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# Towards a Circular Economy: Government Policy in Waste Management Based on the 3R Concept in Makassar City, Indonesia

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**Abstract:** Ineffective waste management can lead to the accumulation of waste, which results in environmental damage and low economic income for the community. The purpose of this study was to analyse the participation of the community in the implementation of the 3R circular economy in Makassar City. Qualitative research methods were used in this study. The data sources of this research were collected through interviews, observations, and study of relevant documents. Secondary data was collected by searching data from the Google Scholar database using the Publish or Perish application and Vos Viewer to map the topic. The results and discussion also used the NVivo 12 Plus "Concept Map" analysis tool. The results showed that household participation in 3R-based waste management towards a circular economy in Makassar City cannot be said to be achieved. This is because the main principle of the circular economy is waste management with the 3R principle, but the overall conclusion is that the 3R principle in waste management does not occur properly in the Ujung Pandang sub-district of Makassar City. The novelty of this research lies in its integration of qualitative methodologies, advanced data analysis tools like NVivo 12 Plus, and a focus on mapping the community's participation within a 3R circular economy framework in a specific urban context. This study uniquely identifies gaps in the practical implementation of 3R principles, providing new insights into the socio-environmental and economic dynamics of waste management. This research contributes to the government and the community so that they can collaborate more in managing waste optimally. Good waste management will have a significant impact on health, a clean environment, and economic value.

***Keywords:*** *Circular Economy; Waste Management; 3R*

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## INTRODUCTION

Waste management is an important issue in public administration that involves various aspects, from public policy to the implementation of practical programs at the local and national levels (Kurniawan & Santoso, 2021; Fernando, 2019). The study of public administration plays an important role in understanding the dynamics and challenges involved in waste management, as well as finding effective and sustainable solutions.

Waste management is the most pressing environmental issue to be addressed worldwide (Gómez-Sanabria et al., 2022; Murthy & Ramakrishna, 2022). With a growing global population, rapid urban growth, and consumptive lifestyles, the volume of waste generated is also on the rise (Glavič, 2021; Isharyanto Ciptowiyono, 2013). Inadequate management has the potential to

significantly affect the environment, human health, and sustainability of natural resources (Ajibade et al., 2021; Ukaogo et al., 2020). Thus, management becomes a challenge that is very risky to human life if not managed properly.

Currently, the world's global environment is facing a waste crisis, as the amount of waste generated continues to increase and is predicted to reach 2.2 billion tonnes by 2025. Currently, the volume of waste generated is already at 1.3 billion tons per year (Fatimah et al., 2020). In the midst of this challenge, various approaches and strategies have been developed to manage waste better. Starting from recycling and waste reduction approaches to advanced technologies in waste treatment (Liu & Nguyen, 2020; Roy et al., 2022; van Zanten et al., 2021). Efforts to change people's mindsets and industry practices have been the main focus.

The increasing volume of waste occurs due to inadequate facilities and infrastructure (Saja, 2015) and the low quality of waste management (Khan et al., 2022), limited land for final for more information processing (Dogu et al., 2021), and also due to the rapid population growth (Kumar & Agrawal, 2020). Therefore, the increasing population and poor human consumption behavior will generate more waste.

With the increasing urgency of the waste problem, many approaches are being taken to managing waste. One such approach is through waste management practices that aim to promote the concept of circular economy. The concept of circular economy refers to a system where resources are utilised in a way that promotes reduction, reuse, and recycling (Blomsma & Tennant, 2020; Iacovidou et al., 2021; Mazur-Wierzbicka, 2021). What is important in the circular economy is the existence of reduce, reuse, and recycle (3R) activities carried out by the community.

To reduce the negative impact of waste on the environment, reducing, reusing, and recycling activities are very important approaches (Mohammed et al., 2020). Reduce activities, which focus on reducing waste production, encourage people to adopt a simpler and more sustainable lifestyle (Novianti et al., 2023). This includes avoiding the purchase of unnecessary items, choosing products with less packaging, and reducing the use of disposable items. In addition, reuse activities also play a significant role in reducing waste by encouraging people to reuse items that can still be used (Steinhorst & Beyerl, 2021). Recycling activities play a crucial role in reducing waste and promoting the reuse of existing materials. Recycling materials from paper, plastic, metal, and glass can save the consumption of new natural resources and minimise the capacity of waste going to landfills (López Ruiz et al., 2021). Recycling also opens up new opportunities for the circular economy, where discarded materials are transformed into new products or raw materials for other industries.

Various kinds of research related to 3R-based waste management towards a circular economy are proof that this research is significant. Research from Kurniawan et al. (2024) said that the problem of waste is identical to the problem of climate change and the need for decarbonisation and overcoming these problems with the digitalisation of the circular economy. In comparison, other research discusses circular economy practices in the SME environment and strengthens the relationship between the government, SMEs, and the community in overcoming the waste problem (Arsawan et al., 2024). In addition, research related to waste management in Makassar City sourced from household waste can be utilised and converted into economically valuable goods (Abdillah, 2023). Including what needs to be considered in waste management is the dynamics of national waste management policies (Fatmawati et al., 2022). These various studies indicate that research related to waste management is still interesting, including aspects of collaboration, policy dynamics, circular economy, and the challenges and benefits of waste management.

Therefore, based on previous research on the concept of 3R-based waste management. This research will further discuss the role of households in Makassar City in managing their waste, which, of course, has never been discussed by previous researchers. Through this research, we can provide new findings that can be used as evaluation material for the government in matters of waste management in Makassar City.

The waste problem in Makassar City is one of the problems faced by the current government. Even the Makassar City government has issued various programmes to overcome waste in the community. One of the innovations provided is the existence of 1,076 Waste Bank units in the community and government agencies (Humas Kominfo Makassar, 2023). In 2022, the amount of waste entering the landfill was 905 tonnes/day. In 2024, it is predicted that the existing waste will

reach more than 4.1 million tonnes. Therefore, with a population of 1.7 million people in Makassar City in 2024, it is estimated that each person will produce 1 kg of waste per day. Therefore, waste management should be one of the priorities of the Makassar City government in creating a clean, healthy environment and having a positive impact on society.

Various challenges faced by Makassar City in managing its waste in the Antang landfill are over capacity (Widiyanti et al., 2023). Because the waste processing site in Makassar City in the Antang area only has an area of 20.8 hectares, even the height of the pile of garbage in Makassar City has reached 50 metres (Chandra, 2023). When compared to the city of Jakarta, waste management is managed by the DKI Jakarta government, with an area of 110.3 hectares (Mahendra, 2023). This proves that the city of Makassar has very little waste management area. So, the impact caused, in addition to the very high accumulation of waste, the location often causes fires. Even recently, on 30 August 2024, there was a fire that burned 20 houses around the landfill in Antang, Makassar City (Said, 2024). Thus, poor waste management not only has an impact on the environment, health, and economy but also has an impact on social problems.

In general, researchers conducted a search on the topic of waste management using the Publish or Perish (POP) application by entering the keywords "Waste Management; Circular Economy; 3R; Indonesia" in the Google Scholar database. In this search, researchers limited the vulnerable years 2019-2024 with a maximum search of 200 documents. The data was then processed using the VosViewer application to see the extent of co-occurrences related to these keywords, especially in Indonesia. The results of the analysis conducted with VosViewer can be observed in Figure 1.

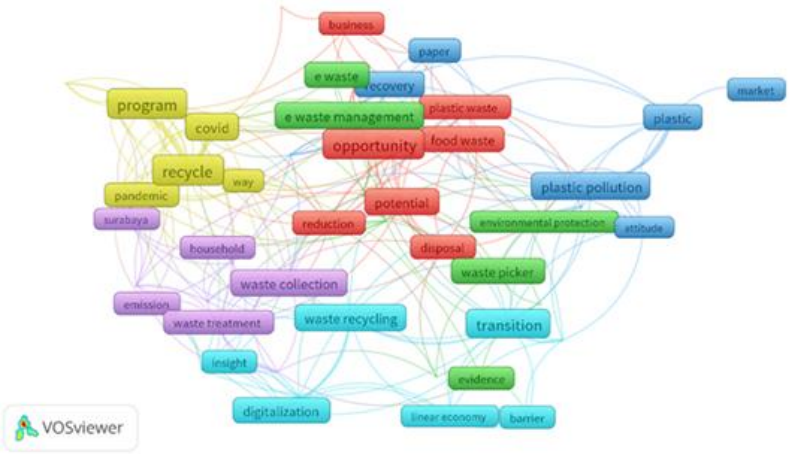


**Figure 1. Co-Occurences Network**
*Source: Processed by researchers from VosViewer, 2024*

Based on the results of research topic mapping conducted using VosVierwer, it is divided into 6 clusters. In the first cluster (Red), many researchers focus more on business issues, circular economy approach, circular economy practice, circular economy principle, food waste, plastic waste, plastic waste management, and reduction. The second cluster (Green) researchers discuss e-waste, e-waste management, economic development, environmental protection, waste pickers, and innovation. Then, in the third cluster (Blue), many researchers discuss the environment, global south, plastic pollution, recovery, sustainable development goals, and wastewater treatment. In the fourth cluster (Yellow), the topic of discussion is directed more toward 3R waste management, COVID-19, Jakarta, programs, recycling, reduction, and waste management policy. The fifth cluster (Purple) refers to emission, household waste management, municipal solid waste management, Semarang City, Surabaya, waste collection, and waste treatment. Then, the sixth cluster (Light blue) discusses circular economy transition, digitalization, linear economy, waste disposal, waste recycling, and the linear economy.

From this analysis, it can be seen that research topics related to waste management are broad and frequently explored. However, this study differentiates itself in several ways. First, it specifically focuses on the role of households as key actors in waste management towards a

circular economy, an area less emphasized in previous studies. Second, it aims to explore household participation in the practice of the 3R concept, which is crucial for implementing effective waste management strategies within a circular economy framework. This research's novelty lies in examining the direct involvement of households in waste management, an area not fully explored in existing literature, and offering fresh insights into how communities can contribute to a sustainable circular economy model.

## RESEARCH METHOD

This study used a descriptive qualitative approach, in which data was gathered through interviews, observations, documents, and literature studies (Rahardjo, 2011). The descriptive qualitative research method was chosen in the study of waste management practices and community participation because it is able to provide an in-depth and comprehensive understanding of this complex phenomenon. Through this approach, researchers could explore the motivations, perceptions, and experiences of individuals and communities in-depth, which often cannot be measured quantitatively. In addition, this method allows flexibility in adapting the research questions so that important nuances and details are not overlooked. Descriptive qualitative research also generates rich and detailed data through interviews, observations, document analyses, and literature studies that provide deeper insights into the social, cultural, and environmental dynamics that influence waste management practices.

The sources of our informants in this study were government elements, environmentalists, and the community, including the Head of the Waste Division, LB3 and Capacity Building of Makassar City, the Motivator of Ujung Pandang District, the Head of Neighbourhood Association, and the community. The purposive sampling technique was used to determine informants (Creswell, 2014). The selection of informants is based on the assumption that the individual has the most in-depth knowledge about the problems in the research case or may have authority, making it easier for researchers to explore the object or social situation under study. The active participation of communities and stakeholders in this research also ensured that their perspectives were directly represented, providing a solid basis for more effective and sustainable practical and policy recommendations.

The secondary data in this study were obtained from the Google Scholar 200 Document database with the keywords "Waste Management; Circular Economy; 3R; Indonesia" in the vulnerable years 2019-2024. Then, the data was processed using VosViewer (van Eck & Waltman, 2010). The flow of data collection carried out by researchers can be viewed in Figure 2.


**Figure 2. Methods of Data Collection and Data Analysis**
*Source: Processed by the researcher, 2024*

Based on Figure 2 above, in the process of collecting data, we conducted interviews involving various actors from both the government and the community. The general aspects that we asked were related to waste management policies, policy implementation, community participation in government policies, and how the impacts and obstacles experienced by the government and the

community. Then, we observed the condition of waste management in the community and directly visited the final landfill in Antang. In the document collection stage, we collected data on waste banks in Makassar City, including waste banks in government agencies, schools, and communities. We then described and analysed the data using the Nvivo 12 Pro application. We used additional data obtained from the Google Scholar database to analyse the research gap that was processed using VosViewer, as described in the background section.

The theory used in this study is Arnstein's theory (2019) , which looks at how the level of community participation, as well as the benefits of participation from the community when managing 3R-based waste.

The location of this research was the Makassar City area, specifically the Ujung Pandang Sub-district. The reason the researcher chose this research location was that Ujung Pandang District is the centre of Makassar City. In addition, Makassar City in 2023-2024 only received an Adipura certificate with the metropolitan city category from the Indonesian Ministry of Environment and Forestry (KLHK). Meanwhile, Makassar City has received 3 Adipura at the national level and 1 at the ASEAN level. Adipura is an award for cities in Indonesia that are successful in cleaning and managing the urban environment. Another reason for the selection of the Ujung Pandang Sub-district is that it has the second least waste generation, which is 7,174 M3 / day. In general, the volume of waste in Makassar City reaches 7,374.5 tonnes/month and 245.8 tonnes/day. Makassar City has a waste potential of 410,291 tonnes in 2021, or 34,190 tonnes a month and 1,139 tonnes a day (Gatta et al., 2022).

Furthermore, in order to produce relevant discussions and conclusions, the author used the Nvivo 12 Plus analysis tool (Mortelmans, 2019). The use of NVivo 12 Plus in research had several fundamental reasons. NVivo 12 Plus is a specialised software for qualitative data analysis that has been designed to help researchers efficiently explore, analyse, and understand data. NVivo 12 Plus provides tools to present analysis results in an effective way. It includes the ability to create reports, diagrams, and graphs, as well as to put together compelling presentations using the data that has been analysed. This allowed researchers to communicate and share research results in a clear and persuasive way.

This study used data collection analysis techniques that were divided into three stages, namely Import Data, Processing Data, and Categorize Data. This was followed by data observation and transcript interviews that are divided into four stages, namely Categorise Data, Coding, Data Visualisation, and Results Preview. The last step was documentation, which was divided into four stages, namely Coding, Data Analysis, Creating Project Maps, and Data Visualisation using a combination of concept maps and project maps.

With its various features and capabilities, NVivo 12 Plus is a popular choice for qualitative researchers who are carrying out their data analysis. These advantages make NVivo 12 Plus an effective and efficient tool for exploring and understanding qualitative data.

## RESULTS AND DISCUSSION

The research findings pertain to the involvement of households in 3R-based waste management, the extent of household engagement in 3R-based waste management, and the factors that impact household participation in 3R-based waste management for the promotion of a circular economy in Makassar City. Discussion of these matters will be presented in the following description.

### 1. Household's Role in 3R-Based Waste Management Towards the Circular Economy

Seeing the increasingly urgent problem of waste, many ways are being taken to manage waste. One of them is waste management activities to create a circular economy (Darmastuti et al., 2021). An important aspect of the circular economy itself is the existence of reduce, reuse, and recycle (3R) activities carried out by the community (Utami et al., 2023). The success of the waste management program with the 3R concept (Reduce, Reuse, Recycle) is determined by the participation of each household (Mahartin, 2023). This is because households are the smallest unit in society that is directly involved in generating and managing daily waste. Even in China, waste management policies are considered important in the concept of circular economy, as waste is considered a hazard and needs to be reduced (Sakai et al., 2011). Meanwhile, municipal waste management plans in Croatia, which relied on the collection and processing of mixed waste in large

MBT centers at the regional or district level, as well as the use of bioreactor landfills and RDF production, were never fully realised. In fact, the plan is now considered obsolete both from a technological and regulatory perspective (Luttenberger, 2020). Based on this case, the role of each household in waste management in the 3R principle in question is very important to overcome the threat and, through waste management, can improve the economy. Therefore, it is necessary to have a policy and waste management that is carried out regularly so that it can create the concept of economic circulation in Makassar City.

### 1.1.Community Role in Implementation

#### *Collection*

The role of the community is to collect waste regularly. At the collection stage, households are responsible for ensuring that the waste generated is collected regularly and efficiently. By conducting regular waste collection, households help prevent the accumulation of waste in their neighborhoods that could potentially cause health and environmental problems.

The process of waste collection involves managing waste from its point of origin to temporary storage before moving on. At this stage, a garbage can is used as an aid, and it is available in every household (Marshush et al., 2023). Household waste collection also reflects the direct involvement of the community in efforts to protect the environment and minimise the negative impacts of waste (Troschinetz & Mihelcic, 2009). It is not just compliance with regulations but also changes in behavior and daily habits that support the principle of sustainability.

In order for the collection of garbage from the community to be in line with the regulations, each household is required to collect their garbage in designated containers. This ensures that the garbage is not scattered. Once collected, the garbage is stored in a designated location until it can be transported by the assigned garbage officer, according to the government's schedule. In addition, the garbage collection of each household can be said to be orderly because each household no longer disposes of its garbage in any place. After all, the government has provided facilities in the form of garbage officers who will pick up garbage at each house with a schedule of 2 times a day, namely morning and evening, and each household pays a garbage retribution of IDR 15,000 / month.

The collection stage of the household role in 3R-based waste management towards a circular economy in Makassar City is one of the main cornerstones in building a sustainable and environmentally friendly system. In this context, waste collection is not only a routine activity but also an important first step in aligning the 3R principles (Reduce, Reuse, Recycle) with the vision of a circular economy. Waste collection at the household level is a strategic starting point to ensure that waste generated is processed efficiently and effectively in accordance with the 3R principles. By segregating waste at source, households can reduce the volume of waste entering landfills, extend the useful life of materials through reuse, and support recycling to minimise the use of new resources.

The role of households in the collection process has been somewhat lacking. This can be seen in the 4 villages, namely Lajangiru, Bulogading, Sawerigang, and Northern Banana, where waste is collected in a somewhat organised manner. However, there is still room for improvement as households are not yet separating dry and wet waste, although each household does have a trash can.

Community involvement in household waste management is very important and can make an additional contribution to the community's economy. It was stated by Azevedo et al. (2021) that the case of household waste management in developing countries needs to emulate the Green Dot methodology in Germany. The Green Dot concept in Germany provides 3 solutions in waste management, namely clear regulations, systematic campaigns or socialisation, and cost issues. Another case in Cameroon shows that waste management services are inadequate, and even existing policies do not fully address waste handling and disposal problems (Manga et al., 2008).

The Makassar City Government should learn about waste collection in other countries, especially cities in China, where, in order to optimise waste collection, the city government must coordinate well with the government below to improve efficiency and regulate existing waste collection. With these efforts, the results of waste collection can create a clean environment and new jobs for waste collectors, which can have an impact on community welfare (Khan et al., 2022). When talking about welfare, of course, it cannot be separated from economic problems. The

income of waste collectors in Makassar City is still relatively minimal because the salary is below the Regency / City Minimum Wage (UMK); the salary earned is only IDR 900,000 / month.

Therefore, people need to be aware of this, and the government needs to provide clear policy interventions to dispose of or collect waste from households in an orderly manner. Waste collection in Makassar City is already well underway, with garbage trucks and motorbikes coming to people's homes every day. However, what needs to be considered is how the waste management policy can have a positive impact, not only on public health. But it must also have a positive impact on the economy of the people in Makassar City.

***Sorting***

At the collection stage, households are responsible for ensuring that the waste generated is collected regularly and efficiently (Ngambut et al., 2023). By conducting regular waste collection, households help prevent the accumulation of waste in their neighborhoods that could potentially cause health and environmental problems (Gutberlet & Uddin, 2017).

Waste segregation in households is an important first step in implementing the 3R principles (Ilham et al., 2022). Through proper segregation, households can separate different types of waste, such as organic, plastic, paper, metal, and others (Pedersen & Manhice, 2020; Schmidt & Laner, 2021). This paves the way for the implementation of the 3R strategy. By understanding the importance of household waste segregation in the context of the 3Rs, Makassar City can strengthen the foundation of building a sustainable waste management system and supporting a circular economy. Effective segregation not only helps reduce the volume of waste going to landfills but also opens up opportunities to reuse resources in the production and consumption cycle.

In the Ujung Pandang sub-district itself, there is a mandatory program that must be carried out by each RT / RW in each kelurahan, namely community service every Sunday, and with the community service program, each household is directed to sort their waste. In addition, one of the indicators that need to be applied by RT / RW is to require education and socialisation in the community about waste management so that there are no more areas like the Ujung Pandang sub-district where waste is piled up in any place.

Although efforts to encourage waste segregation at the household level have been made as part of the 3R-based waste management strategy (Reduce, Reuse, Recycle) towards a circular economy in Makassar City, there are still obstacles that hinder its success. One of the main problems is the low awareness and participation of the community in the practice of waste segregation at the household level. Another factor is the lack of supporting infrastructure and facilities such as adequate segregated waste bins, lack of education on the importance of waste segregation, and the mindset of each household that really needs to be changed.

Although the role of households in the sorting process has been fulfilled, it cannot be deemed as entirely satisfactory, as there are instances where not all households engage in separating organic and non-organic waste. In Lajangiru village alone, there are 7 active waste banks, Bulogading 2 active waste banks, Northern Banana 3 active waste banks, and Sawerigading village 0 waste banks with an average of 5-10 customers. According to the data collected by researchers in the field, it appears that the number of households in each village who participate in the waste bank program is relatively low, with only around 5-10 customers per village. This suggests that there is still a significant lack of waste sorting practices among households. The findings also indicate that the sale of waste to the waste bank by each household is not occurring consistently.

Household waste segregation is important because it is part of the 3R concept of Reduce, Reuse, and Recycle. In a comparative case in Malaysia, research from (Moh & Abd Manaf (2014) says that there is still much waste that is not managed properly, even just wasted in the open. Thus, the government is committed to improving its waste management services. Importantly, Sharma et al. (2021) stated that to achieve a circular economy, people must play an important role in sorting waste at home. The opinion is related to that of Bishnoi et al. (2022) that experts and legislators need to plan policies and intervene in the community to increase waste segregation in households. Therefore, waste segregation in the circular economy needs to be considered, as well as the existence of policies that intervene and the awareness of the community itself in managing their respective waste.

***Recycling***

Households play an important role in supporting recycling by separating and preparing recyclable waste such as paper, plastic, metal, and glass (Edjabou et al., 2021; Zhou et al., 2021).

By choosing to use recycled products and supporting local recycling efforts, households contribute directly to reducing the need for new raw materials and minimising the amount of waste going to landfills (Maiurova et al., 2022).

Waste recycling at the household level plays a very important role in creating a circular economy in Makassar City. A circular economy is an economy that places a high value on the reuse, recovery, and recycling of products, resulting in less waste and less consumption of new resources (Popović & Radivojević, 2022).

In this context, the 3Rs (Reduce, Reuse, Recycle) practice is the cornerstone of waste management (Ioannidis et al., 2021). At the household level, recycling practices consist of separating waste into various categories, including paper, plastic, metal, glass, and organic materials. The waste is then processed through the recycling process to become new raw materials that can be used in various industries or other activities (Krishnan et al., 2021). For example, plastic bags can be recycled into pouches. Cooking oil can be reprocessed into lighting devices such as candles.

Based on the interview data collected on household recycling practices, it has been found that only approximately 30% of households engage in recycling. Furthermore, it is observed that households that actively participate in recycling are the ones that have been motivated and encouraged. Implementing waste recycling in every household can bring about positive economic benefits for each household. Then, the constraints of the waste recycling process, which is already on a large scale, usually divert it into SMEs, but each household prefers to directly sell their waste to the waste bank rather than having to recycle it themselves.

The role of households in the recycling process is still very lacking. Of the 4 villages in the sub-district of Ujung Pandang, they do not carry out the waste sorting process properly, and this has an impact on the waste recycling process in each household. Based on the findings from our field research, it has been observed that households tend to prefer selling sorted waste to waste banks rather than undertaking the recycling process themselves. This preference can be attributed to various factors, such as busy schedules and the lack of facilities that assist households in transforming waste into valuable handicrafts through recycling.

Therefore, the recycling process in households often does not run optimally, especially in Ujung Pandang Sub-district, Makassar City, due to several factors. The busyness of each household is the main obstacle, where time and energy are limited to sort and collect waste effectively. In addition, a mindset that does not fully understand the importance of 3R-based waste management practices is also an obstacle, where some people may not realise the economic and environmental benefits that can be obtained from recycling.

In addition, the lack of facilities also complicates this process, especially since there is no place for households to sell their waste directly. Without adequate economic incentives, community participation in waste management with the 3Rs to achieve a circular economy in Makassar City is sometimes hampered.

To support the recycling process in waste management, it needs to be supported by quality facilities and infrastructure. This is in accordance with the opinion of Kurniawan et al. (2023) that one of the things that supports the recycling process in waste management is the use of digital technology. Through monitoring digital technology in waste management, we can find out the amount of waste collected, sorted, and recycled. In addition, the 3R concept of a circular economy also needs to pay attention to the sustainability of its human resources. The concept can provide value to human resources, both in terms of the environment and the economy, and this is in accordance with what Marrucci et al. (2021) stated: human resource management positively affects organisational performance in waste management. Then, human resource management can contribute to the achievement of a circular economy.

Therefore, in the aspect of waste management, especially in the waste recycling process in Makassar City, it is necessary to pay attention to the facilities and infrastructure that support success in achieving a circular economy, especially in the utilisation of digital technology and the human resources involved in order to have a positive impact on the economy and a healthy environment.

***Disposal***

At the disposal stage, although waste disposal is generally regulated by local governments or waste management service providers, households have an important role in ensuring that waste

is properly disposed of in accordance with applicable regulations (Purnomo, 2021). By using officially designated waste disposal sites, households help keep the surrounding environment clean and prevent pollution.

Proper disposal of household waste plays an important role in achieving waste management based on the 3Rs (Reduce, Reuse, Recycle) and leading to a circular economy in Makassar City. In the midst of awareness of the importance of environmental conservation and efficient use of resources, households are a strategic starting point in managing waste properly (Atiku, 2020). This process starts from the waste sorting stage at the household level, where each individual is tasked with sorting waste according to its type, both organic and inorganic.

Furthermore, waste that has been properly segregated will be directed to the appropriate waste disposal sites, including temporary waste disposal sites or landfills. By carrying out this waste disposal stage properly at the household level, the people of Makassar can participate in efforts to maintain environmental cleanliness and develop a sustainable and environmentally friendly economic system.

An orderly household waste disposal process is an important foundation for strengthening community participation in 3R-based waste management and moving towards a circular economy in Makassar City. With every household disciplined and consistent in implementing the correct waste disposal method, including sorting and disposing of waste in the right place, Makassar City has experienced significant positive changes.

The implementation of an orderly waste disposal procedure reflects an important social paradigm shift, where each individual feels responsible for keeping the environment clean and paying attention to its impact on the ecosystem. Thus, orderly waste disposal in households will create a cleaner, healthier, and more sustainable environment for Makassar City, especially in Ujung Pandang Sub-district.

The role of households in the disposal process in the villages of Lajangiru, Bulogading, Sawerigang, and Northern Banana has been acknowledged, although there is room for improvement. While waste disposal is being carried out in an orderly manner according to the local government's schedule, there is room for further improvement in terms of implementing proper waste management practices, including collection, sorting, and recycling. In order to achieve the goal of a circular economy in Makassar City, households need to focus on reducing, reusing, and recycling waste effectively. However, in the Ujung Padang subdistrict, there is still a need to improve the implementation of these principles.

The process of waste disposal is equally important, so it has become one of the centres of attention for the Makassar City government. Therefore, it is necessary to have the right rules and mechanisms so that people do not throw their garbage carelessly. The solution offered by Pardini et al. (2020) is that it is necessary to implement smart and community-oriented waste management in waste management. The concept offered is an IoT-based waste management model that aims to realise smart cities. This can be an example of the city of Makassar, which is striving to become a world city with various developments that have been carried out. However, Sharma et al. (2020) said that moving towards smart cities in waste management is not easy because there are several obstacles. The obstacles in question are related to operational costs, lack of policy intervention, uneven internet connections, and lack of information technology infrastructure.

### 1.2.Community Role in Benefit Capture

Utilising households in 3R-based waste management towards a circular economy in Makassar City is an important, economically and environmentally beneficial process. Applying the 3R principles (Reduce, Reuse, Recycle) within households, communities can reduce the overall amount of waste generated (Listiningrum et al., 2023). This not only helps alleviate the strain on landfills but also minimises the unfavourable impacts on the environment.

In addition to economic benefits, 3R-based waste management can also provide environmental benefits (Utami et al., 2023). Responsible and sustainable waste management practices can increase public awareness of the environment and build more environmentally conscious habits among community members, especially the younger generation.

Overall, the utilisation of benefits for households in 3R-based waste management towards a circular economy in Makassar City includes economic benefits and environmental benefits. By applying these principles, households can play an active role in creating a cleaner, more

sustainable environment. The benefits that the community can experience are illustrated in Figure 3.

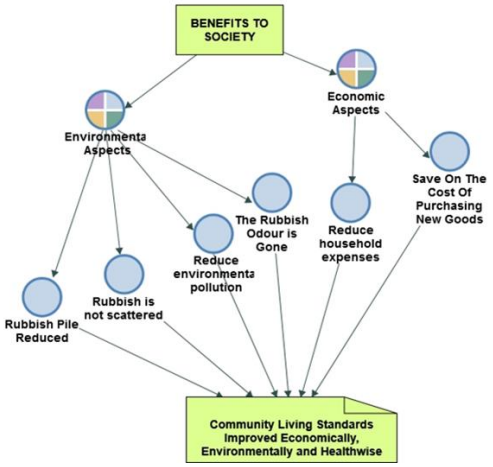


**Figure 3. Concept Map Analysis of "Benefits to the Community"**
*Source: processed by the researcher with Nvivo 12 Plus, 2024*

One opportunity that stands out is the promotion of recycling and reuse. By utilising technology and creative approaches, waste can be converted into raw materials to produce new products, reducing the need for natural resources and waste in landfills. The craft products processed by waste banks in Makassar City can be seen in Figure 4.

**Figure 4. Crafts Made from Recycled Garbage**
*Source: Processed by researchers, 2024*

Waste management has significant benefits for the community, not only in the environmental context but also in the formation of social awareness and responsibility and improving the economy. Every household has not fully recognised the contribution of households in benefiting the economy. This is evident in the 4 villages in Ujung Pandang sub-district, where waste sorting and recycling processes are not consistently practiced. As a result, the goal of achieving 3R-based waste management towards a circular economy in the city of Makassar has not been realised, as there is no significant economic impact from these processes.

Taking advantage of the environmental aspects of the 4 villages in the Ujung Pandang sub-district, when viewed in the surrounding environment, is quite good because the garbage that is piled up, the garbage that is scattered, and the garbage that smells has been reduced. However, when viewed at the landfill (Final Disposal Site), it can be said to be inversely proportional because as a result of managing waste in households with the 3R principle that is not maximised, the amount of waste volume that reaches the landfill also increases so that the circular economy in

Makassar City has not been achieved because people tend to lack discipline and lack of facilities regarding 3R-based waste management.

If waste is managed properly in terms of policy and community participation, it will certainly provide benefits to the community in terms of environmental and economic aspects. This agrees with what was conveyed by Wang & You (2021) that the benefits obtained are reduced greenhouse gas emissions. Positive things are also conveyed by Purchase et al. (2021) that proper waste management can improve the level of public health quality and improve the community's economy.

**2. Level of Household Participation in 3R-Based Waste Management Towards Circular**

The level of household participation in 3R-based waste management towards a circular economy, according to Arnstein, can be measured by three levels, including 1) Nonparticipation, 2) Tokenism, and 3) Citizen Power. The higher the level of household participation, the more optimal the role of households in 3R-based waste management towards a circular economy in Makassar city.

The number of waste banks in Makassar City is 1196, and they are spread across various sub-districts. Meanwhile, in Ujung Pandang District, there are 69 waste banks, and only around 22 are active. Data on waste banks in Ujung Pandang District can be seen in Table 1.

**Table 1. Total Waste Banks in Ujung Pandang District**

| *Status* | *Unit Waste Bank (BSU)* | *School Waste Bank* | *SKPD Waste Bank* |
|---|---|---|---|
| Active | 17 | 2 | 3 |
| Not Active | 30 | 12 | 5 |
| Total | 47 | 14 | 8 |

*Source: Data processed by researchers, 2024*

**2.1.Non-Participation**

Nonparticipation is the lowest level of participation, where, at this level, households are never involved in waste management activities, and households have no knowledge of 3R-based waste management. Based on the field findings obtained by researchers, the Ujung Pandang urban village shows poor results because households still involve themselves in waste management activities even though they are not done consistently. Furthermore, households also have knowledge of 3R-based waste management because some households have applied the 3R principles even though the practice is still very lacking and not done consistently.

**2.2.Tokenism**

Tokenism is a moderate level of participation because, in this tokenism team, households in 3R-based waste management activities are still sometimes involved, have knowledge of 3R-based waste management, and practice in daily life but have not been implemented consistently. Based on the findings obtained by researchers, the Ujung Pandang sub-district has a tokenism participation level. This is based on households involving themselves in waste management activities, having good knowledge, and practicing 3R-based waste management, but these 3 aspects are not carried out consistently.

**2.3.Citizen Power**

Tokenism is a moderate level of participation because, in this tokenism team, households in 3R-based waste management activities are still sometimes involved, have knowledge of 3R-based waste management, and practice in daily life but have not been implemented consistently. Based on the findings obtained by researchers, the Ujung Pandang sub-district has a tokenism participation level. This is based on households involving themselves in waste management activities, having good knowledge, and practicing 3R-based waste management, but these 3 aspects are not carried out consistently.

## CONCLUSION

Based on the results of the analysis regarding household participation in 3R-based waste management towards a circular economy in Makassar City, it cannot be concluded that the desired outcomes have been achieved. This is due to the fact that the main principle of the circular economy, which involves waste management with the 3R principle, is not properly implemented

in the Ujung Pandang sub-district of Makassar City. The findings in the research are that the waste segregation process in Ujung Pandang Sub-district, Makassar City, has not been maximised. Then, in the waste management process, it was also found that the recycling process was minimal because people immediately threw away or sold their waste. The negative impact is that household waste is not managed properly, which makes the volume of landfills accumulate.

This is because the role of households in waste management in the aspects of collection, sorting, recycling, and disposal has not been implemented properly. This is triggered by several factors, such as the lack of public awareness, negative perceptions that still exist in households, the lack of waste bin facilities for each household, and the lack of maximum socialisation of policies or programs and education carried out by the government.

Therefore, these obstacles can be used as evaluation materials and recommendations for the government to further improve the waste management process in terms of policies, utilisation of digital technology, and improving facilities and infrastructure to increase community participation in waste management towards a 3R-based circular economy.

Finally, the limitation of this study is that it was only studied in 1 sub-district in Makassar City. So, we recommend that future research be conducted in other sub-districts in Makassar City to be used as a comparison. Future researchers can also compare the results of this study outside of Makassar City to see the gaps and impacts caused by waste management in the community.

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