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Pentahelix model implementation in community development: The case of Kampung Sampah Bernilai Programme in Samarinda

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Abstract: The Samarinda City Government through Department of Environment has made innovations to address waste issues through Kampung Sampah Bernilai (Kampung Salai) Programme, which is implemented at the Rukun Tetangga (RT) level. This programme aims to increase community participation in waste management from upstream to downstream. This study aims to examine the implementation of the pentahelix model in the community-based Kampung Salai Programme. The study was conducted in 3 neighbourhoods in Sempaja Timur Village that have implemented the programme. The conclusions that can be drawn from the field data are as follows: as an innovation programme, it was able to encourage the emergence of waste care communities at the RT level. The activities of this community include opening a waste bank, processing inorganic and organic waste, and developing a circular economy. The stakeholders (pentahelix elements) have adequate capacity to support waste management, but their roles are not optimal, especially the government and universities because they are still oriented towards different programmes and interests. Thus, the pentahelix model used in Kampung Salai does not guarantee the sustainability of the programme.

Keywords: Pentahelix Model, Community Development, Sampah Bernilai, Samarinda

INTRODUCTION

Along with economic development, urbanisation and population growth in Samarinda City, production and consumption activities have also increased significantly. This results in an increase in the amount of waste generation (Gwebu, 2003; Khajuria *et.al*, 2009; Omololu & Lawal, 2013; Shershneva, 2022). The presence of this waste causes environmental pollution (land, water and air) and poses a threat to human health itself (Nwachukwu *et.al*, 2018; Kenekar, 2021). Therefore, waste management is a major challenge in urbanised societies (Rahardyan *et.al*, 2015).

Table 1. Number of Population Projections in Samarinda City (People)

Area	Year		
	2021	2022	2023
Samarinda	859.250	865.911	872.304

Source: BPS, Population Projection of dictricts/cities in East Kalimantan, 2015-2025

Table 2. Total Waste Production in Samarinda City (M^3)

Waste	Year		
	2021	2022	2023
Waste Volume	816.588	824.168	841.286

Source: BPS Samarinda

Tables 1 and 2 show that during the same period, population growth and waste production in Samarinda City were directly proportional, with population growth followed by an increase in waste production. It means that the two have a close relationship with each other.

Therefore, it is important to understand the relationship between population growth and waste generation to determine waste management strategies. In some waste management practices there are two things that need to be considered, namely on the one hand the factors that affect waste generation are the level of public education and infrastructure (Khajuria *et.al*, 2009), and on the other hand the level of education also affects public participation in waste management. Furthermore, community participation is the key to successful waste management (Setiawan et.al, 2022).

The development of public awareness and lifestyle towards waste management needs to be fostered and improved (Muyassarah et.al, 2022). The form of cultivating a mindset and awareness of responsibility for all waste generated by households is reflected in the kampung sampah nilai programme. McDonough & Braungart (2002) explained that waste has a high and valuable value. For this reason, sustainable waste management is needed. Such waste management will involve many actors. The community is one of the actors who are required to actively participate in the management of the waste problem (Scheinberg, 2010).

The implementation of waste management in Samarinda is regulated in Peraturan Walikota Number 13 of 2019 concerning Regional Policies and Strategies for the Management of Household Waste and Waste Similar to Household Waste in Samarinda City (Kaltimtoday.co, 2021). The management of household waste and similar household waste certainly requires the involvement of the community who are the producers of the waste themselves.

The importance of community participation in waste management has encouraged the Samarinda City Government through the Department of Environment (Dinas Lingkungan Hidup/DLH) to make innovations to address waste problems through the Kampung Sampah Bernilai (Kampung Salai) Programme which is implemented at theneighbourhood association (Rukun Tetangga/RT) level. In this case, the city government as the actor most responsible for municipal waste management (Mario et.al, 2022), seeks to empower the community in waste management in order to encourage the emergence of public awareness and responsibility for the waste generation they produce in their daily activities. Community involvement in waste management is one of the developments of upstream waste management strategies, namely reduce, reuse and recycle (Atyadhisti & Sarifudin, 2019) and is the foundation for the transition to a circular economy (Mario et.al, 2022).

The community-based waste management strategy initiated by DLH is also a form of community development that aims to change people who are passive about waste problems to be active in waste management so that the environment where they live becomes better. The principles of community empowerment and collective action (Kenny & Connors, 2017) characterise community development in the implementation of this strategy.

The implementation of the Kampung Sampah Bernilai Programme will be studied using the pentahelix model. The Pentahelix Model is a design of integration between five sectors which are coordinated with each other (Amrial et.al, 2017). This model is used to explain the integration and coordination of the five elements involved in this community-based waste management programme innovation. In this model, each element or stakeholder works synergistically to foster innovation and innovation-based economy (Sudiana et.al, 2020; Muhyi et.al 2017) and community empowerment (Syafari, 2018). The five elements involved in this programme are the government, universities, businesses, local communities, and the media. This pentahelix model is used in community development in three salai villages in three neighbourhoods,

namely: Kampung Salai Kejujuran (RT 43), Kampung Salai Amanah (RT 32), and Kampung Salai Turi Putih (RT 48).

METHODS

This research was conducted in three neighbourhood in Sempaja Timur Urban Village, Samarinda City, which are considered successful in implementing the Kampung Sampah Bernilai program from the Environmental Agency. Data collection was conducted through literature study techniques, participatory observation, and interviews with informants. The data collected is qualitative, and is presented in the form of narratives, tables, or graphs. The main data needed are data on the idea/concept of the Kampung Salai program, the behaviour of residents or the practical activities of waste reduction and management, as well as the participation and function of the pentahelix elements (stakeholders). Function analysis was used to determine the role and importance of each pentahelik element in programme implementation. The results of the study are presented in an analytical description to explain the implementation and collaborative practices of the pentahelix model in community-level waste management.

RESULTS AND DISCUSSION

Kampung Salai Programme: A Community-Based Waste Management Innovation

The Kampung Sampah Programme has been implemented by the Samarinda City government starting since 2021 as one of the innovations to achieve waste reduction targets in accordance with the Samarinda City Jakstrada. The main objective is to encourage community involvement in achieving the waste reduction target that has been set. Each neighbourhood association is asked to form a new institution/organisation at the RT level called Kampung Sampah Bernilai with a formal structure approved by the village government. This means that the idea and initiative to form this institution came from above (the government) or top down. The main tasks of this institution are twofold, namely: (1) to mobilise residents to manage waste at home properly, and (2) to manage waste on an area scale (one neighbourhood) so that it becomes more valuable.

Following the concept designed by DLH, there are four values that will be felt by residents with area-scale waste management at the neighbourhood level, namely: social value, cultural value, worship value, and economic value. Social value refers to increased interaction, care, mutual cooperation when managing waste together so that a harmonious and harmonious community is formed. Cultural value leads to the formation of new habits (habitus) of waste management from the source, namely the household. The value of worship means that the behaviour of managing waste and maintaining cleanliness is lived as an act or form of worship. The meaning of economic value is that waste can be managed and processed so that it has a selling value. In addition, economic value also means that the economic value of an area increases because the quality of the environment increases to be cleaner, more comfortable, beautiful, and healthy, which reflects the physical quality of the area and its residents (DLH Samarinda, 2013).

A measurable indicator of success for this programme is the amount of waste reduction that goes to landfill. This cannot be achieved if residents still follow the old pattern of throwing all household waste into landfills. The new pattern is to reduce waste from home so that less waste goes to landfill. This new pattern is not yet understood and practised in the community. Generally, all waste is thrown into landfills.

Sempaja Timur Village is an active and successful village in the salai village programme, as evidenced by the fact that three neighbourhoods have won the salai village competition at the city level in a row. The three salai villages are Kampung Salai Kejujuran (RT 43) formed in 2021, Kampung Salai Amanah (RT 32) formed in 2022, and Kampung Salai Turi Putih (RT 48) formed in 2023. The various activities carried out by the three salai villages include: (1) Establishment of a waste bank. The waste bank accepts inorganic waste savings that still have a selling value such as plastic bottles, glass bottles, cardboard, paper, cans, iron, etc. from customers; (2) Ecobricking. Plastic waste that doesn't sell, becomes more valuable when made into ecobricks. The trick is to put small plastic waste into a plastic bottle until it is solid. Ecobricks become the material to make other products such as chairs, tables, etc; (3) Development of waste-based crafts. Waste is converted into useful and economically valuable craft items; (4) Composting or fertiliser production. Organic waste such as dried leaves, fruit peels, vegetables, etc. are processed into solid compost. Fruit peel waste can also be made into liquid organic fertiliser; (5) Maggot cultivation. Organic waste or wet food waste is utilised for maggot feed; (6) Eco enzyme producing. Eco enzyme is made from fresh fruit peel waste. In addition, these activities are able to become an economic driver for residents, with the emergence of economic activities sourced from waste management (circular economy).

The kampung salai programme, as a top-down system to engineer behavioural change in the community, can be said to be successful to a certain extent. Firstly, the three salai villages still exist today with their own challenges, dynamics and creativity. The establishment of salai villages, in fact, has raised and united people/neighbourhood residents who have been concerned about the environment since the beginning to join and move together. The number of people who care about the environment is not large, but it is very important as a driving force to continue the programme with all its challenges. Each salai village has people who consistently activate the waste care movement in their community. They are not just aiming to win the kampung salai competition organised by DLH.

Secondly, residents have a more in-depth and comprehensive knowledge about waste, and have started to carry out waste management since being involved in salai village. There is no exact data on the number of residents who have implemented good and correct behaviour in managing waste. However, it is certain that some residents have new knowledge and started managing waste from the source. This means that the Kampung Salai program initiated by the city government has been able to trigger or encourage changes in the behaviour of some residents. Concrete evidence of this behavioural change can be seen from the existence of waste banks that are still running today in the three salai villages. The customers must have sorted their waste from home, collected their valuable waste, and deposited their waste according to a predetermined schedule. In addition, the environment has become cleaner, more beautiful, and more comfortable, as seen in RT 43, which has had a salai village since 2021.

Third, there is a reduction in the amount of waste going to landfill. This can be seen from the amount of inorganic waste that residents save in the waste bank. The waste bank regularly sells the waste to collectors. Similarly, organic waste is processed by residents into solid compost, eco enzyme, liquid organic fertiliser, and others. The manager of Kampung Salai Turi Putih RT 48 said that they focus more on making solid compost and eco enzyme, in addition to managing the waste bank. The compost and liquid fertiliser are sold or used by the members themselves.

According to the salai village organisers, there are challenges they face. Firstly, there has not been full citizen participation, due to a lack of knowledge, awareness and concern. There is no structure and system built by the government that can force residents to participate. Secondly,

recycled waste products (handicrafts from waste and waste recycling) still do not have a place in the market, as evidenced by low consumer demand. This happens because the image of recycled products is still negative, namely as goods from garbage. In addition, the quality of many recycled products is still low, for example, they are less aesthetic, untidy, and look cheap. Salai village managers are faced with the problem of product marketing. Third, the knowledge of salai village managers is still low in relation to waste management technology, which limits their creativity. These challenges are basically the problems that still beset the salai village, so creative solutions must be found so that this programme does not stop in the middle of the road.

Collaboration between pentahelix elements/organisations

Following the scheme designed by DLH, the kampung salai programme must involve and cooperate with many parties/institutions. Each party is expected to play a role according to its capacity to strengthen the salai village. Stakeholders that need to be involved in the pentahelix model include government elements, universities, business people/business world, local communities, and the media. Salai village managers must be able to develop a collaboration network of the five pentaelix elements, because the government (DLH) does not facilitate it. The development of cooperation is left entirely to the initiative and social network owned by the members of the salai village itself in accordance with the activity programme carried out. From the pentahelix collaboration network built by the three salai villages, the role of each pentahelix element is known as shown in the Table 3.

Tabel 3. Peran elemen Pentahelik pada Program Kampung Salai

Pentahelix Elements	Actors	Roles
Government	Environment Departmen (DLH)	• Conceptualising, regulating, implementing and evaluating the programme. • Conduct tiered monitoring and coaching, namely from DLH to sub-districts, sub-districts to villages, and villages to neighbourhoods and Kampung Salai. • Facilitate the competition • If necessary, perform consultative functions.
	Government of North Samarinda Subdistrict	• Coordinating with DLH, kelurahan, RT heads and kampung salai for programme implementation. • Mentoring and monitoring the implementation of kampung salai • Providing facilities if needed
	Government of Sempaja Timur Village	• Coordinating with DLH, sub-district, neighbourhood association (RT), and Kampung Salai management. The sub-district provides information to neighbourhood associations and kampung salai, listens to the difficulties/obstacles of kampung salai, provides input/suggestions on the problems faced.

Pentahelix Elements	Actors	Roles
		• Mentoring and monitoring the implementation of kampung salai. • Providing facilities if needed.
Colleges/universities	Academics from Mulawarman University, Samarinda and Widya Gama University, Samarinda	• Transferring knowledge, providing training and mentoring to community members. The aim is to increase knowledge, environmental awareness, and provide waste management skills. Universities involved lecturers and students from both academic and social/economic programmes. Socialisation and training on waste segregation, organic waste processing (composting, ecoenzymes), inorganic waste utilisation, waste bank management, circular economy, social media management, etc.
Business actors	Collectors	• The main partnership element of a waste bank is the waste collectors who buy the waste. Since there is already a Waste Bank Induk (BSI) in Samarinda, the waste bank can establish a partnership with the BSI. This partnership is inseparable from the calculation of profit and loss. The waste bank will sell to the partner who gives a higher price.
	Shop/store/catering	• Kampung Salai also establishes partnerships with shops/stores/catering businesses to market their products. The products of Kampung Salai's economic enterprises include hydroponic mustard greens, spinach, etc. which are fertilised with their own solid and liquid compost. The vegetables can be sold directly or made into chips or other snacks that are deposited or sold to stalls or small shops. Kampung Salai has not yet been able to collaborate with large businesses. • In addition, catering businesses can provide organic waste such as fruit peels, vegetable scraps, etc. for composting. • Partnerships with businesses are built according to the typical products produced by each salai village.

Pentahelix Elements	Actors	Roles
Local communities	Mosques/religious organisations in RT.43, RT.32, RT.48.	• Inorganic waste collection involves institutional elements within the neighbourhood. The mosque becomes a waste bank customer and plays an active role in supporting the collection of plastic waste to be deposited in the waste bank. Proceeds from the sale of the waste become a source of cash for the mosque. Many members of the community have become customers, with the proceeds donated to the mosque.
	Dasa Wisma in neighbourhoods RT.43, RT.32, RT.48.	• Dasa wisma became a channel of communication and socialisation for the RT and kampung salai about the Kampung Salai and waste bank programmes to the residents.
	Integrated Service Post (Posyandu) in neighbourhoods RT.43, RT.32, RT.48.	• Posyandu is also used as an informal communication channel to socialise the waste bank and kampung salai. Posyandu cadres can become partners of kampung salai.
	The other Kampung Salai	• Fellow Kampung Salai establish partnerships by exchanging experiences and knowledge about salai village management. In a relay manner, kampung salai RT 43 transferred knowledge to kampung salai RT 32, and then to RT 48.
Media	Whatsapp (WA)	• The WA group is used for internal communication between salai villagers and neighbourhood associations. Communication here is important as a means of sharing information on activities, conducting education, and discussions to get input and suggestions related to programme implementation. This media is cheap and effective to establish communication with members.
	FB, IG, youtube	• FB and IG are important tools to convey information and activities to a wider audience. A lot of knowledge and creative ideas can be learnt and exchanged so that waste management can become a broader social movement. • Partnerships between Kampung Salai, the government, the business world,

Pentahelix Elements	Actors	Roles
		universities, environmental communities and others can be built in cyberspace.

Source: field data

The presentation in the Table 3 shows several things. Firstly, the partnership between government elements (DLH, Sub-district, Village) and the kampung salai is hierarchical-vertical. This means that the relationship built is not equal and parallel. The government (DLH) acts as an initiator, regulation maker, direction provider, and coach according to its authority. The roles of the sub-district and kelurahan are almost similar, namely performing administrative functions, coordination/communication channels, and guidance. The real role is to assign and make a management decree, convey various information such as technical information on the kampung salai competition, etc. In addition, the sub-district and village governments play a role in providing useful input for the development of kampung salai, which is given during visits to kampung salai. Here, kampung salai have the status of target communities, which are fostered and required to follow regulations and technical rules.

Second, the collaboration between university elements (lecturers and students) and kampung salai is also in a vertical relationship. Universities act as resource persons or mentors, while the members of kampung salai are the ones being trained. Academics and students play a role in transferring knowledge and providing training materials needed by the waste care community. Lecturers have an interest in carrying out one of the dharma of Colleges, namely community service, while students have an interest in gaining experience in field assistance. The initiative or proposal to collaborate comes from the manager of the salai village, with the interest of getting experts who are able to provide training.

Third, the collaboration between business actors and the kampung salai is more horizontal. Both parties are brought together because of economic interests, where their actions are based on profit and loss calculations. The collectors buy waste because they want to make a profit, while the waste bank will sell to collectors who can provide a high purchase price. The interest in developing a business and making a profit is taken into consideration by the waste bank and salai village managers when choosing a collector partner. Similarly, kampung salai partners with small shops or stalls that sell circular economy products, such as brazilian spinach chips, catfish chips, sticks, and others.

Fourth, the collaboration between the local community and kampung salai is horizontal. The collaboration here is between the salai village and other social units in the neighbourhood, such as mosque congregations, recitation groups, posyandu, dasa wisma, arisan groups, etc. The salai village manager has an interest in gaining the support and participation of residents by establishing partnerships with other social units. Residents in general also have an interest in a clean, comfortable and healthy environment. Collaboration between salai villages is carried out with the same interest of increasing mutual knowledge, and supporting each other so that the waste reduction movement is more widespread.

Fifth, the media element in this pentahelix model is the use of internet-based social media that is used by the management of salai village to disseminate information. The activities of kampung salai are uploaded to Facebook and Instagram with the aim of offering ideas and promoting kampung salai to inspire many people. In this way, parties who see and are interest-ed can establish partnerships for mutual progress. In addition to facebook and instagram, kampung salai also uses WAG as a means of internal communication for neighbourhood residents. So far, the use of WAG has been very effective and efficient.

The descriptions above corroborate the findings that the success of the kampung salai programme at the RT or local community scale requires the support of many parties. Each element and actor tries to carry out its role and function. It appears that the government element, especially DLH, has a high commitment to waste reduction, but is still seen as a 'programme implementer' in the sense of a "project" (a programme/job that must be completed and ended within a certain period of time). This can be seen from the performance that increases when approaching the kampung salai competition, after the competition is over, the performance begins to decrease in fostering kampung salai. The same thing happened to the college/university element (academics) who collaborated incidentally and unsustainably. The business element can collaborate more sustainably, especially with collectors. Similarly, elements of the local community or social units in the neighbourhood can establish sustainable relationships if the salai village manager is able to maintain them. In this case, the sustainability of the pentahelik partnership and the sustainability of the kampung salai programme still seem to rely on the initiative and ability of individual actors (kampung salai managers) because the structure and system have not really been formed.

CONCLUSION

Based on the description above, the conclusion that can be drawn is that the waste reduction innovation through the Samarinda City government's kampung salai programme is able to encourage the growth of waste-caring communities in local communities. With their own challenges and dynamics, the managers of kampung salai try to carry out various activities on an ongoing basis, including waste bank activities, processing inorganic and organic waste, and developing the circular economy of residents. The success of kampung salai is due to the support and co-operation of the pentahelix.

The government, especially DLH, has a very strong commitment to the waste reduction movement to achieve the targets set by the government. However, from the pentahelik collaboration model, it can be seen that the government seems to work based on "project logic" (work that must be done and completed within a certain time). Similarly, there are elements of academia that collaborate incidentally to fulfil the community service dharma of universities. Such a hierarchical and differentiated collaboration model between elements does not support the sustainability of the kampung salai programme. The elements of business actors and local communities in the pentahelik model whose relations are horizontal have a tendency to be sustainable. Business actors, especially collectors and salai villages, have the same interests, so they can be sustainable as long as their interests are equally fulfilled. Social media elements (FB and IG) are utilised to promote activities.

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