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Application of The Concept of Reduce, Reuse and Recycle in Handling Domestic Waste in The City of Dili, Timor-Leste

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ABSTRACT

Garbage is the result of human activity in rural areas which puts great pressure on the environment, especially when waste is not transported and ends up accumulating in open places and in bodies of water. Waste management can generally be done by burning it, throwing it into the gutter, piling it up around the house and most often throwing it into the river. Even though several experts have found various ways to deal with waste, including recycling, these methods still do not solve the problem of waste which is increasing in quantity and type, both in rural areas and in other settlements. One program for handling waste problems is through the 3R program, which is a program that implements the 3R principles, namely reduce or reduce the amount of waste, recycle or recycle waste, and reuse or reuse waste. Through qualitative methods, an analysis of the application of the 3R (Reduce-Reuse-Recycle) concept in waste handling in Dili City is presented descriptively. Data collection was carried out through literature study, namely data from books, research journals, articles, websites and related documents. It was found that through the application of the 3R concept the materials were selected appropriately and were able to save energy use (Reduce); utilizing various objects or products that are no longer used into a product with a new function, while still maintaining its original form (Reuse); as well as waste processing which can be used to produce new materials, which can then be processed into various products (Recycle). The use of the 3R concept (reuse, reduce, recycle) can inspire residents to create an area with an independent level of waste management which will help the government to create a healthy, clean and comfortable environment.

INTRODUCTION

Waste is the result of human activities in both rural and urban areas which puts great pressure on the environment, especially when waste is not transported and ends up accumulating in open places and in bodies of water [1] . Waste management can generally be done by burning it, throwing it into the gutter, piling it up around the house and most often throwing it into the river. Even though several experts have found various ways to deal with waste, including recycling, these methods still do not solve the problem of waste which is increasing in quantity and type, both in rural areas and in other settlements. One concept for handling waste problems is through the 3R concept (Reduce, Reuse and Recycle) [2] .

The 3R principle in waste processing is a sequence of steps necessary to ensure good waste management. The aim of the 3R principle is that through the Reduce principle the generation of waste will be reduced from the start. Then it is supported by principles Reuse functions so that waste can be reused. Lastly, principles Recycling is needed if you want to recycle waste so that it has economic value again. After the 3R stage there is the next stage, namely Recover (Waste to Energy) which functions to convert materials that can no longer be recycled into energy sources or environmentally friendly materials. And the last is the Disposal stage , namely the allocation and management of waste that cannot be recycled and reused [3] .

Waste is a serious problem in the capital city of Dili, Timor-Leste because of the community's lack of discipline in

disposing of waste, but only a few people pay attention to cleaning up waste. Based on data from the Ministry of State Administration of Timor-Leste (2021), Dili produces 220 tons of waste per day, only 55% of which is transported to the Tibar Final Disposal Site, 45% is thrown away carelessly, into waterways and washed into the sea. From day to day, waste production continues to increase because the population in Dili City continues to increase, indicated by the daily needs of the community. Currently, the waste management system currently underway in the city of Dili is still classified as conventional (traditional or classic), namely collecting, transporting and disposing of. In the future, if we want the city of Dili to be clean, healthy and harmonious, it is necessary to implement a structured waste management concept so that it can help the community dispose of waste properly and correctly, namely the 3R (Reduce, Reuse and Recycle) concept .

Waste management in the City of Dili Timor-Leste is managed following procedures and prioritizing environmentally friendly and sustainable management through existing waste handling and reduction systems based on the rules mandated in the Timor-Leste Legal Decree Law No. 2/2017 Dated March 22 concerning Urban Solid Waste Management Systems [4] . Decree Law N0.26/2012, 4 July basic environmental law, market 7 concerning citizens' rights and article 8 citizens' obligations. If the regulations are left and cannot be implemented seriously in handling waste in Dili City, it could have an impact on environmental problems because poor waste management causes waste to become a pollutant for the environment and to overcome this, optimization of waste management is needed. There is a need for data or information regarding aspects of waste management, generation and composition of domestic waste which provide added value for urban waste managers in planning good waste management in the future [5] .

Waste management really needs to be done to minimize its bad impacts. Garbage that accumulates without proper management can cause problems, such as disease and the production of dangerous chemicals. Garbage that accumulates in ditches and rivers also causes flooding which has become a regular disaster in Dili City, Timor-Leste. The solution to dealing with the waste problem that can be done is to handle waste at the household level. A simple activity that can be carried out to reduce the volume of waste, especially organic waste, is to process the waste into fertilizer liquid organic . The activity of processing waste into liquid organic fertilizer is very easy and cheap. This activity can be carried out at the household level by separating organic and inorganic waste, then processing the organic waste into liquid organic fertilizer. If in the future this waste accumulates and is not managed and processed properly, it will have a negative impact on the environment and the health of housing residents. Apart from that, the potential for air pollution, environmental pollution and the spread of other diseases is also very large. Therefore, efforts are needed to manage residential waste in a cheap, easy and enjoyable way so that waste solutions can be resolved properly [6] .

Looking at the explanation above, the waste management approach should be carried out through a 3R-based and community-based approach, integrated waste management by implementing management from the source. 3R is an effort that includes activities to reduce , reuse and recycle waste . Reduce is an effort that focuses more on reducing consumptive lifestyles and always using "non-single use" which is environmentally friendly and prevents waste generation, reuse is an effort to utilize waste materials through repeated use so that they do not immediately become waste, without processing means reusing waste. suitable for use for the same or other functions, and recycling means that after the waste has to leave the home environment, it needs to be sorted and processed locally into new products. Waste management using the 3R pattern is an effort to reduce the burden on landfills (final disposal sites) of waste [7] .

The character of caring for the environment cannot just grow, but efforts must be made to develop it continuously from an early age, through real activities that are close to everyday life [8] . To cultivate a character who cares about the environment, the most strategic step is through education. Realizing this, schools as educational institutions need to instill and develop students' awareness of the environment from an early age in order to form human resources who can wisely utilize their potential. in acting to create a conducive environmental quality, ecological, truly sustainable and sustainable, of course in various ways who is sympathetic, creative, innovative by adhering to values and wisdom local culture [2] .

For this reason, a paradigm shift in waste management in Dili City, Timor-Leste is needed starting from now. Community involvement in waste management is one of the key factors in overcoming urban waste problems. The application of the 3R concept in managing waste in a self-managed manner by the community is nothing new in management rubbish. However, the implementation of community-based waste management with the 3R concept must begin by changing the behavior of "throwing" waste into the behavior of "managing" waste.

MATERIAL AND METHODS

Through qualitative methods, an analysis of the application of the 3R (Reduce-Reuse-Recycle) concept in waste handling in Dili City is presented descriptively. Data collection was carried out through literature study, namely data from books, research journals, articles, websites and related documents. All information collected from various sources, books and scientific journals, is then compared and analyzed. This aims to provide insight and answer research objectives regarding the 3R concept applied in interior design and its impact on sustainability. With this approach, researchers can explore various practical and philosophical aspects of implementing the 3R (Reduce-Reuse-Recycle) concept in interior design.

RESULTS AND DISCUSSION

1. Results

The implementation of waste management using the 3R method is a waste processing method that is quite effective in reducing waste, by involving the active role of the community, the 3R method can reduce the amount of waste generated in Dili City.

The solution to dealing with the waste problem that can be done is to handle waste at the household level. A simple activity that can be carried out to reduce the volume of waste, especially organic waste, is to process the waste into liquid organic fertilizer. The activity of processing waste into liquid organic fertilizer is very easy and cheap. This activity can be carried out at the household level by separating organic and inorganic waste, then processing the organic waste into liquid organic fertilizer [8]

Community-based waste management is a high level of participation because it is based on decisions taken by the local community (*bottom up*), where community involvement in waste management is driven by their determination and awareness of the meaning of their involvement [9] . The role of external parties is only to provide stimulus/support according to the needs decided by the local community. Community participation is in the entire waste management process, starting from decision making in identifying problems and needs, program planning, program implementation, as well as in evaluating and enjoying program results. From several international articles obtained from several internet sources such as Google, Google Scholar, PubMed, it was found that the most effective effort to minimize the amount of waste in communities that are still unfamiliar with waste management is by implementing the 3Rs, namely Reuse, Reduce and Recycle, as in the following table:

Review artikel konsep Reduce, Reuse, Recycle.

Name : May Widyastutie, Isman Kadar, Sri Wahyuni, (2021)
Title : Evaluation of the 3r (reduce, reuse, recycle) waste disposal site program in the context of reducing waste in sukabumi city
Result : Based on the data analysis, it can be concluded that the 3R Waste Disposal Site program is feasible to be implemented as an effort to achieve the target of reducing household waste and similar household waste in accordance with regional policies and strategies in waste management
Published: Journal of Science Innovare, Volume 04, Number 01.

Name : Deby Chintia Hestiriniah, Trecy Austin, (2020)
Title : The effectiveness of the Implementation of the Program 3R (Reduce, Reuse, Recycle) In Waste Treatment in Kalidoni District Palembang City
Result : From the research conducted, the processing of garbage through the program 3R proclaimed by the District Kalidoni've been running effectively, it can be seen from the indicators of the effectiveness obtained by the researchers that the Level of Success of the Program, the Success Rate of the Target, the Level of satisfaction with the Program, the Level of *Input* and *Output,* and the Level of Achievement of the Objectives
Published : Journal of Public Administration Studies, Vol. 5, No.2.

Name : Nishita Ivy, Mohammad Main Uddin and Mohammed Kamal Hossain, (2013)
Title : People's perception on using waste bins in reduce, reuse and recycle (3rs) process for solid waste management (swm) in Chittagong, Bangladesh
Result : Three types of 61,200 waste bins had been distributed among 20,400 families in 22 project areas, in which 40%, 55% and 35% respondents were interested to separate their waste as source segregation at three sampled areas respectively. 55%, 65% and 45% respondents were positive towards reducing waste in the same areas respectively, whereas 65%, 75% and 60% respondents were found positive on reusing waste in the areas respectively. 75%, 85% and 70% respondents showed positive response in recycling of waste.
Published: International Journal of Applied Science, Technology and Engineering research Vol. 2(3), pp 30-40

Name : Musa Mohammed et al, (2021)
Title : Modeling of 3R (Reduce, Reuse and Recycle) for Sustainable ConstructionWaste Reduction: A Partial Least Squares Structural Equation Modeling (PLS-SEM)
Result : Based on the results, the exploratory power of the study model is considered sustainable with R2 values of 0.83%. At the same time, the results of relationships between improving factors, policyrelated factors, construction waste generated, and sustainable construction waste reduction were significant.
Published: Journal Sustainibility, 2021, 13, 10660.

Name : Tika Luthfi Mahartin, (2023)
Title : Waste management plan with reduce, reuse, recycle (3r) method
Result : Implementation of Waste Management using the 3R Concept (Reduce, Reuse, Recycle) has proven to be capable of reducing the percentage of the amount of waste generated.
Published : Journal of Sustainability, Society and Eco-Welfare, 1(1): 49-59

After analysis of the five articles, it was found that the application of the REDUCE, REUSE AND RECYCLE concept had a significant impact on reducing waste, the burden on landfills and keeping the environment clean and providing economic benefits for the community.

2. Discussion

Managing waste properly is one important way to keep our environment clean and healthy. The 3R principle (Reduce, Reuse, Recycle) is an effective way to manage waste. This principle aims to reduce the amount of waste produced and reuse waste that can be recycled. The environment is increasingly becoming a major concern throughout the world. Many are concerned about the worsening environmental conditions and want to contribute to improving the situation. One way that can be done is to apply the 3R concept (*Reduce, Reuse, Recycle*) in everyday life. The 3R concept is an effective way to reduce negative impacts on the environment. 3R includes reducing the use of materials and energy [10] .

The 3R concept is very important in maintaining the sustainability of the surrounding environment. This concept is an action that can be taken by individuals, families and communities to reduce the negative impacts resulting from human activities on the environment. The following is a brief explanation of each 3R component:

1. Reduce: the concept of reducing the use of unnecessary materials and reducing the amount of waste produced. This

can be done by reducing consumption of natural resources and reducing waste production. Some examples of reducing the use of unnecessary materials are buying products with environmentally friendly packaging, using reusable shopping bags, or choosing products that have a longer shelf life. The benefit of the reduce concept is that it can reduce the use of natural resources and reduce the amount of waste produced. In this way, it will reduce negative impacts on the environment [7] .

2. Reuse: Reusing items or materials that can still be used after their initial use. Examples include refilling water bottles, recycling packaging, or donating used items that are still functional rather than buying new ones. The benefit of this concept is that you can reduce the amount of waste produced and reduce the use of new natural resources. The application of the *reuse* concept can minimize negative impacts on the environment [6] .

3. Recycling: The process of changing used materials into new materials that can be reused. It involves collecting, processing and refining waste to produce new products. Recycling helps reduce the use of scarce natural resources and reduces negative impacts on the environment. The benefits of the recycling concept are also the same, namely reducing the amount of existing waste and reducing the use of new natural resources. Through this method, it is hoped that it can reduce negative impacts on the environment and increase the efficiency of using natural resources [9] .

The implementation of the 3R concept in the City of Dili, Timor-Leste must start from small steps by being caring and respectful of the environment to sorting waste starting from home using the 3R concept (Reduce, Reuse and Recycle) which can have a significant positive impact on the environment. Old habits should be fought together because a better environmental future is obtained from the sacrifices of all people [8] .

Therefore, priority is now given to the use of environmentally friendly materials and supports sustainable design practices. One of the approaches adopted is the application of the 3R (Reduce-Reuse-Recycle) concept, namely by reducing the use of new materials (Reduce), reusing existing materials (Reuse), and recycling materials that can be recovered (Recycle). By prioritizing materials that comply with the 3R concept, there is the potential to reduce the carbon footprint of the materials industry and interior production. In addition, reusing and recycling materials can also reduce dependence on limited natural resources [11] .

The application of the 3R concept or community-based waste management, in this case is expected to minimize waste production, reduce the impact of waste accumulation, and generate economic value. which in turn can improve community welfare. Apart from that, optimizing socialization regarding household waste management, and emphasizing regulations regarding waste management and sanctions for those who commit violations. In order to raise public awareness in general, especially in the City of Dili, Timor-Leste, in maintaining the beauty and cleanliness of the environment and preventing the spread of environmental-based diseases such as Malaria, Diarrhea, ISPA, Skin Diseases, Dengue.

Conclusion

From the findings above, it can be concluded that the 3R (Reduce-Reuse-Recycle) concept is an effort made to realize sustainable development. The 3R concept is a cycle of reducing – reusing – recycling various existing waste, so that it can be reused in interior design. Through the application of the 3R concept, materials are selected appropriately and are able to save energy usage (Reduce); utilizing various objects or products that are no longer used into a product with a new function, while still maintaining its original form (Reuse); as well as waste processing which can be used to produce new materials, which can then be processed into various products (Recycle). There are many ways that can be used to process waste that is considered worthless, into a useful product

REFERENCE

[1] A. H. Chowdhury, M. R. U. Haque, and T. Hossain, "Developing 3Rs (reduce, reuse & recycle) strategy for waste management for urban areas in Bangladesh: A socioeconomic and climate mitigation option," *Proc. 2014 3rd Int. Conf. Dev. Renew. Energy Technol. ICDRET 2014*, 2014, doi: 10.1109/icdret.2014.6861706.

[2] M. Widyastutie, I. Kadar, and S. Wahyuni, "Evaluation of the 3R (Reduce, Reuse, Recycle) Waste Disposal Site Program in the Context of Reducing Waste in Sukabumi City," *J. Sci. Innovare*, vol. 4, no. 1, pp. 23–29, 2022, doi: 10.33751/jsi.v4i1.6113.

[3] DC Hestiriniah and T. Austin, "The Effectiveness of the Implementation of the Program 3R (Reduce, Reuse, Recycle) In Waste Treatment In the District We the City of Palembang," *J. Public Adm. Stud.* , vol. 7, no. 1, pp. 15–20, 2022, doi: 10.21776/ub.jpas.2022.007.01.3.

[4] RD of Timor-Leste, "Decree-Law No. 2/2017 of March 22, 2017 of the Democratic Republic of Timor-Leste," 2017.

[5] RD of Timor-Leste, "Decree-Law No. 26 /2012 of 4 July BASIC LAW FOR THE ENVIRONMENT," vol. 39, no. 1, pp. 1–41, 2012.

[6] M. A. Dalimunthe, A. Suhendar, A. R. Ritonga, F. A. Nasution, L. N. Nasution, and P. E. O. Batubara, "Effectiveness of waste management site reduce, reuse, recycle program in improving ecological citizenship," *IOP Conf. Ser. Earth Environ. Sci.*, vol. 1352, no. 1, 2024, doi: 10.1088/1755-1315/1352/1/012040.

[7] B. G. Lottermoser, "Recycling, reuse and rehabilitation of mine wastes," *Elements*, vol. 7, no. 6, pp. 405–410, 2011, doi: 10.2113/gselements.7.6.405.

[8] T. L. Mahartin, "Waste management plan with reduce, reuse, recycle (3r) method," *J. Sustain. Soc. Eco-Welfare*, vol. 1, no. 1, pp. 49–59, 2023, doi: 10.61511/jssew.v1i1.2023.181.

[9] C. Visvanathan and T. Norbu, "Reduce , Reuse , and Recycle : The 3Rs in South Asia 2 . Current Practices of 3Rs in South Asia," *3 R South Asia Expert Work.*, no. April, 2006.

[10] A. M. King, S. C. Burgess, W. Ijomah, and C. A. McMahon, "Reducing waste: Repair, recondition, remanufacture or recycle?," *Sustain. Dev.*, vol. 14, no. 4, pp. 257–267, 2006, doi: 10.1002/sd.271.

[11] K. Kabirifar, M. Mojtahedi, C. Wang, and V. W. Y. Tam, "Construction and demolition waste management contributing factors coupled with reduce, reuse, and recycle strategies for effective waste management: A review," *J. Clean. Prod.*, vol. 263, p. 121265, 2020, doi: 10.1016/j.jclepro.2020.121265.