

Analysis of Housing Area with Sustainable Community Approach

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Abstract— In line with the city development, especially in meeting the needs of residential, public housing areas increasingly demanding healthy, safe and comfortable. To achieve the criteria of a healthy, safe and comfortable there needs to be some effort environmental friendly development. Not only the residential area of the environment itself, but also of building occupancy. A healthy environment can be realized from the community that participate in its implementation. So the purpose of this study was to determine the physical form and system of housing construction in the area in Surabaya with green development approach and the extent of community participation in achieving environmental friendly development. This research is a case study with the collection data methods of observation, interviews, and documentation. The results show that the building construction system has been good enough in practice. Most of the existing home form has been far different from its original form so that the community has shown the form of participation in creating environmental friendly buildings such as the procurement of building openings, the application of landscaped grounds, and components and eco-friendly products that have been used. Whereas in respect of public participation in the residential area are nearing a sustainable society but actively participate in managing the natural environment still needs to be improved. Therefore, it needs the support of a sustainable community that can help implement sustainable development. Residential neighborhood, healthy home, and sustainable communities can realize sustainable environmental friendly residential areas. The current development of environmentally sound development is being targeted today by the issue of global warming that has worldwide.

Index Terms— residential area, healthy homes, building, human participate, sustainable communities, environmental friendly development, green development approach.



1 INTRODUCTION

INDONESIA is the largest archipelago in the world with more than 13,700 islands and the island has an area of 1,919,443 km², extending over 5,000 km from west to east and 1,700 km from north to south. The geographical position of Indonesia between 95 ° BT to 141 ° BT and between 6 ° LU to 11 ° LS.

Surabaya is the capital city of East Java province, Indonesia. Surabaya is the second largest city in Indonesia after Jakarta, with a population of the metropolis which reaches 3 million, Surabaya is the center of business, commerce, industry, and education in the area of East Java.

In Surabaya, especially in dense residential areas, land is needed for housing, commercial and recreational needs, so there is no longer an empty area that can be used for the Sanitary Landfill. Surabaya city with a population of nearly 3 million people, is the second largest city of Indonesia and a very big role in receiving and distributing industrial goods, engineering equipment, agricultural products, forest products, groceries, and so on, especially for Eastern Indonesia.

2 THEORICAL BACKGROUND

In residential areas design concept of sustainable development, there needs to be a continuous contribution in the area between the physical elements (such as residential buildings) and people's participation in it. Support or contributions are divided into criteria for a healthy home and community participation. ^{[1][2][3][4]}

1) Healthy Building

A healthy home is a home that can provide healthy living conditions for the residents. Therefore, a healthy home building design must meet the requirements that :

- There are number of rooms / residence hall with a floor area sufficient qualified so that residents can meet the needs and activities of life.
- There are enough clean water to drink and are eligible / cooking, bathing water, water for washing and cleaning the house.
- Available equipment for disposal of rain water, sewage, garbage in ways that meet the health requirements.
- Meeting house roof construction, flat and not leaking so it can protect from heat and cold. Angle of slope of the roof should have to conform roof covering materials. ^[6]
- House floor construction must be water tight and always dry, so you can easily be cleaned of dirt and dust, can also avoid moisture soil water up to the floor.
- The air is clean, healthy and fresh is needed in the energy creating good health. Ventilation air is able to

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flow properly, indoor air pollution-free condition of the house will help create a comfortable, safe and healthy place to live.

- g. Lighting is one of the elements that has great potential in healthy humans. The light of the sun in the morning will nourish the body, while the artificial lighting at night to illuminate the function so the eyes can see in the dark. ^[6]
- h. The use of building materials that are good for health.
- i. There is a green element in the home both indoors and outdoors. ^{[5][6]}

(Source : Decree of the Minister of Health No.: 829/Menkes/SK/VIII/1999)

Sustainable design approach for a healthy home is introducing nonpolluting materials and assemblies with lower energy requirements and higher durability and recyclability. Residents played a major role in maintaining a healthy indoor environment, especially in residences. Contributors to indoor air quality include cleaning habits and other behavior, such as consumer products, furnishings, and equipment purchases, as well as where and how the occupants use. Certification of consumer products and building materials as a product low - emitting is the primary control measure for achieving indoor air quality is good. The key product in this case is the office furniture, flooring, paints and coatings, adhesives and sealants, wall coverings, wood products, textiles, insulation, and cleaning products. Finishing materials play a major role in indoor air quality as related to moisture retention and mold growth. ^{[1][3][4][5][6]}

2) Sustainable Community

A sustainable society is a society that has economic, environmental, social and healthy and resilient. Sustainable communities manage human resources, nature, and finance to meet current needs by ensuring that adequate resources are equitably available to future generations. The sustainable business community ^[7], that is:

- a. A better quality of life for the entire community without compromising the welfare of other people. ^[7]
- b. Healthy ecosystems. ^[7]
- c. Effective governance is supported by community participation meaningful and broad-based. ^[7]
- d. Economic security. ^[7]

(Source : President's Council on Sustainable Development published ISC Elements of Sustainable Communities in Letters 1997, Task sustainable community reports.)

The concept of a sustainable society as a framework to guide action consists of three aspects^[8], namely:

1. Climate and Environmental Health ^[8]

- a. Protection and enhancement of the local and regional ecosystems and biodiversity.
- b. Conservation of water, land, energy and non-renewable resources.
- c. Utilization of preventive strategies and appropriate technology to reduce pollution
- d. The use of renewable resources no faster than the rate of renewal.
- e. Infrastructure that improves access to services and markets without damaging the environment.

2. Social welfare ^[8]

- a. Fulfillment of basic human needs for clean air and water and nutritious locally sourced, food is not contaminated.
- b. The provision of quality health, care, and treatment for all members of society.
- c. Safe and healthy housing accessible to all.
- d. Equal access to quality educational services, formal and informal.
- e. Basic human rights of all members of society are respected and defended against injustice and exploitation, including physical and psychological damage.
- f. Protection, enhancement, and public appreciation of the diversity of cultural manifestations, property, customs, and traditions.

3. Economic security ^[8]

- a. Community members equitably benefit from economies centered on strong and healthy society.
- b. Diverse economic base and financially viable.
- c. Reinvestment of local economic resources.
- d. Maximization of local ownership of the business.
- e. Meaningful employment opportunities for all citizens.
- f. Job training and education programs responsive and accessible that allow workers to adjust to future needs.
- g. Businesses that improve the sustainability of society.

(Source : President's Council on Sustainable Development published Elements of ISC in its 1997 Sustainable Communities, Task sustainable community reports.)

3 RESULTS AND DISCUSSION

In the concept of sustainable communities as a framework for directing the planning area in particular housing area consists of three aspects, namely :

1. Climate and Environmental Health

It is closely related to the application of environmentally friendly planning and environmental well being applied on a small scale such as a building or a large scale in the form

of a residential area. In healthy building is not just house with a clean home environment but involves the physical appearance of the building. Building healthy has several criteria such as the presence of openings in the building as a pathway that allows air circulation and light.

Indoor air quality can provide their own impact on the health aspects of its occupants (effect on human health). Knowledge of setting indoor air quality can be obtained from various sources such as levels of education, associated regulations, and institutions related to indoor air quality. Setting indoor air quality can be evaluated in terms of building openings in air circulation. The number of openings in buildings provide opportunities for transition of air in and out of the building the greater. Substitution of indoor air with outdoor air outside the building is a form of air circulation. The more exposure the greater the chances of air circulation. Building openings usually a window, roof openings and ventilation holes.

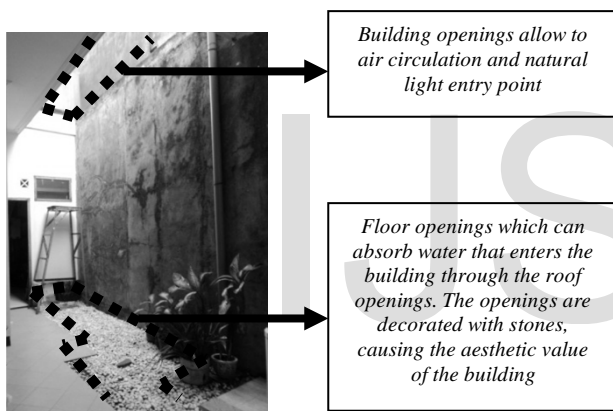


Figure 1. Part of citizen house

However, this openings building sometimes cause problems if it is not supported by careful planning in the design of the building. For example, an opening in the roof of the building allows the water in the rainy season with an easy entry into the building, causing ponding of water in the building. Therefore, the needs to be supported by planning openings on the bottom floor as well as not making pavement allowing incoming water absorbs into the ground. The openings floor can be added so that the water falling and come into the stones on the floor and then it not emit spark falling in land. Can be seen in Figure 1.

In realizing the need for building a healthy home must be considered efficiency technique in building, outdoor and indoor management, active and passive solar system, building components, and products. Overall emphasis on building design based environmentally friendly. Buildings should use efficient construction techniques taking into account the impact and benefits to be

obtained later. The larger the smaller the benefits and the impact it can be said that the building is environmentally friendly building.

a) Efficiency technique in building

In terms of building construction, which has a foundation and construction that is strong enough and safe for the occupants inside the building and made of materials that are durable, easy to maintain, there are power lines and fire resistant. In addition, there are several things to consider in building a healthy home design namely:

1) Maximize Natural Lighting

Sunlight can be optimally used as a source of natural light in a healthy home based on the orientation of the building where the building should be facing north-south to avoid heat and direct sunlight. Similarly, the size of the room and openings so that sunlight can enter and illuminate the room to the maximum, the size of the width of the room height should be 2 times the size of the openings.

Healthy home must have adequate natural lighting. Homes that lack of sunlight is very humid and uncomfortable and vulnerable to germs. Generally, natural light to come through the window, but if not possible, the light can be obtained from the glass tile. Nevertheless, home lighting should not be too much, because it can create an eye sore and the room became stifling.



Figure 2. Natural lighting from windows and ventilation holes

From the picture in above, it can be seen that the number and size of building increasingly large windows allow maximum light entering the well so that in the morning until late afternoon did not need to wear a light like the light to get the light in the room. Aside from the windows and ventilation holes, natural lighting can also be obtained from the door of the house. Based on the observation of one of the houses in the residential area can be seen the use and placement of doors and windows in the house are designed as much as possible so that the natural lighting of the building can be obtained.



Figure 3. Natural lighting from windows and doors

2) Natural Ventilation

The clean air is an important thing to have in a healthy home. Because one of the basic human needs is meeting the needs of both oxygen and this can meet when we get home and we have a good and sufficient ventilation for air exchange. This is also included in the terms of eligibility healthy home should possess a residence for the family.

The principle of natural ventilation is creating air circulation to cool the air entering into the room and circulate the hot air out through openings that are strategically positioned. Position openings are good for creating air circulation is opening top and bottom openings. Healthy home must have adequate ventilation, so air circulation becomes smooth and fresh air. Air vents make oxygen levels inside the house while keeping moisture maintained house.

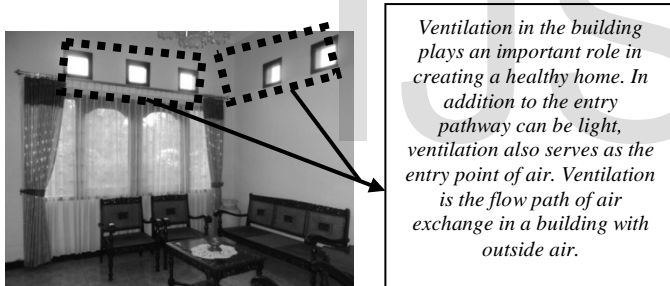


Figure 4. House ventilation holes

Create an air vent through the window openings. Air circulation in the house will be getting maximum cross ventilation. If not possible, can be made through the ventilation holes in the wind. In addition, as much as possible do not use a fan, because it can cause spots on the lungs. Garden on the patio or in the house will also assist in the production of oxygen.



Figure 5. Park on the porch

b) Outdoor and indoor management

Outdoors and indoors requires a simple connection such as cable or other openings procurement so that fresh air that is outside of the building to get into the room and an exchange or circulation of air, but the air coming into the house must be clean air is not bad air and dusty. Management and outcomes of air in the room is good for the residents to provide warmth in the winter, and provide cool air in the dry season.

Management and outcomes in the room that is the presence of quality domestic water supply is clean and can be consumed by the occupants of the house so that the presence of water on a house directly to provide healthcare for the residents of the house. Natural disasters caused by several natural factors can not be denied but it can also originate due to human actions, such as floods and landslides. The existence of good waste treatment and waste management that does not pollute the water and soil is a management that can affect indoor and outdoor health impacts for residents.

a. Waste Disposal

Every day, the bathrooms waste, kitchens, and garbage. Healthy home should have a septic tank and waste water disposal does not contaminate the soil and groundwater as well as odorless. The position of the septic tank should be made as far as possible with the water pump. Each house has a healthy landfills are closed so as not to contaminate the surrounding environment.

b. Water Supply

A healthy home needs clean water for its inhabitants, ie at least 60 liters per day per person-for drinking, bathing, washing, and others. Other basic human needs is the fulfillment of the need for clean water. So that a healthy home is also expected to have facilities and infrastructures in the water supply sufficient for the needs of all family members.

c. Pollution and Contamination

Most pollution comes from smoke generated home kitchen For that, the home should have a smoke exhaust so as not to contaminate another room. Also avoid the use of paint from hazardous materials, which could potentially interfere with occupants of the respiratory system.

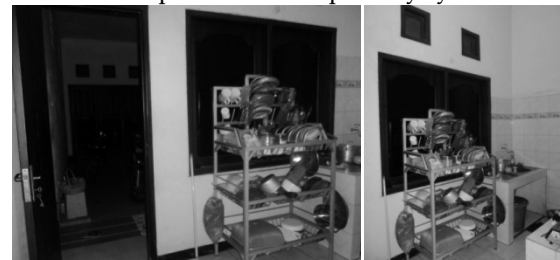


Figure 6. The windows and doors were found on the kitchen space as a pathway allows air circulation in the room.

Pollution generated from household waste can be minimized by the presence of trees and other plants that can serve as reducing air pollution. So that air can be maintained residential neighborhood freshness. The number of trees in a residential area is becoming one of the prevention of air pollution, household scale. Obligations that have been recommended to the citizens is to have at least one tree in every house, in addition to supporting the green movement and clean can also increase the aesthetic value of residential environment. In addition to its primary function as an absorber of carbon monoxide and carbon dioxide and produce the oxygen.



Figure 7. Plant in the roadside

c) *Active and passive solar system*

The use of solar radiation for energy is a concept about the environmental impact of burning fossil fuels that produce solar energy. Modern solar technology utilizes the heat energy generated from the sun to power residential and industrial heating and cooling systems through the use of photovoltaic, or PV, panels. Also known as solar cells, these devices capture and convert solar energy into electrical energy. How this energy is collected and distributed to define the difference between active and passive solar collectors.



Figure 8. Solar system

Sumber: <http://homeguides.sfgate.com>

Active solar systems use external source of energy for electric blowers, pumps and other types of equipment to collect, store and convert solar energy. Having absorbed the energy from the sun, will be stored for later use. Small systems are used to provide power for heating and cooling systems in homes and other buildings, while large systems can provide power for the entire community.

A passive solar system does not involve a mechanical device or use outside of conventional energy sources are needed to regulate dampers and other controls. The classic example of the basic structure of the passive solar

greenhouses, sunrooms and solarium - as sunlight passes through the glass window, interior absorbs and retains heat. This modeling concept can cut heating costs by half compared with the same heating in a traditional way without the use of passive solar. In terms of design, the success of the system depends on the orientation of passive solar and thermal mass of the exterior walls of the structure, which means that their ability to store and distribute heat.

d) *Building components*

Building components can be evaluated from the floor, roof, doors, and wall paint used in buildings.

a. *Floor*

The floor is a watertight condition for a healthy home. The material can be varied: tiles, cement, wood, or ceramic. The floors were dusty or muddy besides being uncomfortable can also become disease. Selection of floor material is very important. For example, the slippery tile floor can cause slipping occupants.

On the observations in one of the homes in the residential area, there are two types of flooring are used which are both made from kemarik. The different types of ceramics is tailored to the placement location. Fine ceramic types were placed in the rooms such as living room, family room (living room), bedroom, terrace house, and the kitchen. As for the use of coarse ceramics used in bathrooms, washrooms and a transitional space between the wet and dry place.

b. *Roofs and ceilings*

Clay tile spelled out the most suitable for the home in the tropics such as Indonesia, being better able to absorb the sun's heat. Should avoid the use of tin roofs or asbestos, because it can cause the hot air into the room. Ceiling heights should also be considered. Because the ceiling is too short can cause the room was hot so reducing comfort.

Tile is a building material used to absorb heat and do not reflect the heat. So both are used to reduce heat levels in a residential neighborhood.

c. *Door*

Most of the doors are used in every house on this residential complex using a wooden door with a touch of natural color of the wood is brown. In one observation in citizen homes, the same shape as the door in the general shape of the door at the main entrance consists of 2 doors and door openings each room in the house in the form of doors 1 door openings. The basic ingredients of the door itself is wood and plywood with matching color is brown. At the main door has a magnitude of 2 x 1.2 meters with additional vents that are above the door with a height of approximately 50 cm and the other room door has a magnitude of 2 x 0.8 meters.

d. Paint the wall

The use of paint is also noteworthy because of some paint products can damage the health of the occupants. Many are easily chipped wall paint color can be attached even to the touch. And not a bit of wall paint that easily erode and become dust that can interfere with the respiratory system. The right color choice can also improve the comfort of the occupants.

Wall paint used is not easily chipped paint even into dust that can interfere with the respiratory system so that the occupants are safe to use. The colors used are also fused with ornaments that are in the house.

e) Products

As much as possible using products that are environmentally friendly in the home ornaments so as to minimize the negative impact that can be felt by the residents of the house. Based on the observation of one of the houses in the residential area can be viewed products used mostly from wood ranging from guest chairs, tables, cabinets, beds, up to the banister. So it can be said that most of the furniture used is environmentally friendly furniture.

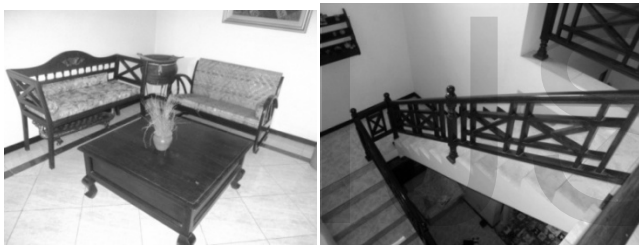


Figure 9. The use of chairs, tables and banisters were made of wood

Unhealthy buildings will have a negative impact on the occupants. Such as sick building syndrome to be suffered by anyone who frequently spend time indoors with the unhealthy condition of the room. Someone who spent all day in an air-conditioned room will most likely experience the sick building syndrome.

In addition, the cleanliness of the house also need to be considered as one of the requirements of a healthy home is to have a clean environment. We all know that cleanliness is part of faith and cleanliness is also a health base. So that when we crave a healthy living course should be able to meet the standards for a clean and healthy home. The building is owned by the system could allow for a house can be free of dirt, dust, smoke and other contaminants that could have an effect on health.

2. Social welfare

In affordable housing has been a source of clean water for the entire home residents, as suppliers need clean water comes from taps and electricity needs of the citizens comes from PLN (*state power company*), so that the basic housing

needs are met. The need for clean air in the housing with the provision of air conditioning room that provides comfort because it can eliminate the heat in the house despite the fact that the air conditioning does not necessarily able to help the air is cleaner despite the fact that AC (*air conditioner*) feel refreshed. In this housing residents also obtain clean air by planting plants and trees around their homes so that the air is clean and healthy can also be obtained by residents.

In the residential area, there are schools "Bunga Bangsa Elementary School" (a picture), and early childhood education (ECD) that can support the educational needs of the citizens of this housing. Facilities contained in the housing economy is relatively small businesses that the culprit is the local people who open a home business by selling groceries or just food and drinks and in front of the housing market there are also temporary (image b) who sells vegetables, and fish in morning which was also used by residents to meet food needs and sidewalk vendors selling food and drinks. For other support facilities on housing, there are sports facilities such as indoor surface (image c) for various types of sports, and there is also a garden as a place of social interaction, and children's play (picture d).



Figure 10. a) Bunga Bangsa School Elementary School b) Temporary Market

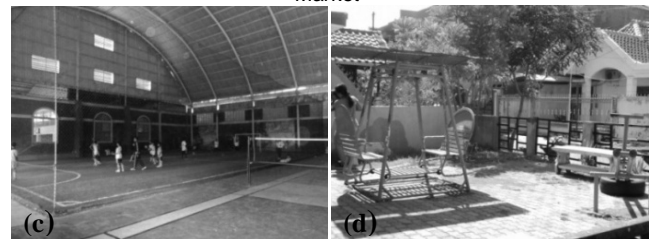


Figure 11. (c) Sports (d) Park

In terms of security and criminal cases, as far as this residential area is safe and free from criminal acts because of this residential area has been completed by several security officers-borne at each access point to enter the housing area. So the level of security offered is able to keep the peace and comfort of the occupants of the housing.

For social activities at the housing associations are PKK are always doing activities together each month among other social gathering, recitation, posyandu, and recreation. For the majority of the teaching activities of its members are

mothers adjusted the location of their activities with members deal recitation. Similarly, the activities of the PKK, IHC and monthly social gathering whose members are also mothers. Posyandu here is one of the activities that cater to pregnant women and parents of infants and toddlers for review developmental growth. Where is the caretaker of some mothers posyandu housing residents and local health authorities.



Figure 12. (a) social interaction that takes place in early childhood (b) mothers arisan complex

4 CONCLUSION

The application of environmentally sustainable development requires the application of the linkages between health and community participation in supporting the realization of a sustainable residential area. Sustainable communities will support efforts to create environmentally sustainable residential building in terms of architectural buildings ranging from building orientation to the building materials used, as well as in terms of architectural design environments that promote the existence of the building that allows the use of natural elements in supporting the realization of environmentally sustainable buildings. The examples that can be seen in this housing area is where people have started to develop their residential buildings into environmentally friendly building with provision of windows, doors, and ventilation holes are large enough so that a significant amount of light during the day needs can be fulfilled with the help of natural light. Similarly, in the case air circulation building where windows, doors, ventilation holes, and other building openings allow air circulation inside the building. These things can not be achieved if the people residing in the region do not support or participate in it.

Of the three approach in sustainable community concluded that of the first aspect is to have a healthy environment and climate, in resident areas have not been real active to manage the natural environment such as excessive use of energy resources, there is conservation land, yet commercialize renewable energy, and not implementing the 3R program (reuse, reduce, and recycle).

The second aspect in this housing residents have had social welfare, this can be seen with the fulfillment of basic

needs for clean air and water, adequate provision of social infrastructure, housing that is safe and healthy, and a good citizen social interactions with the activities monthly routine performed by residents.

The third aspect of this housing residents have had economic security, it can be seen from the majority of citizens livelihood is a businessman, lecturer, entrepreneur who is middle class and above.

Explanation of the results of the three aspects of sustainable community housing residents can be seen that the housing residents have approached with sustainable society but is actively involved in managing the natural environment still needs to be level.

From the research it can be concluded that both of the buildings to community participation in housing areas studied can be categorized able to support the development program of environmentally sound residential areas.

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