatial design characteristics on low-rise residential neighbourhoods in Basra city: Enhancing residents' social interaction. *International Journal of Housing Markets and Analysis*.
- Amalia, R. N., & Dianingati, R. S. (2022). Pengaruh jumlah responden terhadap hasil uji validitas dan reliabilitas kuesioner pengetahuan dan perilaku swamedikasi. *Generics: Journal of Research in Pharmacy*, 2(1), 9–15.
- Anggiani, M., & Ghassani, D. P. (2022). Hubungan Keterikatan Tempat Terhadap Minat Kedatangan Pengunjung Di Bangunan Alih Fungsi Komersial. *RUAS*, 20(2), 1–12.
- bin Abu Bakar, M. E., & King, N. K. (2018). Social Interaction and Third Space Relationship in Vertical Housing in Malaysia". *Journal of Engineering*, 1–10.
- Buck, L. E., & Bodenheimer, B. (2021). *Privacy and personal space: Addressing interactions and interaction data as a privacy concern*. 399–400.
- Coley, R. L., Sullivan, W. C., & Kuo, F. E. (1997). Where does community grow? The social context created by nature in urban public housing. *Environment and Behavior*, 29(4), 468–494.
- Conefrey, T., & Staunton, D. (2019). Population Change and Housing Demand in Ireland. *Economics Letters*.
- Creswell, J. W. (2014). *Research design: Qualitative, quantitative, and mixed methods approaches*. Thousand Oaks, California : SAGE Publication.
- Cross, N. (2021). *Engineering design methods: Strategies for product design*. John Wiley & Sons.
- Gifford, R. (2007). The consequences of living in high-rise buildings. *Architectural Science Review*, 50(1), 2–17.
- Kaur, P., Stoltzfus, J., & Yellapu, V. (2018). Descriptive statistics. *International Journal of Academic Medicine*, 4(1), 60.
- Landry, N., Gifford, R., Milfont, T. L., Weeks, A., & Arnocky, S. (2018). Learned helplessness moderates the relationship between environmental concern and behavior. *Journal of Environmental Psychology*, 55, 18–22.
- Maharani, R. T., & Fitriyanto, D. A. (2022). Biophilic Design to Enhance Residence Comfort in Covid Era. *Journal of Architectural and Engineering Research*, 2, 41–51.
- Marzaman, L. U., & Fisu, A. A. (2020). Hunian Vertikal Kontainer Buruh Pt Kima Dengan Konsep Arsitektur Humanis. *Pena Teknik: Jurnal Ilmiah Ilmu-Ilmu Teknik*, 5(2), 91–103.

- Melinda, L., Erlina, E., Badaruddin, B., & Rujiman, R. (2021). *Vertical Residential Development In Medan City In Supporting Sustainable Development*. 1(1), 41–44.
- Modi, S. (2014). Improving the Social Sustainability of High-Rises. *CTBUH Journal*, 1.
- Musa, Z. N., Sarip, A. G., Aini, A. M., Aziz, W., Hanif, N. R., Al-Sadat, Z., & Tedong, P. (2015). Issues in managing vertical residential building in Malaysia: Homeowners' perspective. *Proceedings of the Korean Housing Society Conference*, 583–590.
- Orben, A., Tomova, L., & Blakemore, S.-J. (2020). The effects of social deprivation on adolescent development and mental health. *The Lancet Child & Adolescent Health*, 4(8), 634–640.
- Pandelaki, E. E., & Firmandhani, S. W. (2022). Inclusive space for children in vertical housing. *Journal of Architecture and Urbanism*, 46(2), 100–106.
- Pramudito, S., Praptantya, A. L. T. W., & Nasir, D. J. (2019). Studi model rancangan hunian vertikal berdasarkan bentuk interaksi warga di bantaran sungai Winogo Yogyakarta. *ARTEKS: Jurnal Teknik Arsitektur*, 3(2), 149–160.
- Ramadhan, M. (2021). *Metode penelitian*. Cipta Media Nusantara.
- Ritzer, George; Goodman, J Douglass. (2010). *Teori Sosiologi Modern*. Renada Media.
- Rosemback, R. G., Rigotti, J. I. R., Feitosa, F. da F., & Monteiro, A. M. V. (2017). Demografia, planejamento territorial e a questão habitacional: Prognóstico da situação habitacional do Litoral Norte Paulista. *Revista Brasileira de Estudos de População*, 34, 301–320.
- Sakina, B., & Kusuma, H. E. (2016). Hubungan antara jenis hunian sewa dan kualitas interaksi sosial mahasiswa. *Prosiding Temu Ilmiah IPLBI*, 500, 033.
- Syahwara, P. (2015). *Kondominium di Baciro Yogyakarta "Tata Ruang dan Sirkulasi yang Dapat Memicu Interaksi Sosial dalam Batas Property Size."*
- Wie, I. W., & Dewi, J. (2019). Space Configuration of Vertical Housing for Optimal Social Interaction Support. *KnE Social Sciences*, 421–443.
- Wirawan, D. I. (2012). *Teori-teori Sosial dalam Tiga Paradigma: Fakta sosial, definisi sosial, dan perilaku sosial*. Kencana.