Low-cost apartment (Rusunawa) and market with Liveable Settlements approach in South Jakarta

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Abstract. The research aimed to design market and low-cost apartment (Rusunawa) by applying a livable settlements approach. Several indicators must be fulfilled so that a building can be said as a livable settlement. The research used a descriptive method for the Pasar Minggu market's physical condition as an object and Pasar Minggu merchants as the research objects. Data analysis was done by calculating the number of units needed for Rusunawa through calculation of the requirement of market space and market facility. The design of low-cost apartment and market was analyzed according to several aspect such as sunlight, wind, and noise. The result was a comfortable building to live in and used liveable settlement concept. The market and the low-cost apartment will complement the indicators of liveable settlement. Thus, a comfortable residence equipped with supporting facilities and a good environment will help improve life quality.

1. Introduction

Decent or liveable housing or residence is a right for low-income society. It is because by occupying decent housing, it is expected to improve the quality of life for those low income people in various aspects. DKI Jakarta Provincial Government together with the Ministry of Public Works and Public Housing built a low-cost apartment or Rusunawa in Pasar Minggu, South Jakarta. The construction of this strategic apartment is part of the revitalization of Pasar Minggu area.

However, the problem faced by DKI Jakarta Provincial Government is the limited land owned by DKI Jakarta Provincial Government, so that they have the idea to utilize the assets owned by the Regional Government, namely public facilities such as schools, bus station, rain station, sports centers, and public health center. Then from the facilities owned by the DKI Jakarta Regional Government, an integrated apartment will be built with these facilities with the aim of increasing the efficiency of land use and rejuvenation of the assets owned by DKI Jakarta Provincial Government. In this project the assets of the Regional Government are Pasar Minggu market. Pasar Minggu market has been established since 1984 and the building has reached 33 years-old. Also, Pasar Minggu market is unfit for use. In an interview with the management of UPB Pasar Minggu, Mr. Sabar said that it is true that currently, Pasar
Minggu market’s condition is not suitable for use. The building condition is not maintained properly and the fire system in the building cannot be used.

![Figure 1. Existing Condition of Pasar Minggu Market](image1)

Based on the field survey, it was found the unsuitable factor of Pasar Minggu market. Those factors are messy trading area, improper or narrow air circulation, poor air handling in the building that makes stuffy, inadequate lighting so in some places are dark and even in the morning they need to turn on the lights. These field survey results reinforced the idea of this research, which is to rebuild the Pasar Minggu traditional market together with the construction of low-cost apartment (Rusunawa). So, Pasar Minggu will be more appropriate as it applies liveable settlements approach in their design. Moreover, the project will improve the life quality of market merchants and residents of Rusunawa.

![Figure 2. Existing condition of Pasar Minggu](image2)
In this research, the design for Rusunawa used the concept of livable settlements. Liveable settlements theory taken from several sources. First is Newton’s livable settlements theory [1]. The theory stated that livable settlements indicators are environmental quality, surrounding facilities, housing, room air quality, transportation, mobility, facilities, and welfare. The second theory derived from [2] explained that indicators of livable settlements are the availability of various basic needs for urban society, the availability of various public and social facilities, the availability of public spaces for interacting and socializing, secure and free from fear, supporting economy, social and cultural function, environmental sanitation and the beauty of environment. Theory from [3] has several indicators of livable settlement. Those are spatial planning aspect, environmental aspect, transportation aspect, educational facilities aspect, health facilities aspect, infrastructure and utilities aspect, economic aspects, security aspects, and social aspects.

Based on those three theories, it summarized into three main indicators of liveable settlements. The first indicator is the quality of the unit, which includes the unit area, light and natural air, and availability of clean water and electricity. The second indicator is facilities. It used SNI 03-7013-2004 guidelines [4] concerning the design of low-cost apartment facilities. Lastly, the third indicator is the environment quality, which includes the physical beauty of buildings and environmental sanitation. It means to design suitable settlement the physical beauty of buildings is needed and also the arrangement of clean and healthy sanitation to create a good environment.

The implementation of liveable settlements concept aimed to give merchants or Rusunawa residents a decent housing. Moreover, it also improves their quality of life by responding to their need for accessibility and mobility. The merchants are easier to reach markets and their house within 1 (one) location, so that they can more easily take care of household interests such as taking children to school; schools or PAUD (Early Childhood Education) are also provided in the Rusunawa. Also, families can live in more comfortable, safe, and liveable environments, and children can grow and develop in a good environment.

According to a study by [5], to create a liveable settlements, the design must pay attention to the needs of the occupants. So, that the results of the Rusunawa design that is formed will meet the needs of the merchants.

Based on the background information and the identification of problems in this research, the research problem is how to design low-cost apartment (Rusunawa) and traditional market in accordance to liveable settlements approach.

The research purpose and objectives are to create a low-cost apartment or Rusunawa and market design that is suitable for merchants to live in, to improve the quality of life of market merchants and to increase the efficiency of land use in urban areas, especially in Jakarta.

2. Research methods

This research used qualitative descriptive study that aims to establish facts, variables, circumstances, and phenomena that occur when the research takes place and presents them following the original or actual circumstances. Qualitative research is also an inductive approach to the formulation of knowledge that uses research and emphasizes subjectivity and the meaning of experience for individuals [6]. The data consisted of primary data and secondary. Table 1 shows primary data and Table 2 shows secondary data needed in this study:
Primary and secondary data that have been collected are then analyzed to determine the needs of market space, the needs of market facilities, and the space for low-cost apartment (rusunawa) units. Based on the analysis, a comparative study was carried out and reference from SNI related to the development of low-cost rental housing and markets was implemented. So, the design fitted the applicable regulations and also complemented the indicators of liveable settlements including the quality of the unit by providing a sufficiently large unit size, equipped with natural lighting and air, equipped with supporting facilities both on site and outside the site through the results of facility analysis, and the last is good environmental quality from the arrangement of the area, building construction and environmental sanitation.

3. Results and Discussion
According to interview results with the manager of the Pasar Minggu UPB, the number of merchants and vendor types in Pasar Minggu market was obtained. Then, the data were analyzed based on the needs of Pasar Minggu space. The guidelines for designing the Pasar Minggu is based on SNI (Indonesian National Standard) 152:2015 [4] concerning Requirements for Public Market. Table 3 shows the requirement for market space.

| Unit Names         | Total Unit | Standard Unit | Total Area (m²) | Source |
|--------------------|------------|---------------|-----------------|--------|
| The closed-kiosk unit | 1,479 units | 5 m²         | 7,395 m²       | Survey |
There are two types of units provided, namely booth units with size of 5 m² (2 m x 2.5 m) and the size of open booth is 3 m² (2 m x 1.5 m). The measure is obtained from analysis results of a survey conducted on the Pasar Minggu market and also refers to the SNI guidelines. Table 4 shows sketch of kiosk and booths in Pasar Minggu market.

**Table 4.** Sketch of kiosk and booth units

| Unit Type                  | Key Plan | Middle type |
|---------------------------|----------|-------------|
| Management Office:        |          | 65 m²       |
| Manager's Office          | 3        | 36 m²       |
| Marketing office          | 2        | 14 m²       |
| Admin office              | 3        | 15 m²       |
| Toilet                    | 8 locations | 224 m²     |
| Lactation Room            | 1        | 12.5 m²     |
| Small mosque              | 1        | 300 m²      |
| Guard Post                | 10       | 4 m²        |
| Loading and unloading zone| 1        | 50 m²       |
| Butcher area              | 1        | 250 m²      |
| Landfill                  | 1        | 30 m²       |
| Plaza                     | 2        | 300 m²      |
| Subtotal area             |          | 10,624 m²   |
| 40% circulation           | Subtotal x 40% | 4,250 m²   |
| Total                     |          | **14,875 m²** |
Analysis of space requirements for low-cost apartment (Rusunawa) starts from providing facilities needed by Pasar Minggu Rusunawa. Based on literature study of facilities infrastructure around the site with 1 km radius, it was found several facilities that have potential to support the Rusunawa function. In this design, the provision of Rusunawa facilities refers to the SNI regulation regarding the Rusunawa facility planning, so by surveying facilities around the site, the available facilities are no longer be designed in Rusunawa. Table 5 shows the facilities around the site.

**Table 5. Functions around the site**

| Potential Objects          | Description                                                                 | Potential |
|----------------------------|-----------------------------------------------------------------------------|-----------|
| Pasar Minggu Train Station | Pasar Minggu train station, which is on the east of this site, becomes very important. It provides great benefits for Pasar Minggu market, as the access to locations will be easier because it can be reached using public transportation. | +++       |
| Pasar Minggu Bus Station   | Pasar Minggu bus station, which is right on the side of the site or on the north of the site is also a very good potential to support the function of the Rusunawa and the market to be built. It is because the bus station will be beneficial for visitors to | ++ +      |
reach the site, as well as residents of the low-cost apartment (Rusunawa) or merchants.

| Location                        | Description                                                                                                                                                                                                 | Rating |
|---------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------|
| Pasar Minggu Police Station     | Pasar Minggu Police Station is only 375 meters from the site. The location that near the site will beneficial for the need of a sense of security, and easy access to the police station if needed. | ++     |
| Pasar Minggu Sports Venues      | Pasar Minggu Sports Venues is only 650 meters from the site. This Sports Venues can be a place for the residents to exercise.                                                                                     | + +    |
| Pasar Minggu General Hospital   | Pasar Minggu General Hospital is only 150 meters from the site. The hospital near the site is beneficial for Pasar Minggu market merchants and Rusunawa residents. Besides, this design does not require health facilities that are too large considering the existence of health facilities around the site. | + + +  |
| Multipurpose Building          | The multipurpose building is only 250 meters from the site. This building can function as a meeting place or event venue for up to 3000 people.                                                                 | +      |
| Firefighters                    | The Pasar Minggu firefighters unit is only 600 meters from the site. The existence of this firefighters is very beneficial to the Pasar Minggu and Rusunawa as a safety facility from fires, considering the risk of fires from the Market and Rusunawa. | ++     |
| SDN 02 Pagi Pasar Minggu        | The existence this elementary school in Pasar Minggu is very beneficial because with the presence of educational facilities close to the site, only 600 meters from the site, will be very supportive to residents living in Rusunawa. | +++    |
| SMPN 35 Jakarta                 | The existence this junior high school is very beneficial because with the existence of educational facilities for junior high school-age youth around the site, which is only 1 kilometer away and can be easily reached using public transportation | ++     |
| SMAN 28 Jakarta                 | The existence of this senior high school is very beneficial because with the existence of educational facilities for senior high school-age youth around the site, which is only 1 kilometer away and can be easily reached using public transportation, | + +    |
Based on the analysis that showed in Table 5, some function facilities were not yet available. So, to create a liveable settlement the facilities that following the SNI will be provided. Table 6 shows the result of the analysis of Rusunawa facility space requirements.

**Table 6. Analysis of Space Requirement for Rusunawa**

| Unit Names                      | Total Unit | Standard Room | Total Area (m²) | Source               |
|--------------------------------|------------|----------------|-----------------|----------------------|
| Social Unit                    | 21         | 74 m²          | 1,554 m²        | Survey               |
| Community Association Office   | 1          | 36 m²          | 36 m²           | SNI-03-7013-2004     |
| Neighborhood Association office| 1          | 36 m²          | 36 m²           | SNI-03-7013-2004     |
| Environmental Safety System post| 1          | 4 m²           | 32 m²           | SNI-03-7013-2004     |
| Prenatal & Postnatal Care Center| 1          | 36 m²          | 36 m²           | SNI-03-7013-2004     |
| Mosque                         | 1          | 300 m²         | 300 m²          | SNI-2003-1733-2004   |
| Multipurpose building          | 1          | 250 m²         | 250 m²          | SNI-03-7013-2004     |
| Open Space                     | 1          | 100 m²         | 100 m²          | SNI-03-7013-2004     |
| Garden                         | 1          | 150 m² / 100 households | 600 m² | SNI-03-7013-2004     |
| Playground                     | 1          | 180 m²         | 180 m²          | SNI-03-7013-2004     |
| Management Office:             |            |                |                 |                      |
| Manager's Office               | 1          | 5 m²           |                 |                      |
| Marketing Office               | 1          | 7.5 m²         |                 |                      |
| Admin Office                   | 1          |                |                 |                      |
| Bedroom                        | 2          |                |                 |                      |
| Early childhood education programs | 1          | 125 m²         | 125 m²          | SNI-03-7013-2004     |
| Public toilet                  | 2          | 28 m²          | 56 m²           | Survey               |
| Security post                  | 2          | 6 m²           | 12 m²           | Survey               |
| Generator room                 | 1          | 24 m²          | 24 m²           | Building system      |
Based on the analysis of the Pasar Minggu market space requirements and Rusunawa facility space requirements, the analysis of Rusunawa space requirements can be performed. The data were obtained from Pasar Minggu local government regulations that are KDB, KLB and KB regulations. To determine the number of Rusunawa units that can be available, it is calculated through the maximum limit of the building area coefficient which is reduced by the space requirements for Pasar Minggu and Rusunawa facilities. So, the result was the available space to be used as a unit. However, the boundary cannot be used fully because of the regional regulations and restriction. After, calculating the KDB, KLB, and KB limits on the site, the number of Rusunawa units that available is 315 with each area of 36 m². Table 7 shows the plan view of Rusunawa

Table 7. Rusunawa Plan View

| Room Program | Total | Area   | Plan View |
|--------------|-------|--------|-----------|
| Bedroom      | 2     | 18 m²  |           |
| Lounge       | 1     | 10 m²  |           |
| Laundry Room | 1     | 1.5 m² |           |
| Toilet       | 1     | 3.5 m² |           |
| Kitchen      | 1     | 1.8 m² |           |
| Terrace      | 1     | 1.2 m² |           |
| Total Area   |       | 36 m²  |           |

The unit plan with the size of 36 m² was designed according to the survey result of the Tambora and Pesakih Rusunawa. The results were to determine the quality of the residential unit regarding area, light, air circulation, and availability of clean water and electricity. Moreover, it also refers to SNI regulations concerning Rusunawa design. Therefore, the plan view of this unit was livabel for Pasar Minggu
merchants. Besides providing a decent unit and also equipped with good facilities in accordance with SNI, there are other important indicators needed for livable settlement.

Environmental quality is an important indicator to be analyzed because it is related to physical beauty and the environment so that the environment becomes beautiful and comfortable. So, the analysis of the sun, wind, noise, view, zoning, achievement, and circulation to complete the indicators are shown in Figure 3:

![Figure 3. Schematic analysis results](image)

(Description of Legend : Jalan – Street, Tapak – Area, Sungai – River, Pasar- Market, Sirkulasi – Circulation, Arah Service – Service Direction, Arah MB/MT – Car/Motorcycle Direction)

The building on the site is a single type. However, the site area is 1.8 Ha which can be considered as an area. With the Rusunawa and Market functions, the conclusion is that the site will be divided into two zoning sections. Each of the first zoning is the Rusunawa zone or in the northern part of the site, and the Market zone or is in the southern part. Both of them are a single unit of function on an area of 1.8 Ha in Pasar Minggu. Figure 4 shows the transformation of mass composition for Rusunawa and Market buildings:
The blue in Figure 4 shows the transformation of mass composition from Rusunawa through the analysis process. Two masses of C and J buildings were connected by a two-story bridge. It gives the impression that the building is still one unit. Formation tends to extend from the east to the west with the aim of the side of the building facing west is smaller than the side of the building facing north and south.

The red in Figure 4 is the transformation of the mass composition of Pasar Minggu market, which consists of two masses building which are then connected to four-story bridge. It gives the impression that the building is a single entity. Buildings extending from the east to the west with the aim that the faces of the buildings exposed to the sun's heat from the west are fewer. So that areas affected by the sun's heat can be utilized as a service function such as toilets, stairs, and loading dock areas.
4. Conclusions

The development of Rusunawa and Pasar Minggu market with the implementation of livable settlement was based on three main indicators of the theory. First indicator is unit quality. It was designed with an area of 36 m² for Rusunawa and for the Market unit is a 5 m² kiosk and 3 m² booth, using lighting and natural air in space. And of course there is clean water and electricity for each residential unit and market unit.

Second indicator is facilities. Complementing the facilities of the Rusunawa and Market functions using a reference to the SNI regulations on the Rusunawa and Market design. All the required facilities are first analyzed for their presence around the site as a substitute facility, and other facilities not yet available in the vicinity will be designed to support the function of the Rusunawa and Market buildings.

Third indicator is environmental quality. Environmental design related to the physical beauty of buildings and the arrangement of the environment resulting from analysis so as to create an environmental beauty that affects the sense of comfort and security for residents.

By applying livable settlement concept, it creates a decent shelter and trading place for Pasar Minggu merchants. Also, it can provide convenience, safety, comfort, and beauty that will improve the quality of life.

The research suggests that the development of Rusunawa for the community should pay attention to the principles of livable settlements. So that new settlements and building designs in the cities will be more feasible or livable. Then, it will increase the number of people who are happy and increase their quality of life.

5. References
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