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The Concept of Circular Economy in the Implementation of Source-Based Waste Management in Bali

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A B S T R A C T

Bali, which is a world tourist destination, is still facing a waste problem because the amount of waste is increasing along with the increase in the number of tourists. The Suwung landfill, as the largest waste disposal site in Bali, is no longer able to accommodate the increasing amount of waste production. Tackling waste problems The Provincial Government of Bali issued Bali Governor Regulation Number 47 of 2019 concerning Source-Based Waste Management. Source-based waste management provides an opportunity for the community to be creative in processing the waste they produce, such as compost, liquid organic fertilizer, eco-enzymes, brackets, or biopesticides. Source-based waste management efforts require support from various parties, including banks. Banks can also play an important role in education and social campaigns about the importance of managing waste.

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INTRODUCTION

Bali as a foreign tourist destination still has problems with waste management that are not optimal. The island of Bali, with a population of around 3.9 million and over 2 million tourists per year, also suffers from poor waste management (Zurbrügg et al., 2012). The volume of waste disposed of at the landfill continues to increase thereby shortening the life of the landfill. The sanitary landfill waste disposal method that was originally planned by the landfill tends to shift to open dumping (Winahyu et al., 2013). The open dumping system implemented at the Suwung landfill pollutes the surrounding shallow groundwater (Arbain et al., 2012). The composition of Suwung landfill waste is mostly organic waste, around 78.1%, and inorganic waste, around 21.9%. It was recorded that 45.71% of organic waste was in the form of garden/garden waste, 17.71% in the form of food waste, and 1.48% in the form of rubber and leather. Inorganic waste consists of 19.26% plastic and 0.54% metal (Dewi et al., 2017).

The waste that goes to landfill in developing countries like Indonesia is generally dominated by organic waste, with a moisture content of up to 80% (Abbas et al., 2020). The high water content of organic waste that goes into the landfill will potentially increase the methane gas emissions produced (Dewi et al., 2017). Methane gas is one of the triggers for global warming which has an impact on climate change. This landfill gas can be used as an alternative energy to replace fossil energy (Nurhadi et al., 2020). A study at the Suwung landfill, Denpasar stated that the average volume of waste that enters the Suwung landfill is 3,551.88 m^3/day. The amount of waste is capable of producing electrical energy from methane emissions at the Suwung landfill reaching 6.66 MW (Dewi et al., 2017). This energy potential is unfortunately wasted and contributes to global warming. Efforts to reduce methane gas emissions from waste must be carried out through waste management measures. Rini et al. (2020), waste is a contributor to non-greenhouse emissions in the form of CH4 gas which has a global warming potential 21 times greater than carbon dioxide gas (CO_2). Where the emissions generated from household waste are 1.35 Gg CH_4 and 3.72 Gg CO_2. Retnawaty et al. (2019) stated that waste selection and management activities contributed to reducing the production of methane gas by up to 0.54%.

LITERATURE REVIEW

Rini et al. (2020), waste is a contributor to non-greenhouse emissions in the form of CH4 gas which has a global warming potential 21 times greater than carbon dioxide gas (CO_2). Where the emissions generated from household waste are 1.35 Gg CH_4 and 3.72 Gg CO_2. Retnawaty et al. (2019) stated that waste selection and management activities contributed to reducing the production of methane gas by up to 0.54%.

METHODOLOGY

Articles are written using the method of observation and literature study. Observation by observing and documenting. Literature study by searching scientific articles online at https://scholar.google.co.id/. In order to simplify the process of collecting literature using keywords, such as: waste management,

resource-based waste management, circular economy and Bali. The literature collected is articles published between 2018 and 2023.

Literature studies play an important role in providing studies and clear discussion boundaries, finding theories or arguments that support claims, and defining and explaining key ideas for use in empirical study sections (Nakano & Muniz, 2018). Literature study as a basis for future research and theory. Literature studies serve as a foundation for knowledge development, provide guidelines for policy and practice, provide evidence of effects, and, if done well, have the capacity to generate new ideas and field-specific directions (Snyder, 2019).

RESULTS

The accumulation of waste contributes to greenhouse gas emissions, one of which is the production of methane gas. Mitigation measures in an effort to reduce methane gas production from waste are carried out by the Provincial Government of Bali through Bali Governor Regulation Number 47 of 2019 concerning Source-Based Waste Management. The implementation of this regulation in principle stipulates that every household and the like are required to carry out source-based waste management, namely reducing, sorting, processing and utilizing waste according to their respective capabilities and creativity. This governor's regulation was originally part of an effort to reduce waste disposal at the Suwung landfill and was also related to the planned closure of the Suwung landfill. Governor Regulation Number 47 of 2019 was followed up with Governor of Bali Decree Number 381/03-P/HK/2021 of 2021 concerning Guidelines for Source-Based Waste Management in Villages/Subdistricts and Traditional Villages. It is hoped that waste management will start from the household level, as well as an effort to implement the zero waste concept from households. Agustina and Hidayat (2013) state that the concept of zero waste is essentially a strategy for managing waste so that nothing is wasted and causes environmental pollution. Meanwhile, Murray (2020) revealed that the zero waste framework is related to the responsibility of waste producers in efforts to reduce waste, reuse, and recycling efforts.

Figure 1. Food waste is a source of household waste

Figure 2. Condition of the Suwung TPA, Denpasar

The resource-based waste management policy, if understood, is a step to encourage the public to apply the concept of a circular economy, by turning the waste produced into products of economic value. Communities can optimize the use of materials and reduce costs by utilizing the waste produced as a valuable product. According to Preston et al. (2019), a circular economy is an economy in which products and materials are recycled, repaired, and reused rather than disposed of, and in which waste from one industrial process becomes a valuable input into another process. A new vision of how the waste management system can be transformed into a circular economy is needed, so that a paradigm shift occurs from a linear economic model to a circular economic model (Hemidat et al., 2022).

Source-based waste management provides an opportunity for the community to be creative in processing the waste they produce, such as compost, liquid organic fertilizer, eco-enzymes, brackets, or biopesticides. This breakthrough could be a very promising solution in waste management, especially in urban areas or areas with high population density. Purwanto and Prasetio (2021) state that residential waste management can be a simple circular economy model that is applied in various urban housing areas. The circular economy conception is the result of sustainable development (Banaite & Tamošiuniene, 2016). The concept of a circular economy offers a path towards sustainable growth, good health, and decent work while saving the environment and its natural resources (World Health Organization, 2018). The point is that in a broader context, a circular economy strategy can contribute to climate change mitigation in terms of reducing greenhouse gas emissions in various sectors (Caldas et al., 2022).

Source-based waste management as a form of implementing a circular economy requires support from various parties, including banks. Banks can help in various ways, such as providing capital loans. This waste management business needs a model loan with easy application conditions. This assistance will later be useful in business development and expanding the range of services, as well as developing technology that is more effective in processing waste. The distribution of capital loan assistance to waste management business actors certainly has various benefits for banks. Ozili (2021) states that some of the benefits that can be received by banks include (i) greater loan diversification opportunities, (ii) encouraging responsible and sustainable banking, (iii) increasing loans to circular clients and the recycling sector which means more benefits for banks, and (iv) correcting bad perceptions about banks in society.

Banking support can also be in the form of facilitating the formation of partnerships between business actors and the government and the community. In resource-based waste management, strong collaboration is needed between business actors, the government, and the community. Banking can facilitate meetings between these parties and assist in the formation of mutually beneficial partnerships. According to Ikram (2021), collaboration is a solution to the poor implementation of a program by one institution, due to the limitations of that institution. Collaboration is also a solution to overcome the high cost of a program.

Banks can also play an important role in education and social campaigns about the importance of managing waste properly. This can be done by holding seminars, workshops, and other activities aimed at increasing public awareness about the importance of the circular economy concept. One example of an initiative that can be supported by banks is a program for processing organic waste into compost. This compost can be used for agricultural needs, thereby reducing the use of chemical fertilizers that are harmful to the environment. In addition, this program can also provide economic benefits for local people who can sell compost products. Ozili & Opene (2022) even recommends that banks develop a common understanding of the circular economy; issue widely accepted and recognized guidelines on circular economy finance; adapt existing financial models to suit circular economy models; offer lines of credit for circular businesses; make green banks; train bank staff; promote a strong culture of waste reduction and material reuse; ensure that the risk committee board is competent in circular risk management and control.

Another role that can be played by banks is to provide incentives to businesses and communities that have successfully implemented resource-based waste management. These incentives can be in the form of relief in financing or other rewards that can motivate business actors and the community to continue to make creative efforts in waste management. According to Ozili & Opene (2022), banks have an important role both as leaders in circular economy finance and as lenders for companies in a circular economy. Moreover, the transition to a circular economy requires additional new technologies, infrastructure and innovation, social changes, and changes in daily practices (Lehtokunnas et al., 2020)

CONCLUSIONS AND RECOMMENDATIONS

Source-based waste management policies can be one of the policies in an effort to reduce waste from sources or at the household level. Source-based waste management is an important step in implementing the zero waste concept starting from the household level and reducing methane gas emissions due to the accumulation of waste in landfills. This policy is also a model for implementing the concept of a circular economy, by turning the waste produced into products of economic value.

Implementation of resource-based waste management as a form of implementing a circular economy requires support from various parties, including banks. Banks can help in various ways, such as providing capital loans. Another role can be in the form of support in education and social campaigns about the importance of managing waste properly. Another strategy is to provide incentives to businesses and communities who have successfully implemented resource-based waste management.

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REFERENCES

Abbas, Z., Utomo, S., & Budiyono, B. (2020). Analysis of Optimum Garbage Heaps Age on Recovery of Landfills Dominated by Organic Solid Waste. *Journal of Ecological Engineering*, *21*(8), 91–97. https://doi.org/10.12911/22998993/127092

Agustina, G., & Hidayat, D. (2013). *Perancangan mobile game sebagai media edukasi zero waste lifestyle bagi remaja*.

Arbain, Mardana, N. ., & Sudana, I. . (2012). Pengaruh Air Lindi Tempat Pembuangan Akhir Sampah Suwung terhadap Kualitas Air Tanah Dangkal di Sekitarnya di Kelurahan Pedungan Kota Denpasar. *Ecotrophic*, *3*(2), 55–60. https://ojs.unud.ac.id/index.php/ECOTROPHIC/article/view/2504

Banaite, D., & Tamošiuniene, R. (2016). Sustainable development: The circular economy indicators' selection model. *Journal of Security and Sustainability Issues*, *6*(2), 315–323. https://doi.org/10.9770/jssi.2016.6.2(10)

Caldas, L. R., Silva, M. V., Silva, V. P., Carvalho, M. T. M., & Toledo Filho, R. D. (2022). How Different Tools Contribute to Climate Change Mitigation in a Circular Building Environment?—A Systematic Literature Review. *Sustainability*, *14*(7), 3759. https://doi.org/10.3390/su14073759

Dewi, P. D. ., Suarna, W., & Suyasa, W. B. (2017). The Potential of Electrical Energy Resulted From Methane Gas Emission In Suwung Landfills, Bali Province. *Ecotrophic*, *11*(2), 132–139. https://doi.org/https://doi.org/10.24843/EJES.2017.v11.i02.p04

Hemidat, S., Achouri, O., Fels, L. El, Elagroudy, S., Hafidi, M., Chaouki, B., Ahmed, M., Hodgkinson, I., & Guo, J. (2022). Solid Waste Management in the Context of a Circular Economy in the MENA Region. *Sustainability (Switzerland)*, *14*(1). https://doi.org/10.3390/su14010480

Ikram, M. (2021). Pendekatan Collaborative Governance Dalam Pengelolaan Sampag Pada Bank Sampah Kecamatan Manggala. *Jurnal Ilmiah Akuntansi Dan Keuangan*, *04*(01), 27–39.

Lehtokunnas, T., Mattila, M., Närvänen, E., & Mesiranta, N. (2020). Towards a circular economy in food consumption: Food waste reduction practices as ethical work. *Journal of Consumer Culture*, *22*(1), 227–245. https://doi.org/10.1177/1469540520926252

Murray, R. (2020). *Zero waste*. Greenpeace Environmental Trust.

Nakano, D., & Muniz, J. (2018). Writing the literature review for empirical papers. *Production*, *28*. https://doi.org/10.1590/0103-6513.20170086

Nurhadi, N., Windarta, J., Ginting, D., Sinuraya, E. W., & Pasaribu, G. M. (2020). Evaluasi Pemanfaatan Gas TPA Menjadi Listrik, Studi Kasus TPA Jatibarang Kota Semarang. *Jurnal Energi Baru Dan Terbarukan*, *1*(1), 20–27. https://doi.org/10.14710/jebt.2020.8134

Ozili, P. K. (2021). Circular Economy, Banks and Other Financial Institutions: What's in it For Them? *SSRN Electronic Journal*. https://doi.org/10.2139/ssrn.3820465

Ozili, P. K., & Opene, F. U. (2022). The Role of Banks in the Circular Economy. *World Journal of Science, Technology and Sustainable Development*, *19*(1), 17–23. https://doi.org/10.47556/J.WJSTSD.19.1.2022.2

Preston, F., Lehne, J., & Wellesley, L. (2019). An Inclusive Circular Economy: Priorities for Developing Countries. In *Chatham House, The royal institute international affaris* (Issue May).

Purwanto, E., & Prasetio, T. (2021). Changing the Paradigm of a Linear Economy into a Circular Economy in Residential Waste Management. *IOP Conference Series: Earth and Environmental Science*, *945*(1). https://doi.org/10.1088/1755-1315/945/1/012054

Rini, T. S., Kusuma, M. N., Pratiknyo, Y. B., & Purwaningrum, S. W. (2020). Kajian Potensi Gas Rumah Kaca Dari Sektor Sampah Di Tempat Pemrosesan Akhir Sampah. *Journal of Research and Technology*, *6*(1), 97–107. http://journal.unusida.ac.id/index.php/jrt/article/view/145

Snyder, H. (2019). Literature review as a research methodology : An overview and guidelines. *Journal of Business Research*, *104*(August), 333–339. https://doi.org/10.1016/j.jbusres.2019.07.039

Winahyu, D., Hartoyo, S., & Syaukat, Y. (2013). STRATEGI PENGELOLAAN SAMPAH PADA TEMPAT PEMBUANGAN AKHIR BANTARGEBANG, BEKASI Strategies of Final Disposal Site (TPA) Management of Bantargebang, Bekasi. *Jurnal Manajemen Pembangunan Daerah*, *5*(2), 1–17. https://journal.ipb.ac.id/index.php/jurnalmpd/article/view/24626

World Health Organization. (2018). Circular economy and health: opportunities and risks. In *WHO press*. http://www.euro.who.int/pubrequest%0Ahttp://www.euro.who.int/en

/publications/abstracts/circular-economy-and-health-opportunities-and-risks-2018%0Ahttp://www.euro.who.int/pubrequest

Zurbrügg, C., Gfrerer, M., Ashadi, H., Brenner, W., & Küper, D. (2012). Determinants of sustainability in solid waste management - The Gianyar Waste Recovery Project in Indonesia. *Waste Management*, *32*(11), 2126–2133. https://doi.org/10.1016/j.wasman.2012.01.011