

## **DESIGNING SCAVENGER SETTLEMENT BY FLEXIBILITY APPROACH IN MUHARTO STREET, BRANTAS RIVER AREA, MALANG**

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### **ABSTRACK**

Muharto street is one of the district in Brantas River Area which is densely populated. Most of the residents works as a scavenger. Most of the houses are not yet qualified as a liveable healthy home.

In this case, land adaptation and flexibility on the residents of the scavengers are needed. The land in this scavenger settlement will be totally renovated with arranging the building mass and adding adequate public facilities. Flexibility approach can innovate a flexible innovation according to the needs of the residents, especially scavengers by using a design method from John Zeisel, which is Environmental Behaviour.

With research-based design, scavenger settlement designing can make a new design innovation. The concept resulted is involving an arrangement of building mass, a healthy flexible and liveable house, meets the needs of scavengers, adequate public facility, and an opened green area.

**Keywords:** Scavengers' settlement, land readjustment, building mass arranging, flexible house.

### **I. INTRODUCTION**

The state of Indonesian citizens at this moment is still below further from good. Since there are many people who live in poverty, population growth exploded, thus it is narrowing the land which is densely populated. According to Kartasasmita (1997: 234), the poor are generally weak in ability to strive and has limited access to economic activities, so that they are left far behind other communities that have a higher potential (Kartasasmita, 1997: 234).

The population density is also found in large cities, one of which is Malang. Malang is 110.06 km<sup>2</sup> wide, with a population in 2015 was 849 437. From the data obtained, population growth in Malang in 2021 was 893 147 persons. Population density impacts on slums, i.e, in the field of

government administration, slums affect the image of powerlessness and inability of the government in regulating the service necessities of life and livelihood of its citizens. Second, the field of social-cultural order of society, citizens living in slum areas that are economically belonged to the poor and low-income, often regarded as the cause of the degradation of discipline and disorder in a variety of social order. Thirdly, in the field of environment, slums caused the degradation of environmental quality (Kharisnanta, 2010).



Figure 1. Scavenger settlement in Muharto Street, Brantas River Area, malang  
Source: www.wikimapia.org

A densely populated area in Muharto, is an area located in the river bank of Brantas River. In fact, the area in this Brantas River bank is a line border river which is a conservation area. Some houses are not yet meeting the standard of a livable healthy house. The lighting and air circulation in every house is not optimum. Each terraced house with 5m x 10m dimension, with a percentage of 50% permanent houses, semi-permanent home to 30%, and 20% are not permanent (private survey data, 2015). Besides housing conditions exacerbated by the absence of a special room that is home to goods resulting from scavenged. The results of scavenged goods are often stored for weeks or even months inside or outside the home.

Land readjustment is one of the land arrangement based on the land improvement. The land in scavengers settlement will be renovated totally with adding adequate public facilities, with reducing building width which are inhabited according to the need of the users, and also lighting and circulation in the room.

Brantas River area is set to be a greenbelt river, to balance the green line to the environment in scavenger settlement. There is a space between the buildings as a public area, and also the

circulation and lighting. Thus, a flexibility in a building is made, and it is in accordance with the residents, also is healthy for the environment.

Furthermore, seeing the fact in Muharto area, which residents are mostly working as scavengers with unhealthy homes, this design uses flexibility approach.

Flexibility in this design is as what is stated by Jacques (1982) as follows:

*Every designer make assumption about the nature of the problems he works upon. Whether he is aware of these or not, they operate as a theory in terms of which he decides upon how to conduct the design process. His effectiveness as a designer will depend upon the degree to which his assumption fit empirical reality. The further his assumptions depart from that reality the more any actions based upon them are likely to product ill fitting solution and to generate uncontrolled and unexpected effects.*

Based on the quote above, it is explained how every designer will make some assumptions from the basic problems on the objects to be designed. In this case, the assumption is the prediction of the problems to be faced. The faster and the sharper the assumption is build with the proper prediction, the more solution will be gained. In this case, flexibility is aimed at searching an optimal problem solving.

## II. THEORETICAL REVIEW

Mudiyono, et al (2007 : 135) mentioned that scavengers are the people who collect and process the wastes on the streets, rivers, waste bins and landfills as sellable items. In this research, the scavengers are those who collect secondhand items by picking, scavenging wastes on the streets, dumpsters, landfills, or houses to be sold. Generally they work on foot by using simple equipment such as sacks and hooks and some use bicycles with basket and pedicabs. They have no schedule limitation that is why they can work anytime they want. Among the types of wastes they pick are plastics, rubbers, drink cans, etc.

In settlement development, Silas (1985) stated that a settlement should follow criteria for good settlements that fulfill the physical and non physical aspects, as follows:

1. Physical aspects, which are:
  - a. geographical location
  - b. natural and developed environment
  - c. environment finrastructure.

2. Non physical aspects, that are:
  - a. political aspects
  - b. economical aspects
  - c. social aspects
  - d. cultural aspects.

To plan a development for a settlement, a good understanding of supporting elements for the settlements is needed, which are:

1. Understanding of the connection between the nature as the media for the continuity of the settlement operations, humans as the main actors in life and society as a group of family community as well as house as a place (to live), and also networks as artificial system to support the operations for the continuity of life.
2. The relationship reality with the nature as a the place, there are humans who form social groups which function as community. These social groups need protection; they make big buildings into big and complex environments so that finally they turn into networks and then human settlements are formed (Sastra M, et al, 2006)

Johan Silas (2002) explained that house means:

1. A place to live a life and living for family; house must fulfill biological needs such as eating, studying, etc, and also meet non biological needs, such as chatting with family members or neighbours.
2. A house functions as a mean of investment; it has investment monetary value which can be measured by money and non monetary which can not, but more to the moral advantages and family happiness.
3. A house is a place to make a living; the residents can increase their income for living.
4. Furthermore, a house as a place to stay, it has to provide enough space for its residents. There are main rooms such as bedroom, studying room or workspace, family room, service room such as kitchen, and terrace or living room.

Those mean that a house is a place to rest, to actualize oneself to increase the quality of life. It's also a place to socialize mainly with family, a place to meet physical and spiritual needs, and a place to stay.

This discussion will talk about the materials used in scavengers' house. The one that was chosen was containers. The choosing of this material is due to its flexibility and cheap price, and innovation of recycling. Container has the characteristic of modular so that it can be piled up or

arranged side-by-side and the shape can be modified, based on the desired design to make a bigger room. The walls can be removed to add the house's interior. Next this container house can be modified in the future easily and quickly. There are several sizes that are usually used to make house or shape which are 40 ft and 20 ft. A 40-ft house is 12,19 meters long, 2,44 meter wide, 2,59 meters high. Meanwhile the 20-ft house dimension is 6 meters in length, 2,4 meters in width and 2,59 in height.



Figure 2. Dimensions of containers

Source: "Container sizes". *Shipsbusiness.com*. Retrieved 1 February 2013.

The methods used in this land readjustment is rearrange the borders for the land based on zoning instructions in spatial planning. Then by adjusting the land borders ownership, there will be contributed land for public space or other infrastructures. That's why, the method principals are replot, shuffle, and contribution.

Space flexibility is where a space can be used for some activities which have diferent characteristics and space structure change without changing the building's structure can be done. According to Toekio (2000), there are three flexibility concepts which are expandability, convertibility, and versatility. Further explanations of those three principals are as follows:

### 1. **Expansibility**

Expandability concept means room design which can contain growth in widening. Design can develop adjusted with needs. The prediction towards future needs can be handled with providing flexible rooms parted temporarily.

### 2. **Convertibility**

Convertibility concept means room design designed to possibly change room orientation and atmosphere adjusted to will without renovating existing room. One of the ways is using partition

walls. The example is in changing room orientation in display events which can be placed in the middle or the side of the room.

### 3. Versatility

Versatility concept means flexibility with a place with multi function use to contain mult activities in different times. It can be used to many activities such as parties, meetings, seminar, etc.

Degory explained as quoted:

*“.....The relationship between the designated spaces are variable; sleeping to eating, dinning to bathing, washing to working etc. Hence the flexibility of the house lies in its accommodation of changing relationship s between events, context and the use of the space.”*

(DeGory,1998)

Degory explained that flexibility is in the accommodation which changes the relationship between events, context, and room usage which change room limits, structure, or the form for environment. Because degory was focused to the relationship of the rooms which happens inside that can change.

Because of the external factors, flexibility can be created from user behavior inside, yet the configuration or model is the decision of the architech. So that flexibility in architechture is a room function in arcitechture can change adjusted to the needs of the user.

## III. DESIGN METHODOLOGY

The matter of thesis design being discussed is a design capable to provide flexibility in the cuilding fit with the needs of the scavengers. So that there is a new change and innovation to form building and rooms mass arrangement fit to users need, the stability adapted towards dwellers and its surroundings creates healthy building.

Many methods about design linked to environmental behavior has been delivered (T Moore, 1974; Zeisel, 1981; Carmona, 2003) that the design involves human behavior happens in a physical environment involves research about behavior in an environment or environmental behavior. In searching link between physical setting, behavior setting, and design issue, there are reseach characteristics of environmental behavior research (Groat Wang, 2002):

1. Research focused to natural pattern happening (from sociology & physical link).
2. Research measuring specific design variable.
3. Research using statistics to find pattern from correlational link.

According to Spradley (in Dyah, 2011), the sample that was taken in the qualitative research is social situation which consist of three elements that interact synergistically.

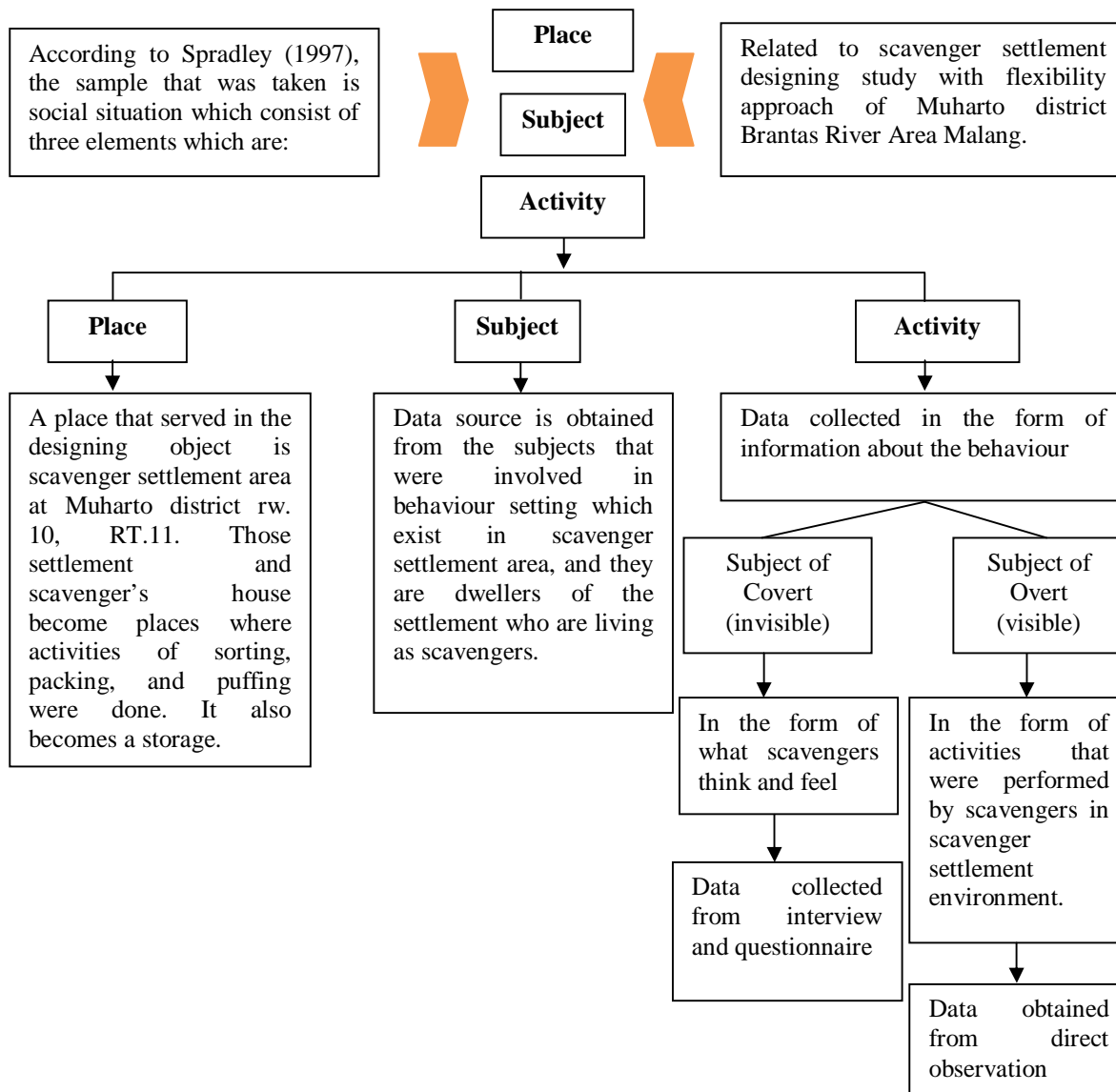


Figure 3. Scheme Research Method by Spradley  
 Source: Spradley, James P., (1997), Metode Etnografi

Based on the literature study, there are many common criterias to help designing Scavengers’s settlement by Flexibility Approach in Muharto District DAS Brantas Malang. Those

criteria could be seen from the condition of field and the approach that has been used. Then various criteria has been selected by using re-image by John Zeisel who concentrates more on the environment and interaction between each other (Zeisel, J. [1987] *Inquiry by Design: Tools for Environmental-Behaviour Research*. New York and Melbourne: Press Syndicate of The University of Cambridge.)

According to Zeisel, the design has 3 main steps, which are:

- a. *Imaging*, offering something giving criteria on how the architecture in the future.
- b. *Presenting*, which is the result of criteria applied to design
- c. *Testing*, evaluation of the design created based on criteria. Overall done based on empirical knowledge.

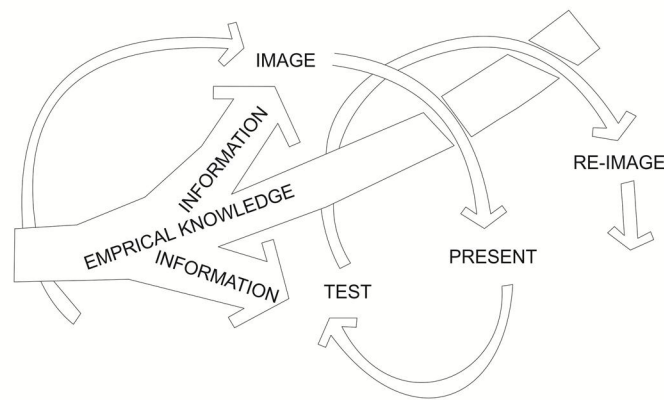


Figure 4. Diagram Metode Zeisel

Source: Duerk, Donna P.1993,,*Architectural Programming*, Van Nostrand Reinhold, Germany

The process of designing is a spiral metaphor where the design process can begin anywhere and this design process will always show spinning groove, so that the step of imaging-presenting-testing will always be gone through in the process by adjusting the design purpose and information and owned source. Scavengers residence design with flexibility approach uses Zeisel (1984).

#### IV. ANALYSIS AND RESULT

Foundation analysis being used was a data analysis of existing site to determine potentials and problems that emerged from choosing site location, so that it can able to resolve designing problem.



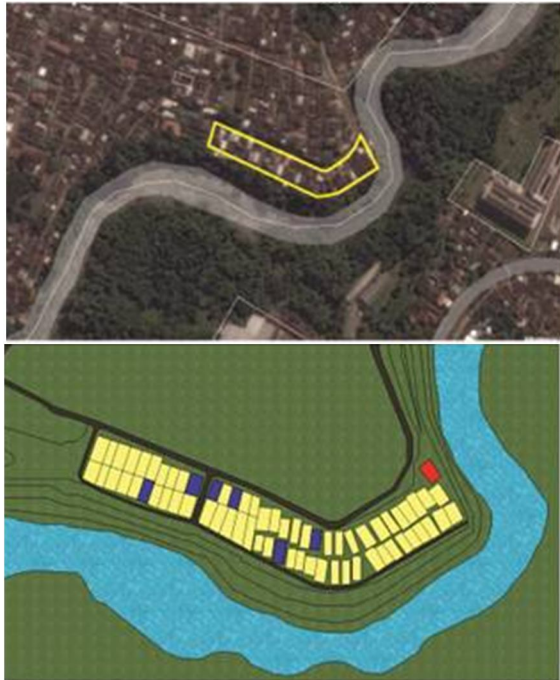
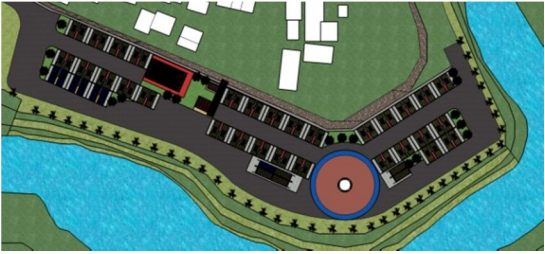
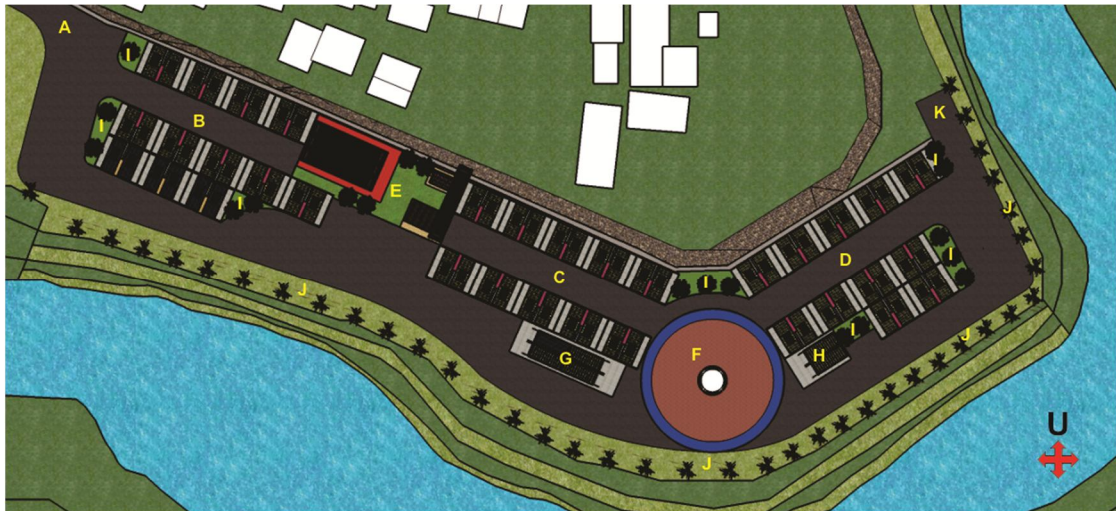
Existing Condition	Response
 <p>Description:</p> <ul style="list-style-type: none"> <li>- Land's width 4633 m<sup>2</sup></li> <li>- Scavengers' house building 3300 m<sup>2</sup> (72%)</li> <li>- Green space 516 m<sup>2</sup>(11%)</li> <li>- Road 816 m<sup>2</sup> (17%)</li> </ul>	 <p>Description:</p> <ul style="list-style-type: none"> <li>- Land's width 4633 m<sup>2</sup></li> <li>- Scavengers' house building 1584 m<sup>2</sup> (34,2%)</li> <li>- Green space 1106 m<sup>2</sup>(24%)</li> <li>- Public facilities 311 m<sup>2</sup> (6,7%)</li> <li>- Storage Area 180 m<sup>2</sup> (3,9%)</li> <li>- Road in surface 1452 m<sup>2</sup> (31%)</li> </ul>

Table 1. Land readjustment Analysis (adjustment of scavengers' settlement)  
 Source: Analysis, 2016

For buildings' mass adjustment was divided between cardboard boxes' scavenger's house and papers' scavengers' house. Its purpose is to give comfort and flexibility for the scavengers.

For public facilities (mosque, Neighborhood Association Hall, Islamic School and Early Childhood Education School) were located right in the center of the resident as an area that could be used together. The overall shape of the building mass arrangement extends along the river . The layout plan of scavengers' settlement as follows:



**Description:**

- A. The driveway settlement scavenger RW.10 RT.11
- B. The complex houses 18 houses plastic pickers and scavengers paper 6 homes
- C. The complex houses 20 homes scavenger plastic
- D. Plastic scavenger complex houses 22 homes
- E. Complex publik facilities (mosque, Hall RT, playground, TPQ area)
- F. Manufer plaza where emergency vehicles and vehicles container carrier
- G. Areas where the storage container to house scavengers B complex and C
- H. Areas where storage containers for home complex scavenger D
- I. Public green open space (green open space settlements)
- J. Private green open space (open space green riverside)
- K. The road to the settlement RT.12

Figure 5. Siteplant's  
Source: Analysis result, 2016

This analysis is also executed for the scavengers' activity. This analysis is used to determine which room program developed from any indoor activities that based on the activities analysis results below:

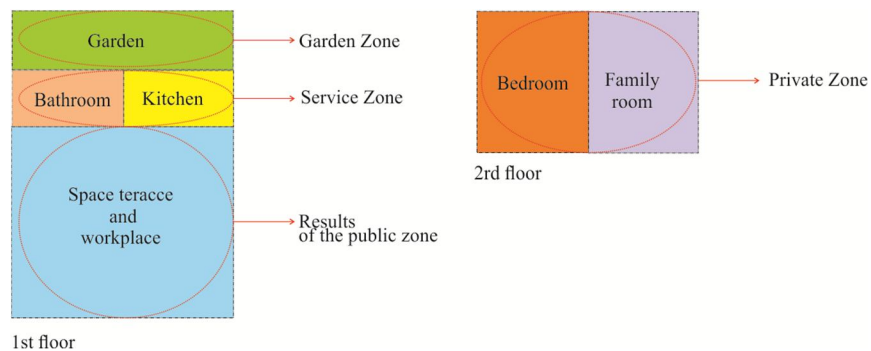


Figure 6. layout plan figure scheme for scavengers' house  
Source: Analysis result, 2016

Below was a zoning explanation table resulted by scavenger house's layout plan:

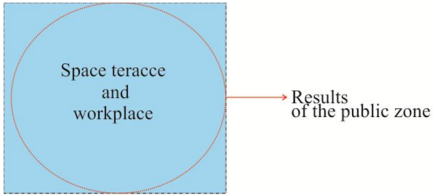

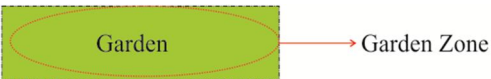
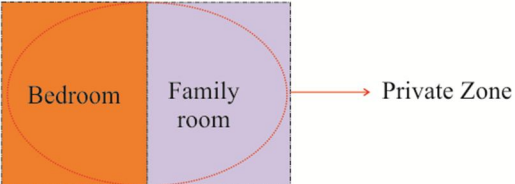
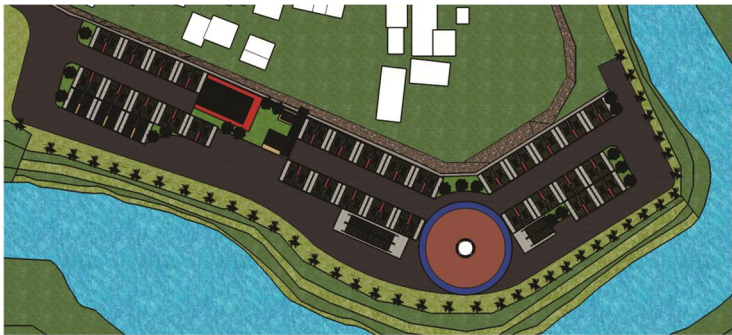
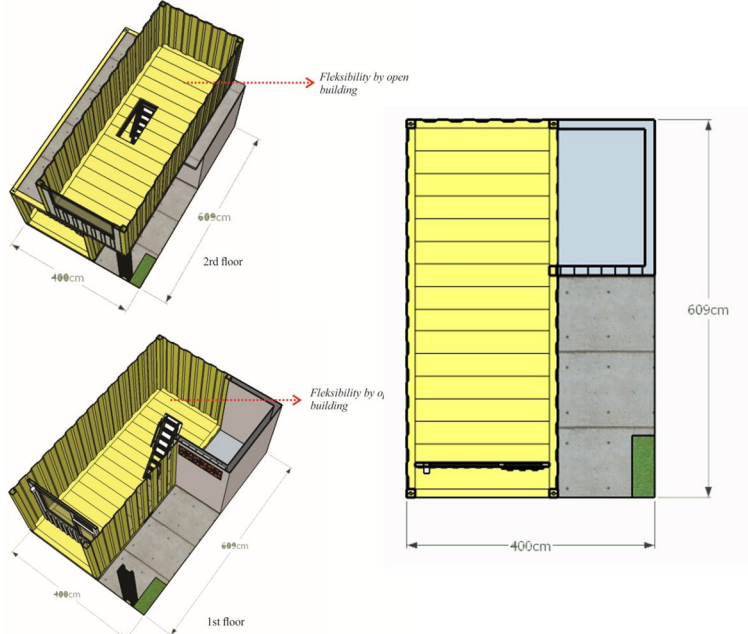

Zone	Description
	<ul style="list-style-type: none"> <li>• Public zoning formed by scavenger’s activities which were storing, sorting, and packing.</li> <li>• As most of the scavengers’ time was spent at workplace hence this public zoning gave space flexibilities as in for workplace, terrace (a room which connected outer area and inside area of the house) and as a room to receive guests</li> <li>• Flexibilities was seen from one room which there were several activities occurred at the same time.</li> </ul>
	<ul style="list-style-type: none"> <li>• Service Zone, which were at kitchen and bathroom.</li> </ul>
	<ul style="list-style-type: none"> <li>• Greenery zone as an open space that allowed fresh air circulation inside the house and as a natural lighting.</li> <li>• This zone resolved humidity problem as a cross ventilation area.</li> </ul>
	<ul style="list-style-type: none"> <li>• Privacy zone as a family area consisted of bedroom and family room.</li> <li>• Flexibility in a room consisted of wide area without permanent border and as a growing area to match scavenger’s need.</li> <li>• This privacy zone is located at second floor, as this area is used for a private resting room and should be healthy. This room should be located far from scavengers’ working area.</li> </ul>

Table 2. Zoning on scavenger’s house’s layout plan

Source: Analysis result, 2016

The innovation of scavengers’ house design was made of 20 ft containers that combined with bricks building. Container’s material selection was based on the easy and flexible usage. With the calculation of land readjustment in the location might be obtained by using 20 ft container’s model.

Result	Description
	<ul style="list-style-type: none"> <li>• Along the street and waterfront arrangement housing concept had a more efficient and flexible in area percentage towards narrow area usage as the scavengers' house.</li> </ul>
	<ul style="list-style-type: none"> <li>• Scavenger's house's concept flexibility by open building.</li> <li>• House's blueprint with dimensions of 4 m x 6,09 m. By the usage of 20ft container. There were three flexibility concepts in the house, which were expansibility, convertibility, and versatility.</li> </ul>
	<ul style="list-style-type: none"> <li>• Riverside green space concept as a riverside's green belt.</li> <li>• An utility which allows contaminated water being directed to the river with litter nets.</li> <li>• In front of each house was provided with control tub, as rainwater's controller.</li> </ul>





	<ul style="list-style-type: none"> <li>• Building's arrangement with using buildings from container, for an easy access for additional multipurpose room.</li> </ul>
	<ul style="list-style-type: none"> <li>• Workplace was located in a front area at side of the house. This workspace was used by the scavengers to select, sort, pack, and to weigh the garbages.</li> </ul>
	<ul style="list-style-type: none"> <li>• The storage was located separated from the housing area, being located inside container car, enabled it to get hauled.</li> <li>• For the storage room, it is located in different area so that it would prevent unpleasant odors from reaching the housing area</li> </ul>
	<ul style="list-style-type: none"> <li>• Public facilities included mosque, Neighborhood Association Hall, Early Childhood Education School and Islamic school. A playground located in the yard is used as a playing area for scavengers' children.</li> </ul>

Table 3. Result

Source: Analysis result, 2016

## V. CONCLUSION

Design problem of scavengers' house design by flexibility approach at Muharto district Brantas River Area Malang is scavengers' housing area with containers as material are heat problems, and also for a high-density housing the building is made with smaller dimensions than the previous ones. Hence, in this flexibility approach a small dimension building is needed but it also need to be able to provide all needs from scavengers' activities.

The solution for scavengers' housing problem by flexibility approach at Muharto District Brantas River Area Malang used the designed criteria which included flexibility as a foundation of mass building and house arrangement with effective rooms corresponding to scavengers' needs, to formulate arrangement concept plan of mass buildings and housing for scavengers.

According to criteria plan for scavengers' housing with flexibility approach are as follows:

1. Mass building arrangement plan and a flexible room organizing
2. Borderless room, by giving temporary borders
3. Innovation and aesthetic design seen from mass building arrangement and building façade using containers
4. Referring to government's regulation regarding to riverside buildings.
5. Storage room which is located separately from working area and living area. To create a clean and healthy living environment.
6. Amount of rooms are adjusted according to needs using an existing area.

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