RESEARCH ARTICLE | MARCH 26 2024

Green kampung in supporting sustainable city: Case study Kampung Kalidami, Surabaya

Erna Andajani ✉; Tuani Lidiawati Simangunsong; Arum Soesanti

AIP Conf. Proc. 3110, 020040 (2024)
https://doi.org/10.1063/5.0204812

Green Kampung in Supporting Sustainable City: Case Study Kampung Kalidami, Surabaya

Erna Andajani[1, a)], Tuani Lidiawati Simangunsong[2, 3, b)] and Arum Soesanti[4, c)]

[1]*Department of Management, Business and Economics Faculty, University of Surabaya, Surabaya, Indonesia*
[2]*Chemical Engineering Department, Faculty of Engineering, University of Surabaya, Surabaya, Indonesia*
[3]*Center for Environmental and Energy Studies, University of Surabaya, Surabaya, Indonesia*
[4]*Department of Mechanical Engineering, Faculty of Engineering, University of Surabaya, Surabaya, Indonesia*

[a)] Corresponding author: ernajani@staff.ubaya.ac.id
[b)] tuani@staff.ubaya.ac.id
[c)] arum_soesanti@staff.ubaya.ac.id

Abstract. Green Kampungs play a significant role in promoting sustainable cities. They not only support environmental sustainability through localized resource management but also enhance social sustainability by fostering community engagement. Green Kampungs promote localized sustainability, encouraging communities to reduce their ecological footprint. The purpose of this research is to identify the role of kampung in a sustainable city, case study Kampung Kalidami, Surabaya. The research employs a qualitative case study analysis. Observing the application of sustainability concept in waste management, local food production, water conservation, and education and awareness and interviews with key people who play a role in the sustainability of the green kampung. The research gathers data from a variety of sources, including academic studies, and firsthand interviews with neighborhood board and citizen board officials (RT and RW) and community members. The results of the study show that kampung Kalidami has urban farming as local food production, initiatives to manage waste at the community level, including composting and recycling programs, and water conservation at their small and medium enterprises level.

INTRODUCTION

It is well known that economic, social, and environmental dimensions are considered three pillars of sustainability [1,2]. Therefore, achieving sustainability requires effort on the three dimensions of economy, environment, and society. In fact, societal aspects are often neglected in the frenetic lifestyle of contemporary society [3]. Sustainable cities, embody the concept of sustainability by striving to create urban environments that are environmentally responsible, socially inclusive, and economically feasible. Sustainable cities represent a holistic approach to urban development that harmonizes economic growth, social inclusion, and environmental stewardship. Sustainable city realization is an ongoing process that requires long-term planning, participation of different stakeholders, and continuous monitoring and adaptation. Sustainable city goals are to create thriving, livable, and resilient urban environments that meet the needs of current and future generations.

The principle of green kampung is environmental sustainability which includes conservation, resource efficiency, and waste management. Green kampung promotes localized sustainability so it will encourage communities to reduce their ecological footprint. It focuses on areas such as local food production, waste management, and renewable energy. Green kampung facilitates the integration of natural environments into urban spaces. Research of [4] presents that green kampung contributes to creating a sustainable city by raising the quality of the environment. It also has positive impacts on improving the local community economy and society. Green Kampung represents a specific aspect of urban development that contributes to the overall sustainability of the city. Green Kampung has integral components to support sustainable cities, such as waste management, renewable energy application, water conservation, and education and awareness.

Proceedings of the 4th International Conference on Green Civil and Environmental Engineering (GCEE 2023)
AIP Conf. Proc. 3110, 020040-1–020040-5; https://doi.org/10.1063/5.0204812

Kampung Kalidami is one of many kampungs in Surabaya. The kampung is developing into green kampung. It has a motto smart people, smart economy, and smart living. Smart people mean green kampung is created by smart citizens. A smart economy signifies green business concepts in small and medium enterprises. Smart living expresses community harmony in creating a safe, comfortable, and clean living environment. Green kampung can play several important roles in the context of sustainable cities. Research related to the significance of green kampung on the sustainability of the city has never been done before. It is important to observe the aspects of green kampung that influence the sustainability of the city. The research objectives are to identify the role of green kampung in a sustainable city and analyze the challenges of green kampung.

METHODOLOGY

The study was conducted at Kampung Kalidami Surabaya during July-November 2022. The research consisted of two main stages as below:

1. Observing the application of sustainability concept in waste management, local food production, water conservation, and education and awareness
2. Interviews with key people who play a role in the sustainability of the green kampung

The research employed a qualitative case study analysis and gathered data from a variety of sources which are academic studies, and first-hand interviews with neighborhood board and citizen board officials (RT and RW) and community members. The interviews with RT and RW officials were conducted to discover their programs to support a sustainable city, how they manage the programs, and the challenges in running the programs. Interviews with community members were conducted to find out their views on the program and their suggestions for future programs. The community is crucial for promoting and implementing sustainable practices that minimize the environmental impact.

RESULTS AND ANALYSIS

Green Kampung can present as a model of sustainable living where water conservation, waste management, and local food production are interrelated components of a holistic approach to urban sustainability. The components collaborate to reduce the environmental impact of the community, promote resource conservation, and enhance community well-being. Green Kampung is an integral element of a sustainable city. It embodies sustainability principles and serves as a practical example of how urban areas can be designed and managed. Green kampung can serve as an educational center for sustainability by educating the urban community about sustainable living and practices.

Solid Waste Management

Waste management is an integral part of creating sustainable cities. By adopting comprehensive waste management strategies that prioritize waste reduction, recycling, and responsible disposal, cities can minimize their environmental footprint, promote resource conservation, and enhance the overall quality of life for the citizens. The result of the study [5] proposes biopori and waste management to support a sustainable city. Biopori is applied to prevent floods or water puddles as a result of decreasing of water infiltration area. Biopori can also process organic waste generated by residents. At Kampung Kalidami the community applies Biopori and Loseda as one of the means to manage organic solid waste as represented in Figure 1 below.

(a) (b)

FIGURE 1. *Biopori (a) and Loseda (b)*

Biopori is a cylindrical hole made vertically into the ground with a diameter of 10 cm and a depth of about 100 cm. It will be filled with organic waste. Biopori infiltration hole is an appropriate and environmentally friendly technology to overcome flooding by increasing water infiltration capacity. Biopori is converting organic waste into compost by utilizing the role of soil fauna and plant roots. Loseda is a container for disposing of kitchen waste or what is called organic waste. The Loseda method is made from a 120 cm perforated pipe and planted at a depth of 30-40 cm. The waste is left in the pipe until it completely decomposes and becomes compost.

The second waste management is solid waste segregation. There are three kinds of segregation. First, they separate waste into three colors of waste bins. The blue color is for organic waste, the yellow one is for recyclable waste, and the red one is for hazardous waste. The second separation of the waste is separated into inorganic waste (plastic glass and bottle) and residue. Then the residue will be disposed of in the landfill. The third method is separated into inorganic and organic waste. The organic waste will be disposed of by composter. Inorganic waste will be brought to the waste bank. The citizen board officials raise awareness about the plastic waste of community members by introducing the different types of plastic waste and their decomposition time so the community will be aware and reduce the usage of plastic. Green Kampung offers opportunities for educational outreach and awareness-building about sustainable living practices. Green Kampungs promote waste reduction at the source by encouraging residents to compost organic waste, recycle materials, and minimize waste generation. Segregation at waste source is significant in solid waste management because upstream separation of waste categories will improve the efficiency of downstream value recovery operations [6].

Local Food Production

Local food production plays a significant role in assisting sustainability within cities. It has a multitude of benefits that contribute to environmental, social, and economic sustainability. Urban farming refers to the practice of growing, cultivating, and producing food and other agricultural products within urban or metropolitan areas. It involves the use of various techniques and technologies to create agricultural spaces in densely populated urban environments. Urban farming can take many forms, from small backyard gardens to rooftop gardens, community gardens, vertical farms, and hydroponic or aquaponic systems. The goal of urban farming is to increase local food production and promote sustainability. Urban farming is a dynamic and adaptable practice that addresses the challenges of urbanization, environmental sustainability, and food security while also promoting community engagement and local resilience. It is an important component of sustainable urban development.

Urban farms can produce significantly more produce on a per acre basis than that typically produced in rural areas, due to the intensive, focused small-scale farming techniques utilized for limited spaces. Urban agriculture is becoming more common in many cities as consumers seek healthy, local produce. Local food production can reduce carbon dioxide emissions by having minimal, short-distance transportation from where food is produced to where it is consumed, and can also help consumers to become better educated about vegetable crops and their production cycles through programs at local farms [7]. Kampung Kalidami employs the urban farming concept as local food production. They grow vegetables to fulfill the need for vegetables. Hydroponic is a method to produce vegetables. The kampung also applies urban farming by utilizing used pipes to grow vegetables and mineral water container usage to grow plants as represented in Figure 2 below.

FIGURE 2. *Hydroponic and Used Mineral Water Containers to Grow Vegetables*

Water Conservation

The cities play an important role in the management of freshwater resources, as they may impact both water quantity and quality through land-use change, overexploitation, and contamination [8]. A water cycle city links environmental protection, water supply security, public health protection, and flood control. A water-sensitive city includes intergenerational equity, ecological integrity, and climate change resilience [9]. Water conservation is a fundamental component of sustainable cities. Sustainable cities integrate water conservation into their planning and development strategies to ensure a more efficient, equitable, and environmentally responsible use of this resource. Water conservation goals can be focused on reducing unnecessary water intake and altering the flow to the places where the physical and chemical properties of the water encourage reuse [10]. There are eight small and medium enterprises at Kampung Kalidami. One of them is ecoprint enterprises. At the eco-print process, it uses 6 to 10 liters of water to produce 6 meters of eco-print fabric. Kampung Kalidami is located in Eastern Surabaya, an urban area, so water issues must be a concern to maintain the sustainability of the enterprises. Nowadays, many urban areas worldwide are having water supply problems. To ensure the sustainability of the industry, the industry must start to consider water saving. The fundamental strategy to overcome water shortage is water conservation. The achievement of conservation depends on community assistance and behavior change [11]. Handcrafters have started reducing water usage and developing simple wastewater treatment. They also process used cooking oil into candles and utilize the precipitate of the eco-print process to prevent contamination by disposing of the oil and precipitate to the environment.

CONCLUSIONS

Green Kampungs play a significant role in promoting sustainable cities. Green Kampungs promote localized sustainability, encouraging communities to reduce their ecological footprint. The results of the study show that Kampung Kalidami has:

- urban farming as local food production,
- initiatives to manage waste at the community level, including composting and recycling programs,
- water conservation at their small and medium enterprises level.

The challenge of the green kampung is ensuring community participation and ownership.

ACKNOWLEDGMENTS

KemendikbudRistek for Community Partnership Program (PKM) Funding for the research with the contract number assignment letter 006/SPP-PPM/LPPM-02/Dikbudristek/FT/V/2022.

REFERENCES

1. S.A. Kadir and M. Jamaludin, Procedia Soc Behav Sci **85**, 179 (2013).
2. H.W. Zheng, G.Q. Shen, and H. Wang, Habitat Int **41**, 272 (2014).
3. A.M. Hassan and H. Lee, Environ Dev Sustain **17**, 1267 (2015).
4. E. Letfiani and A. Widyasari, *KAMPUNG MASPATI AS A SUSTAINABLE KAMPUNG IN SURABAYA CITY* (2015).
5. W. Setyaningsih, T.Y. Iswati, SriYuliani, W. Nuryanti, B. Prayitno, and A. Sarwadi, Procedia Soc Behav Sci **179**, 109 (2015).
6. B. Esmaeilian, B. Wang, K. Lewis, F. Duarte, C. Ratti, and S. Behdad, Waste Management **81**, 177 (2018).
7. S.A. Walters and K.S. Midden, Agriculture (Switzerland) **8**, (2018).
8. H. Jia, H. Yao, and S.L. Yu, Front Environ Sci Eng **7**, 709 (2013).
9. L. Liu and M.B. Jensen, Cities **74**, 126 (2018).
10. S.K. Kurunthachalam, Journal of Waste Water Treatment & Analysis **05**, (2014).
11. M. Gilbertson, A. Hurlimann, and S. Dolnicar, Australasian Journal of Environmental Management **18**, 47 (2011).