

Conference Paper

Penta Helix Collaboration Model in Handling Problems of Waste Management

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ABSTRACT

Population growth and socio-economic activities in the area are positively correlated with an increase in the amount and type of waste and pose a threat to regional ecosystems. The condition of the Ngimpik Final Disposal Site (TPA) is over capacity. The role of the community is needed to change the perspective on the waste that was previously collected, transported, and disposed of to reduce, separate, and utilize waste. Therefore, it is necessary to have a penta helix collaboration between stakeholders in waste management which is possible to overcome the problems of waste management. The research location is the Office of the Environmental and Hygiene Office of Gresik Regency. The research method uses a qualitative approach and data sources are obtained from secondary data, literature studies, interviews, and field visits. Informants were taken from formal figures, the Head of the Department of Cleanliness and the Environment and their staff, the community, and the private sector. Methods of data collection are done using interviews, focused groups, and discussions. This research is expected to result in the application of the concept of a penta helix collaboration model in dealing with waste management problems with a focus on describing the role of the Penta Helix collaboration in the TPST program. A solution to handle the problem of waste management in Gresik Regency through the concept of the Penta Helix collaboration. Data analysis was carried out using qualitative analysis by Miles and Huberman (2014) consisting of four components, namely: data collection (data collection), data condensation (data condensation), data presentation (data display), and drawing conclusions or verification (conclusion and verifying drawings). The results of the study indicate that the community's perspective on waste management has not been effective in terms of collecting, transporting, and disposing of waste to reduce, separate, and utilize waste. The SAMTAKU program has challenges due to internal inhibiting factors (awareness, motivation, and participation) and external inhibiting factors (commitment, trust, communication, and coordination). The Penta Helix collaboration is a solution to handling waste management by dividing the roles of academics as drafters, businessmen as enablers, communities as accelerators, government (government) as regulators, and media as expanders. Keywords: Penta Helix Collaboration, Waste Management, Samtaku Program.

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Introduction

In Indonesia, the problem of waste and its management is an environmental issue that is of concern to the government. The increase in the amount and quantity of waste almost does not occur in all regions and the increase is not enhanced by the improvement and improvement of the management system, facilities, infrastructure, regulations, and the limited capacity of the waste processing site (TPA). Facts in the field of waste management that still focus on dumping it

How to cite:

Hertati, D., Nurhadi, & Tukiman. (2023). Penta helix collaboration model in handling problems of waste management. 7st International Seminar of Research Month 2022. NST Proceedings. pages 371-377. doi: 10.11594/nstp.2023.3359

downstream (TPA) are no longer relevant. This is the main obstacle to waste management which is not ideal and sustainable (Mahyudin, 2017). Collaboration is an important key in solving the waste problem and its management by taking steps to solve it from upstream to downstream, which are carried out cohesively.

The waste problem in East Java Province continues to increase, and it is difficult to find land to be used as a landfill. By the end of 2020, 47 landfills will be full of waste products that average 18,500 tons/hour (Rhofita, 2017). Meanwhile, Gresik Regency's waste pile is 187 tons/day and has 1 unit of Final Processing Site (TPA) in Ngipik, Kebomas District with an area of 6 Ha (Fathoni, 2018). The magnitude of this increase is always changing with changes in consumption patterns and technological advances. This is by the statement (Riani & Cordova, 2018), that the quantity and quality of waste is strongly influenced by changes in people's living standards, which are influenced by three factors, namely population, social economy, and technological progress.

The legal umbrella in formulating TPA regionalization policies based on Law Number 18 of 2018 concerning Waste Management, among others, facilitates collaboration between local governments and the private sector or network partnerships in waste management, coordinates, fosters, and supervises district/city performance in waste management, development system, and regional solid waste management, as well as payment for waste management payments between districts/cities within 1 (one) province (Kusrini et al., 2019). The Gresik Regency Government, to overcome the waste problem, has issued Regional Regulation Number 5 of 2017 concerning waste management. Waste management needs to be carried out in a comprehensive and integrated manner so that it can provide economic benefits, and health for the community, be safe for the environment, and can change people's behavior because waste is not only a national but also a regional problem.

The management of waste produced by humans must be considered immediately because the amount of waste has exceeded its capacity (Dermawan et al., 2018). In 2020, according to the Regional Policy and Strategy (Jakstrada) report, data on the potential for waste generation reached 140 tons/day (Purningsih, 2018). TPA Ngipik is the only final waste disposal site owned by Gresik Regency. The volume of waste has increased every year. The indicators for the success of Gresik Regency's waste management have only reached 38% and 62% of the waste generation has not been managed. Therefore, steps are needed to improve waste management by increasing waste processing facilities. But of course, this must be balanced with the provision of adequate waste processing locations. In fact, for the time being, the capacity of the Ngipik Final Processing Site (TPA) which will accommodate Gresik Regency's waste is very limited.

Waste management in Gresik Regency is currently still using the conventional system, centralized disposal at the TPA, and additional processing units for the Biogas Processing House. Periodically, waste residue from TPS that cannot be reused will be transported by large trucks to Ngipik TPA. Gresik Regency's biggest waste reduction still relies on the informal sector both scavengers and collectors (Gresik Regency Jakstrada, 2020).

Awareness of several community groups, such as the Tahfidz Madrasatul Qur'an Santri Mambaul Falah Bawean and Tarbiyah College Students (STIT) Raden Santri Gresik (RSG) Bawean Gresik, the Gresik Regency Garbage Bank Association (Asbag) carried out several activities such as planting trees of life, choosing garbage, and clean the environment. According to Maulidya (2020), wide open space for the involvement of various actors from civil society and public management is not dominated by the state (state) and the market sector (market). So, the interaction that occurs in the mechanism of checks and balances is not only the implementation and success of the program. Solving the problem of effective waste reduction in environmental conservation and waste management is the key to the initial movement (Suryani, 2014). Communities care together and become active activists in waste management through institutions, and communities, or participating in government programs that can solve Gresik Regency's waste problems sustainably (Billah et al., 2019). The Penta Helix collaboration

summarizes five important parties that can be involved in waste management, namely Academic, Business, Government, Community Partners, and Media (ABGCM).

The Penta Helix collaboration between the Gresik Regency Government, PT Reciki Solusi Indonesia, and Danone-AQUA, the waste bank supervisor, developed waste management and reduction through the Samtaku Integrated Waste Management Site (TPST) in Ngipik Village with an area of 3,000m². Based on the background description above, the formulation of the research problem is what the ABCGM penta helix collaboration model is in solving waste management in Gresik Regency.

Literature Review

Collaborative development model

Collaborative Development Model In an organization that interacts and depends on each other, collaboration is the key to creative thinking. Collaboration is a process of working together to create ideas and solve problems together towards a common vision (Aunurohim et al., 2019). Collaboration is important to achieve the best results when solving complex problems. In its development there is a simple collaboration model consisting of two parties, then it develops into three, four, and up to five parties (Dani Rahu & Suprayitno, 2021).

The triple-helix collaboration was introduced by Rahman and Warsono (2019). This collaboration is based on the interaction of the three components which are the main keys for improving conditions conducive to the birth of innovation, skills, creativity, and ideas in the development of the creative economy. Triple-helix is an approach that describes the emergence of innovation from a balanced, reciprocal, and continuous relationship between academia and research and development institutions, government (government), and business actors/sectors (companies). The synergy of the three components is known as ABG (Academic, Business, and Government) (Wahjusaputri et al., 2018).

The quadruple-helix concept was suggested by Carayannis and Campbell (2013) by adding a fourth helix from the existing Triple-Helix model. This fourth helix is identified as a helix associated with 'media', 'creative industry', 'culture', 'values', 'lifestyle', and 'art'. The reason for adding the fourth helix is because values and culture, on the one hand, and how public reality is formed and communicated by the media, on the other hand, have an impact on the innovation system of a community or country. The role of the media is very important in shaping or directing what innovations are priorities in a country. The penta-helix concept is also suggested by Carayannis et al., (2012) where the fifth helix is an emphasis on the natural environment (social ecology) aspects of society and the economy for knowledge production and innovation systems.

The Penta-helix project empowers local and regional authorities, to find innovative and cost-effective approaches to developing, financing, implementing, and improving sustainable energy and action plans. The main objective is to develop a penta-helix-based method and involve and support authorities at various levels together with other key stakeholders in various sectors to improve the development and implementation of an activity (Winarno et al., 2021). Where the roles of each penta helix actor are as follows: 1. Academics act as concepts, namely standardizing business processes and certifying products and human resource skills. Academics related to sources of knowledge with the latest and relevant concepts, and theories; 2. The business acts as an enabler. Business is an entity that carries out business processes in creating added value and maintaining sustainable growth; 3. The community acts as an accelerator, acts as an intermediary, or becomes a liaison between stakeholders who are people who have the same interests and are relevant to the growing business; 4. The government acts as a regulator as well as acts as a controller that has regulations and responsibilities in developing the business 5. Media acts as an expander that plays a role in supporting publications in the promotion and creating a brand image.

Stakeholder collaboration in waste management

In Waste Management Stakeholders are groups or individuals whose support is needed for the survival of an organization (Ernawati, 2016). Meanwhile, according to Sam (2016), stakeholders are communities, groups, communities, or human individuals who have relationships and interests in an organization or company. These stakeholder categories are referred to as investors, contributors, observers, and end-user stakeholders (Kumalasari, 2018). Based on the level of importance, stakeholders are divided into three groups, namely (Mainardes et al., 2012): a) Primary stakeholders are stakeholders who are directly affected by both the positive and negative impacts of a plan and have a direct interest in the activity. b) Key stakeholders are those who have legal authority in terms of decision-making. c) Secondary stakeholders are stakeholders who do not have a direct interest in a plan but have great concern for the development process. The role of stakeholders in development programs can be classified as follows: (Zainal, 2020): 1. policymakers: stakeholders who act as decision-makers and policymakers; 2. Coordinator: a stakeholder who plays a role in coordinating other stakeholders involved; 3. Facilitator: stakeholder whose role is to facilitate and fulfill the needs of the target group; 4. Implementer: stakeholder implementing the policy which includes the target group.

In Indonesia, the term penta helix is widely used to refer to academics (academics), business (business), community (community), government (government), and the popular media with the term ABCGM (Purnomo et al., 2021). The penta helix collaboration in environmental control has been carried out in Indonesia (Alamanda et al., 2020). Triple helix collaboration in waste management has been implemented by Rosenlund et al. (2017), but the results still have obstacles, where the resulting solution needs to be given a boundary, and a public arena is provided for dialogue. Anttonen et al. (2018) encourage the government to apply the triple helix to be applied to waste innovation policies to achieve systemic change. This study adopted the findings of Rosenlund et al. (2017); Anttonen et al. (2018), who carry the concept of collaborative development elements to overcome environmental problems, especially waste management.

Waste management

Waste is the residue of human daily activities and/or natural processes in solid form which is divided into household waste and specific waste (Dermawan et al., 2018). Household waste comes from the activities of several families that occur inside and outside the home and is collected into a single management system (Nurchahyo & Ernawati, 2019). As the population increases, the volume of household waste increases. The magnitude of the increase is offset by changes in consumption patterns and technological advances, this is by Muhamad (2014), that the quantity and quality of waste are influenced by changes in people's living standards, which include three factors, namely population, socio-economic conditions, and technological advances. The increase in the amount of quality and quantity of waste in Indonesia occurs in all regions, which is balanced by the improvement and improvement of the management system in terms of facilities, infrastructure as well as regulations and management patterns.

In general, waste management in urban areas is carried out through 3 stages of activities, namely collection, transportation, and final disposal. Algifari Martin et al. (2020) describe the stages of the activity process in waste management as follows: a) Collection, is the management of waste from the place of origin to the temporary disposal site before moving on to the next stage. b) Transportation, is transporting waste by using aid facilities in the form of certain transportation equipment to the final disposal/processing site (TPA). c) Final disposal, in this process the waste will undergo physical, chemical, and biological processing until the completion of the entire process. The 3R principles can be described as follows: (a) The principle of reducing or reducing waste: efforts to reduce waste generation in the source environment and can even be done before waste is generated. (b) The principle of reuse: reuse materials or materials so that they do not become waste (without going through a processing process). Reuse can extend the life of the goods through the maintenance and reuse of goods directly; (c) The principle of recycling, recycling

materials that are no longer useful into other materials/new goods after going through a processing process (Natalia et al., 2021).

Material and Methods

The type of research used is by using a qualitative descriptive approach, namely a study that explains something that is the target of in-depth research (Sugiyono, 2013). The research locus is in Gresik Regency with certain considerations and goals that make researchers interested, namely Gresik Regency is one of the best districts/cities, by successfully winning the 2021 STBM Awards for the 5 pillars of the Sanitation Needs Fulfillment category (Supply Creation). The research analysis unit is the head of the environment and hygiene department, the head of the Gresik Regency Cooperation Division, the private sector, the community, and the media. This research is expected to realize realization of the Pentelix collaboration model in handling waste management problems, based on academia, business, community, government, and popular media.

The data collection method that will be carried out in this study is An Depth Interview, to analyze the needs of researchers in formulating concepts and theories of the penta helix collaboration model format in handling integrated waste management problems. Focus Group Discussion: a method to collect data from various experts: the Regent, the Head of the Sanitation and Environment Service and his staff, the community, and relevant private institutions. The data from the FGD is a comparison of data (cross-check) with the results of in-depth interviews. The focus of the research is on the collaboration of Penta Helix ABCGM which is applied in waste management in Gresik Regency by knowing the roles of five parties (academics, businessmen, communities, government, and media) and what obstacles are faced by those who are members of Penta Helix ABCGM in waste processing. The data analysis model from Miles and Huberman consists of 4 (four) main things, namely data collection, data condensation, data presentation, and withdrawal or leverage (Miles & Huberman, 2014).

Results and Discussion

Based on the findings and discussion of the Penta Helix ABCGM collaboration in alleviating waste management problems in the Gresik Regency, collaboration is important in waste management and alleviating environmental problems that accompany it. In explaining the concept of ecocentrism, humans have a role as fighters for environmental balance. So humans should be actively involved in preserving and protecting the environment and also alleviating waste management problems. Waste management in Gresik Regency is carried out by reducing waste, separating waste according to type, and utilizing waste before being disposed of in the Waste Disposal Site (TPA). The way of managing waste will be more cohesive and optimal if it is done in collaboration with all levels of society. In public policy, there is the concept of Penta Helix ABCGM which involves five parties in collaboration. Efforts to eradicate waste problems in Gresik Regency as a whole can use this concept. The five parties have their respective roles with the same goal. Penta Helix ABCGM is project management through collaboration through five parties who have their respective roles, namely Academic (academics) as drafters, Businessman (businessmen) as enablers, Community (society) as accelerators, Government (government) as regulators, and Media (media) as expanders.

Waste management is trying to make people's mindsets related to waste management that only collect-transport-disposal that are charged to the government, become a mindset for managing waste independently of the source, namely reduce-separate-use. So, it takes collaboration from all parties Penta Helix ABCGM. However, in the implementation of the Integrated Waste Management Place (TPST) program, My Waste My Responsibility (Samtaku) has challenges based on inhibiting factors, namely internal factors (awareness, motivation, and participation) and external factors (commitment, trust, communication, and coordination).

The Penta Helix ABCGM collaboration, which is applied in managing waste, involves layers of society who have various roles, both academics as constructors, businessmen) as enablers,

Community as accelerators, Government as regulators, and Media as expanders. Thus, all levels of society have their respective roles and one goal, namely alleviating waste management problems from upstream to downstream. Two factors become obstacles in alleviating the problem of waste management in Gresik Regency. First, internal factors, the lack of awareness of all the parties involved, have not formed a uniform motivation because personal interests are still dominant and participation is not yet solid. Second, external factors, stem from a lack of commitment, mutual trust, communication, and coordination.

These obstacles can be described by enlivening the various roles of various parties through; Academics, with their research and research outputs in providing concepts; Businessman, being a material supporter of the program; Government, regulating policies; Community, as program pioneers and media as disseminators of information and publication of implemented programs. The solution dealing with obstacles in collaboration can be solved by having six collaboration values in the running of the program that is applied between the parties involved, namely trust, interdependence, openness, empathy, risk, and success.

Conclusion

The challenges faced by all parties who are members of the TPST Samtaku Program have been seeking to find solutions through the collaboration of Penta Helix ABCGM. Academics through their research and research outputs provide concepts, business people become material supporters of the program, the government regulates policies, the community as program pioneers, and the media as disseminators of information and publication of the TPST Samtaku program. The solution dealing with obstacles in collaboration can be solved by having six collaboration values in the running of the TPST Samtaku program between the parties involved, namely trust, interdependence, openness, empathy, risk, and success.

Acknowledgment

The researcher would like to thank the LPPM of the Universitas Pembangunan Nasional "Veteran" Jawa Timur which has supported the research funding and the Gresik Regency Environment and Hygiene Service which has assisted in providing data and information in this research activity

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