Design performance of urban transition house towards livable urban settlement; a case study from Semanggi Surakarta Indonesia

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Abstract. Urban area rejuvenation efforts often face temporary relocation constrain. The Semanggi transition house is a house that functions as a temporary residence for communities affected by the structuring and rejuvenation of slums in Surakarta City. The Semanggi transition house is designed by applying the concept of a “Rumah Instan Sederhana Sehat” (RISHA). It was built using a modular system, one of the solutions for the procurement of housing for low-income people who are starting to apply to the handling of slum and dense settlements in Indonesia. This study aims to identify the design performance of the Semanggi transition house. The research location is on The Semanggi Sub-communal, one of the transition houses to temporarily accommodate residents affected by the slum area rejuvenation project on the banks of the Bengawan Solo River. The results of this study found that the performance of the transition house design can accommodate the activities of its occupants with several adjustments. The social and cultural background of the occupants influences the performance of the transitional house design. This study result is expected to be used as an evaluation and recommendation for the planning and design development of transitional housing complexes outside Surakarta.

Keywords: design performance, Semanggi, transition house, urban settlement

1. Introduction
Efforts to create livable urban residential environments are the ideals of every urban planner and designer. Urban liveability is a concept with a multi-dimensional approach and consists of various variables that can be evaluated differently. The understanding of liveability can differ from one community to another and depends largely on cultural background and time context [6]. A livable urban settlement is defined as a settlement structure built with all facilities to meet the basic needs of its citizens to improve their quality of life [5]. According to The American Association for Retired Persons (AARP), a Livable urban settlement is affordable and livable housing with good community service support and adequate mobility options. It can facilitate personal independence and social life [1]. Livable urban settlements allow their citizens to work, live and develop better. The preparation of liveability indicators is an essential issue in livable urban settlement research. Several previous studies have tried to compile liveability indicators from various perspectives, such as social, economic, physical, and environmental perspectives. A liveability indicator study conducted in the metropolis of Tehran (Iran) found that to realize livable urban settlement, it needs to be related to aspects of providing land for settlements, office facilities, industry, commercial, green open space urban infrastructure [5]. There are three leading indicators of livability; First, Economic Vibrancy and Competitiveness, which consists of aspects of
Performance of Economic, Economic Opportunity and Infrastructure; Second, Environmental Friendliness and Sustainability, consisting of aspects of Pollution, Reduced Natural Resources and Concern for the Environment; Third, Socio-Cultural Conditions consisting of aspects of Sanitation and Transportation, Medical and Healthcare, Education and Housing, Diversity of Community, Income Equality, Demographic and Social Cohesion. [6].

Transition houses are temporary residences that help people affected by slum arrangements, rejuvenation, conflict or natural disasters who are homeless or have to leave their homes until they can return to or regain permanent residence. A transition house is conceptualized as an intermediary step between emergency crisis shelters and permanent housing [16] [10] [14]. This is more long-term, where transition houses are densely serviced and more private than emergency shelters but still limited to three months to three years of stay. Such thinking is intended to provide a safe environment and support residents in overcoming trauma-related to displacement or resettlement, address the problems that lead to homelessness, and rebuild their support networks for a comfortable return to resettlement.

The development of planning and designing the transition house design takes place dynamically and sustainably. Various form innovations are carried out to improve the quality of the transition house design both from the physical aspect [2] [7] [12] [4], social and cultural aspects [3] [11], and health aspects [15] [9] and psychological aspects [8].

Semanggi settlement area is a priority for handling slum arrangements in Surakarta city. The model of handling slum areas in Semanggi is expected to be used by the Surakarta government as a model for slum arrangements elsewhere. The early stages of one of the areas affected by the arrangement are the Semanggi settlement area located on the banks of the Bengawan Solo river. There are 56 residents affected by the slum planning program. This settlement structuring program is estimated to take about a year, calculated since the start of the relocation of residents, revamping the site and rebuilding the homes of residents affected by environmental improvement projects. While waiting for the completion of the environmental structuring program, residents affected by this program are placed in transition houses located in the Semanggi sub-communal area.

The Semanggi Sub-communal transition house was built with the construction method RISHA (Simple Healthy Instant House). This construction method facilitates the construction and installation process because it uses a modular precast system that is also more flexible and efficient in terms of construction time and materials. This residence is also equipped with adequate facilities and infrastructure, such as shared facilities, namely parks, parking lots, shared spaces, places of worship, places to trade or kiosks. The physical environment of the Semanggi transition house that is different from the original environment affects the response of residents placed in the residential complex. There are various adjustments to the function of the building and adaptation of the behavior of residents during the occupying of the transitional house.

This research aims to look at the design performance of the Semanggi transition house using indicators developed by Stocker [13], including location area, building structure, open space, infrastructure, and organizational and socio-economic aspects. This indicator can see the design performance that can create a livable residential environment.

2. Methods

This research was conducted at Semanggi sub-communal transition house, Semanggi Village, Pasar Kliwon District, Surakarta. The data retrieval time was carried out in the period March-April 2022. Primary data is taken with several techniques, namely: first, field observations to find out the condition of the residential environment/settlement in the Semanggi Sub-Communal; Second, an interview to explore the preferences of residents with several representatives of the elected residents of Semanggi sub communal transition house; The observed indicators include aspects of location area, building structure, open space, infrastructure, organizational and socio-economic aspects. Analysis is carried out with data triangulation techniques. This technique analyses data from various data sources, including observation data, interviews, and secondary data. The use of this analysis technique aims to combine all data in order to produce precise and comprehensive conclusions.
3. Discussion

3.1. Location and Block Plan of Semanggi Transition House
Semanggi transition house was built in Semanggi village, Pasar Kliwon district, Surakarta. This settlement was built side by side with the Semanggi Apartments complex. There are two flats on the west side of the complex, namely the west and east buildings. The temporary residential complex is on the east side of the flats with four buildings that each have two floors.

![Semanggi Transition House Masterplan](image)

**Figure 1.** Semanggi Transition House Masterplan

Semanggi transition house is a residential system that provides a two-story vertical residential group with a residential type of 36 m² with 56 residential units built. In small communal terms, these dwellings are grouped into sub-communal A, B, and C. The Semanggi Transition House complex is equipped with an integrated household waste sanitation and treatment system. (See Figure 1) It has public transportation access support in the form of sub terminals located on the west side of the complex. Some public facilities are provided, such as Mushala and PAUD located at the north entrance, public and sub-communal polling stations, public and sub-communal parking located at the south entrance, and Sanita park.

3.2. Transition House Building
The Semanggi transition house is built with the concept of RISHA (Simple Healthy Instant House). Semanggi transition house residential plan has a module size of 3mx6m, making it easier for residents
to adjust according to their needs. Residents' adaptation is made by utilizing the available spaces as needed without physically changing. Adaptation is made by changing the function of space or creating a multifunctional space. Most room changes are made to the living room on the first floor and the family room on the 2nd floor. Some function the living room into a business room or make the living room a multifunctional one (can be used for the bedroom's function). The family room on the second floor is also often used as a multifunctional room, as a bedroom or storage room for goods. (See Figure 2)

Another adaptation is made by adding semi-permanent bulkheads to the bedroom. This phenomenon is seen in the second-floor bedroom in several transition house units. Residents utilize the closet element as a semi-permanent bulkhead. The function of the terrace also seems to change for the residents of the transition house who function the terrace of the house for business. In addition to putting semi-permanent elements such as cabinets, they also add a zinc canopy in front of the terrace as an additional protector when it rains. Transition house residents also adapt to the reaction by adding a clothesline to dry clothes in front of the transition house unit.

3.3. Green Open Space Management
As a public facility in urban areas, the planning and management of green open space in the Semanggi transition house complex refer to Law No. 26 of 2007 concerning a proportion of 30% of the provision of green open space in a residential area. The proportion of 30% is a minimum measure to ensure the balance of the city ecosystem, both the balance of hydrological systems, microclimate systems, and ecological systems. Good management of green open spaces can increase the availability of clean air and increase the city's aesthetic value.

The management of green open space in the Semanggi transition house complex is carried out through activities to improve the food security of its residents. Green open space is used as land to grow vegetables and vegetable foodstuffs. Several methods and planting media are used according to the

![Figure 2. Transition house building; (1) Building facade, (2) Building isometric, (3) Building side view, (4) Building Plan](image-url)
available land. Trees and some types of vegetation become shades in temporary residential complexes. This vegetation can help the quality of air conditioning and shade in the complex. (See Figure 3)

![Figure 3. Management of green open spaces; (1) Fruit crops in pots, (2) Utilization of green open space for growing vegetables](image)

### 3.4. Environmental Infrastructure Management (waste, drainage and Sanitation)

Residents can utilize waste treatment sites in biodigesters, and biodigesters process organic waste (food waste, vegetables, liquid waste, and livestock manure) produced by sub-communal residential residents.

![Figure 4. Environmental infrastructure management; (1) Environmental drainage, (2) Biodigester unit, (3) Integrated waste treatment site](image)

Processed organic waste produces methane gas and liquid fertilizers that residents can utilize. However, the waste treatment plant is currently not running or operating. This is related to the human resources of the manager, who has not been adequately conditioned. (See Figure 4)

Likewise, with the drainage system in the temporary residential complex, some obstacles, such as channels, are not smooth but challenging to complete because the closed drainage control tub makes the waterways minimal control and maintenance.

There is a sanita park provided by the government in this complex. Wastewater Treatment (Bio gift) is an outhouse and non-outhouse wastewater treatment system that must be treated first before being discharged into water bodies not to pollute the environment. Furthermore, the processing results are continued through the Sanita Garden processing process to absorb nutrients (filtration). Water processed
by Sanita gardens can be reused for environmental preservation purposes such as garden watering, trees, and fish ponds. For non-organic waste such as plastic waste, paper and other waste, an integrated waste shelter is provided. The garbage from this place is then passed to the landfill provided by the Surakarta city government.

3.5. Socio-Economic Space
Most residents of transition houses are informal sector workers, such as day laborers, tailors, and street vendors. Some work outside the complex but some work inside the complex. Some residents use their porches to sell food and drinks. (See figure 5). They modify the house's terrace so that they can do activities selling food and drinks. This activity is carried out to find additional income to improve the family's economic level.

Social space is formed from residual space in the outer and inner areas of the building. The house's terrace functions as a communal space to socialize among fellow residents. This gathering activity generally occurs during the afternoon and evening. For homemakers who do not work, this socializing activity is often done by accompanying their children to play in the yard. At certain times there are regular meetings of transition house residents. This activity addresses environmental issues and the dissemination of information. This activity is carried out in one of the parking bags in this complex. (See figure 5)

Playground facilities for children are not explicitly provided in the transition house environment. Children's play facilities utilize the open space around the transition house building. Vehicle parking has been provided in a particular place, so residents are not allowed to park their vehicles in the transition house unit.

Figure 5. Socio-economic activity; (1) Selling food on the terrace of the house, (2) Utilization of parking bags for community meeting forums, (3) Socializing on the terrace of the house

4. Conclusion
Based on observations on aspects of location area, building structure, open space, infrastructure, and organizational and social aspects of the economy, it was found that the performance of the design of transition houses can accommodate the needs of its residents. However, there needs to be management control and monitoring of several actors such as the government, expert teams, and residents in this temporary residence. This team collaboration can help improve the performance of transition home design. Disaster mitigation systems need to be improved in these residential complexes, such as particular vehicle circulation, clarity of disaster evacuation routes, and completeness of fire extinguishers. Universal design also needs to be thought of as one of the efforts of equality in the circulation and utilization of space. In addition, there needs to be an additional economic function space to improve the economy of citizens.

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