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ASSESSING THE COMMUNITY PRACTICES AND PERCEPTIONS ON WASTE SORTING IN URBAN AREAS OF INDONESIA: A CASE STUDY IN GORONTALO CITY

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Abstract

This study examines the practices and perceptions of urban residents regarding household waste sorting in Gorontalo City, Indonesia. This study involved 400 household respondents, covering eight sub-districts and 50 urban villages within Gorontalo City. Five key dimensions were assessed including knowledge of environmental and economic benefits, individual motivation, preferences for sorting incentives, perceived difficulty, and actual sorting habits. Data were analyzed using descriptive quantitative techniques with tabulation and percentage analysis. The findings reveal that 73.75% of respondents are aware of the benefits of waste sorting. However, only 32.75% are motivated by environmental awareness, while others are constrained by limited facilities or habitual barriers. Incentive preferences show that 41.25% of respondents favor financial compensation, while 42% prefer improved access to sorting infrastructure. In terms of perceived difficulty, 48.5% consider waste sorting easy, but 37.5% find it moderately difficult and 14% perceive it as difficult. Ultimately, only 12.75% of respondents consistently sort their waste, 39.75% do so occasionally, and 47.5% never engage in sorting. These findings highlight a significant knowledge action gap and underscore the need for integrated policy strategies that combine education, infrastructure development, and incentive-based community engagement to foster sustainable household waste sorting behavior.

Keywords: waste sorting, household behavior, urban management, community perception

A. Introduction

Waste is one of the most crucial environmental issues faced by many countries in the world, especially in urban areas. The rapid urban development, which is often not matched with adequate waste management systems, has led to an increasing volume of unmanaged waste. This situation not only deteriorates environmental quality but also triggers various social and public health problems. The complexity of urban waste issues is further exacerbated by factors such as population growth, urbanization, increasing consumption patterns, and weak municipal waste management strategies. (Putri et al., 2023) and (Kaur & Kaur, 2024) stated that the increase in population globally has a direct impact on the increase in the volume of waste produced worldwide. In line with that, (Wijaya et al., 2024) emphasizes the amount of waste generated in an area is generally closely related to the population, types of activities, and consumption levels. As the population increases, waste production in urban areas also increases, which ultimately triggers significant environmental risks and public health problems.

The problem of waste in urban areas are not merely technical, but is also closely related to cultural, social, and economic factors. In a global context, the issue of urban solid waste management has emerged as a pressing environmental challenge, affecting both developed and developing nations (Suryawan & Lee, 2023). Common waste issues include overflowing bins and improper waste segregation (Gangwani et al., 2019). In Indonesia, this condition is also reflected in the still suboptimal waste management system in a number of large and medium-sized cities (Hambari et al., 2024). According to (Ambina, 2019), the biggest challenges in waste management often occur in cities with high population density. This situation is exacerbated by the rapid population growth and the increased economic activity, especially in cities in developing countries. (Ahsan et al., 2014) highlighted that the lack of training and knowledge about modern waste management practices is one of the factors that hinders the improvement of the waste service system in the region.

The consequences of an inadequate management system can be seen from the increasing environmental pollution, both on land and in water bodies. (Konstantinidou et al., 2024) argues that poor solid waste management, especially in developing countries, contributes significantly to serious environmental pollution. In addition to institutional and technical issues, community behavior also plays an important role in exacerbating this problem. (Hayati et al., 2024) explained that low public awareness is a persistent barrier to effective waste management. In practice, as noted by (Yuwana & Adlan, 2021), there are still many individuals who continue to dispose of waste, which ultimately damages the surrounding environment and threatens the quality of life of the community.

Effective waste management requires strong policy support, structured planning, and active community participation. The lack of integration between regulations, supervision, and active community participation often hampers the implementation of waste management initiatives. Waste management efforts in urban areas often face implementation obstacles due to

minimal policy support from the government, which ultimately leads to the waste accumulation in landfills (Najib & Takwin, 2021). On the other hand, rapid population growth accompanied by increasingly high consumption patterns puts additional pressure on the capacity of existing systems. Rapid population growth and rising consumption patterns further strain existing systems (Tunti et al., 2021). Not only is it a matter of policy, the physical condition of infrastructure and supporting facilities for waste management is also an obstacle in itself. In addition, limitations in infrastructure and processing facilities also worsen the condition. In many developing countries, modern waste management systems are not widely accessible, so communities tend to use traditional methods that harm the environment. Open dumping and direct burning of waste are the main methods of waste processing and final disposal that are common in low-income regions (Ferronato & Torretta, 2019).

The excessive waste accumulation indicates not only the inefficiency of the management system, but also indicates weak cross-sector coordination in environmental management. The accumulation of large amounts of waste indicates problems in the waste management system (Keita, 2021). If left without a systematic solution, this condition can trigger various interrelated impacts. If waste is not managed properly, it will have health, environmental, and socio-economic impacts (Tobe et al., 2024). In the long term, these impacts will disrupt people's well-being and increase the burden of public financing in the health and environmental sectors. One of the major consequences of poor waste management is multi-matrix pollution, which affects air, soil, and water. Improper disposal and management of urban solid waste can cause various types of pollution, such as air, soil, and water pollution (Alam & Ahmade, 2013). In the absence of a decentralized system and oriented towards reduction at the source, landfills remain the default solution, though unsustainable. Currently, most waste management ends up in landfills, so this condition burdens their capacity and requires a very large area of land (Pigome et al., 2021).

Waste management plays an important role in promoting sustainable urban development and preserving the environmental quality. Solid waste management is important in urban development and environmental preservation, as well as maintaining public safety and health (Yu et al., 2017). In relation to environmental protection, waste management is a very vital aspect. Improper management can pose severe threats to human life (Febriyanti et al., 2023). Sustainable waste management can not rely solely on infrastructure and regulations. Community behavioral change through an educational approach is essential in reducing waste generation from the source. Waste can actually be utilized through a processing process that is adjusted to its type or category (Candy et al., 2023). Household involvement is essential for sustainable waste management system success (Lunojo et al., 2025). According to (Murugan et al., 2023), waste segregation reduces landfill load and pollution from exposed waste materials. Hence, education and socialization to the community are important to increase understanding of how to sort and manage waste properly. (Marlina et al., 2023) found that participants in waste sorting education initiatives gained a better understanding of sorting practices, became more aware of the potential negative impacts, and learned about effective processing methods.

The success of a waste management system also depends heavily on good governance. Waste management plays an important role for ensuring environmental sustainability (Branska et al., 2022), and sound governance is critical for achieving sustainable urban solid waste practices (Gachoki et al., 2022). This system must be supported by strong regulations, active community involvement, and incentive based policies that encourage participation. Reducing waste from the source can reduce the burden on collection services as well as processing and final disposal facilities (Memon, 2010). In addition, financial incentives have proven effective in encouraging people to recycle solid waste (Abila & Kantola, 2019), while intervention campaigns have also been shown to be effective in reducing the amount of waste produced by households (Sembiring et al., 2024).

Amidst the complexity of waste management challenges, a local-based approach is needed to capture the unique social dynamics, behavioral patterns, and environmental governance capacity specifically. Gorontalo City, as a center of regional growth in eastern Indonesia, faces mounting challenges in waste management. The development of urban areas, changes in community lifestyles, and limited waste management infrastructure have exacerbated the waste conditions in this area. Although there are a number of local government policies and initiatives, the practice of waste sorting at the household level remains uncommon and poorly institutionalized. The lack of empirical data on community behavior towards waste sorting is one of the obstacles in formulating targeted waste management policies.

The urgency of this research lies in the need to deeply understand how the practices and perceptions of the Gorontalo City community regarding waste sorting activities. Given that waste

sorting at the source is a very important entry point in an integrated waste management system, information on obstacles, motivations, and driving factors behind community behavior is crucial. This research is also relevant as a response to the increasing pressure on the Talumelito landfill, emphasizing the need to reduce waste from the household level. Furthermore, there are not many academic studies that specifically examine this issue in the context of medium-sized cities in the Sulawesi region. This study is limited to examining household waste sorting in a medium-sized urban area, excluding institutional and commercial sectors.

Several previous studies have examined household waste behavior and sorting practices in major Indonesian cities. However, a research gap persists in addressing community level practices in secondary urban areas especially in Eastern Indonesia, such as Gorontalo City. This study aims to identify and analyze the practices and perceptions of the community towards household waste sorting in Gorontalo City. Specifically, it explores sorting behavior by type, understanding of its benefits, perceived barriers, and preferred incentives. The results of this study are expected to inform the design of more adaptive, participatory, and sustainable community-based waste management strategy.

B. Methodology

1. Research Design

This study employed a quantitative approach using a descriptive survey method to obtain a comprehensive understanding of community practices and perceptions regarding household waste sorting in urban areas. The research was conducted in Gorontalo City, which administratively comprises 9 sub-districts and 50 urban villages (kelurahan). Sampling was conducted across all 50 urban villages to ensure spatial representation and capture the socio-demographic diversity of the area. A total of 400 respondents participated in the study, selected through a stratified sampling technique by allocating 8 respondents per urban village. Households were chosen as the unit of analysis, considering that household waste constitutes a major portion of municipal solid waste and serves as a critical point of intervention in improving waste sorting practices.

2. Instruments

The instrument used in this study was a closed-ended questionnaire developed based on indicators commonly used in previous studies on household waste sorting behavior, including those adapted from relevant literature and policy guidelines on waste management in Indonesia. The questionnaire was designed to capture community behavior, perceptions, and barriers related to waste sorting at the household level. The instrument framework was structured to measure five key aspects: knowledge of the benefits of waste sorting, motivation or reasons for waste sorting, preferences for sorting incentives, perceived difficulty in sorting, and waste sorting habits. The instrument was validated through logical validation by matching each question item with its corresponding indicator and measurement objective. The complete structure of the instrument, including the indicators and their respective measurement objectives is presented in Table 1.

Table 1. *Instrument Framework for the Household Waste Sorting Questionnaire*

Indicator	Measurement Objectives
Knowledge of the Benefits of Waste Sorting	To assess respondents' understanding of the environmental and economic benefits of waste sorting
Motivation or Reasons for Waste Sorting	To identify internal factors (awareness, habits) and external factors (facilities, knowledge) influencing sorting behavior
Preference for Waste Sorting Incentives	To evaluate the types of incentives considered most effective in encouraging public participation
Perceived Difficulty in Waste Sorting	To describe respondents' perceptions of ease or technical barriers in sorting waste
Waste Sorting Habits	To measure the frequency of respondents sorting waste by category: organic, inorganic, and hazardous (B3)

3. Technique of Data Analysis

The data collected from the questionnaires were systematically entered and tabulated in the form of frequency tables. A descriptive quantitative analysis was conducted to identify response patterns for each question. The tabulated results were used to illustrate general trends in household waste sorting practices, identify the challenges faced by the community, and

evaluate potential incentive strategies that could be implemented to enhance public participation in sustainable waste management. The research flowchart is clearly presented in Figure 1.

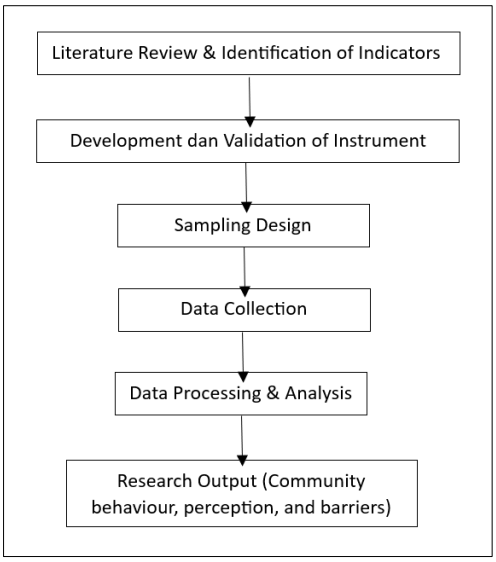

Figure 1. *The Research Flowchart*

C. Findings and Discussion

This study, conducted in Gorontalo City, focuses on community practices and perceptions regarding household waste sorting. The analysis was carried out based on five main indicators: knowledge of the benefits of waste sorting, motivation for engaging in sorting behavior, community preferences for sorting incentives, perceived level of difficulty, and actual waste sorting habits.

1. Findings

This study presents empirical findings that reflect the actual conditions in Gorontalo City, particularly in relation to urban residents' waste sorting practices. Public understanding of the environmental and economic benefits of waste sorting can serve as a foundation for designing more targeted educational strategies. Therefore, this study assessed respondents' level of knowledge regarding the positive impacts of waste sorting activities. The responses related to this aspect are presented in Table 2.

Table 2*. Knowledge of the Benefits of Waste Sorting of Gorontalo City Communities*

Sub District	Percentage (%)		Total
	Aware	Not Aware	
Dumbo Raya	6,50	3,50	10,00
Dungingi	7,00	3,00	10,00
Hulonthalangi	6,50	3,50	10,00
Kota Barat	11,25	2,75	14,00
Kota Selatan	8,00	2,00	10,00
Kota Tengah	10,00	2,00	12,00
Kota Timur	8,00	4,00	12,00
Kota Utara	8,75	3,25	12,00
Sipatana	7,75	2,25	10,00
Total	**73,75**	**26,25**	**100,00**

In the knowledge aspect of the survey, as shown in Table 2, 73.75% of respondents stated that they were aware of the environmental and economic benefits of waste sorting. Only 26.25% indicated a lack of such knowledge. The relatively high percentage of respondents who reported being informed suggests that, cognitively, the issue of waste sorting is familiar to the public. However, as reflected in the low rate of actual sorting behavior, there remains a significant gap between knowledge and implementation. This highlights that education alone is insufficient without accompanying systemic changes and shifts in behavioral culture.

The motivational aspect is an important key in revealing the factors that encourage or hinder people in sorting waste. This indicator explores internal dimensions such as awareness

and habits, as well as external factors such as the availability of facilities or technical knowledge. Table 3 presents the distribution of community motivation in relation to waste sorting behavior.

Table 3. *Waste Sorting Motivation of Gorontalo City Communities*

Sub District	Percentage (%)					Total
	Environmental awareness	Unmotivated /unaccustomed	Lack of sorting facilities	Unaware How to Sort	Others	
Dumbo Raya	3,25	1,75	3,50	0,75	0,75	10,00
Dungingi	2,00	3,00	3,25	1,50	0,25	10,00
Hulonthalangi	4,00	0,50	4,50	0,25	0,75	10,00
Kota Barat	4,00	3,25	5,25	1,50	-	14,00
Kota Selatan	4,25	1,75	3,25	0,75	-	10,00
Kota Tengah	4,50	2,00	4,25	1,00	0,25	12,00
Kota Timur	2,25	2,75	5,25	0,75	1,00	12,00
Kota Utara	5,25	3,75	2,00	1,00	-	12,00
Sipatana	3,25	1,25	3,75	1,75	-	10,00
Total	**32,75**	**20,00**	**35,00**	**9,25**	**3,00**	**100,00**

Table 3 illustrates that the primary motivation for respondents to sort waste is environmental awareness, accounting for 32.75%, followed by the lack of facilities (35%) and being unaccustomed or unmotivated (20%). Meanwhile, 9.25% of respondents stated that they did not know how to sort waste, and 3% cited other reasons. These findings suggest that while a portion of the community possesses environmental awareness, it is not sufficient to drive action in the absence of systemic support. There are still many people remain hindered by technical limitations or ingrained habits.

As part of efforts to provide input for designing community-based policies, this study also assessed respondents' preferences regarding various forms of incentives that could encourage greater participation in waste sorting. This question aimed to explore the extent to which public motivation can be enhanced through reward-based approaches or improved access to facilities. Detailed information on incentive preferences is presented in Table 4.

Table 4. *Incentive of Waste Sorting of Gorontalo City Communities*

Sub District	Percentage (%)			Total
	Economic Incentive	Easier Access	No Incentive Preferred	
Dumbo Raya	4,75	3,00	2,25	10,00
Dungingi	6,25	2,50	1,25	10,00
Hulonthalangi	3,25	4,00	2,75	10,00
Kota Barat	7,00	6,50	0,50	14,00
Kota Selatan	2,25	5,75	2,00	10,00
Kota Tengah	4,00	5,00	3,00	12,00
Kota Timur	5,75	4,00	2,25	12,00
Kota Utara	2,25	8,75	1,00	12,00
Sipatana	5,75	2,50	1,75	10,00
Total	**41,25**	**42,00**	**16,75**	**100,00**

Regarding preferences for incentives that encourage waste sorting practices, Table 4 shows that 41.25% of respondents favored economic compensation, while 42% were more interested in easier access to sorting facilities. Only 16.75% stated that they did not require any incentives. This trend indicates that the majority of the community needs tangible forms of support either financial assistance or improved facility access to be more actively engaged in waste sorting practices.

Evaluating community perceptions of the level of difficulty in waste sorting is essential to understanding the practical challenges that influence their behavior. This indicator helps identify both technical and psychological barriers that may hinder consistent waste sorting practices. Details of respondents' responses regarding the perceived ease or difficulty of sorting waste are presented in Table 5.

Table 5. *Difficulty in Sorting Waste of Gorontalo City Communities*

Sub District	Percentage (%)			Total
	Easy	Moderately Difficult	Difficult	
Dumbo Raya	5,25	3,00	1,75	10,00
Dungingi	3,75	5,00	1,25	10,00
Hulonthalangi	6,50	3,00	0,50	10,00
Kota Barat	5,50	6,25	2,25	14,00
Kota Selatan	6,00	3,00	1,00	10,00
Kota Tengah	5,25	4,00	2,75	12,00
Kota Timur	3,75	5,75	2,50	12,00
Kota Utara	8,00	3,00	1,00	12,00
Sipatana	4,50	4,50	1,00	10,00
Total	**48,50**	**37,50**	**14,00**	**100,00**

Referring to Table 5, the majority of respondents (48.5%) stated that waste sorting is relatively easy. In contrast, 37.5% perceived the activity as moderately difficult, while 14% considered it difficult to carry out. These findings indicate that although nearly half of the community does not experience significant barriers, more than one-third of respondents still face technical challenges in implementing waste sorting. These obstacles are likely related to limitations in supporting facilities, such as the availability of separate containers at home, a lack of information about waste categories, and the absence of regular collection services for sorted waste.

Understanding the extent to which households in Gorontalo City engage in waste sorting was assessed through questions about the frequency of sorting activities by waste type—organic, inorganic, and hazardous (B3). The data collected from respondents serve as the final indicator to evaluate actual waste management behavior at the household level. The results of this assessment are presented in Table 6.

Table 6. *Waste Sorting Habits of Gorontalo City Communities*

Sub District	Percentage (%)			Total
	Always	Sometimes	Never	
Dumbo Raya	1,75	4,75	3,50	10,00
Dungingi	0,50	3,00	6,50	10,00
Hulonthalangi	1,00	4,75	4,25	10,00
Kota Barat	2,00	3,25	8,75	14,00
Kota Selatan	2,00	3,25	4,75	10,00
Kota Tengah	3,25	3,50	5,25	12,00
Kota Timur	0,25	6,50	5,25	12,00
Kota Utara	1,00	5,75	5,25	12,00
Sipatana	1,00	5,00	4,00	10,00
Total	**12,75**	**39,75**	**47,50**	**100,00**

Table 6 indicates that the majority of respondents have not consistently practiced household waste sorting. The tabulated results show that only 12.75% of respondents reported "always" sorting their waste, while 39.75% reported doing so "occasionally," and 47.5% stated that they "never" sort their waste. These figures reveal that nearly half of the households in Gorontalo City have not yet internalized waste sorting as a regular habit. This condition suggests that although waste management has gained attention at the policy level, its adoption among the public remains significantly low.

2. Discussion

The findings obtained from the survey results show complex dynamics in the practices and perceptions of the Gorontalo City community regarding household waste sorting. Although most respondents have known the benefits of sorting and demonstrated environmental awareness, the level of implementation of sorting is consistently low. This is consistent with the findings of (Zakianis et al., 2017), household waste sorting in Indonesia remains low. As knowledge plays a crucial role in shaping behavior, assessing public awareness is important for designing effective

interventions. The distribution of respondents' awareness regarding the environmental and economic benefits of waste sorting is illustrated in Figure 2.

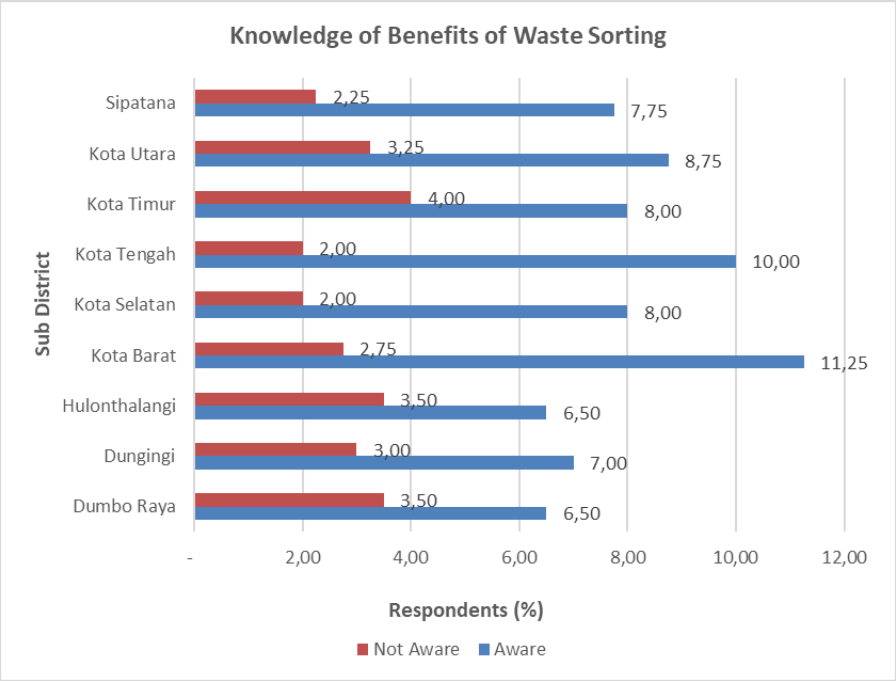

Figure 2. *Chart of Community Knowledge of Benefits of Waste Sorting*

Figure 2 shows that the majority of respondents (73.75%) know the benefits of waste sorting, both from an environmental and economic perspective. Only 26.25% stated that they did not know the benefits. This condition indicates that although the level of knowledge is quite high, the fact that almost half of the respondents have never sorted indicates a gap between knowledge and action. This is often referred to as the knowledge–action gap, which is a condition where understanding does not automatically transform into real practice. The distribution of community motivation in the act of sorting waste is shown in Figure 3.

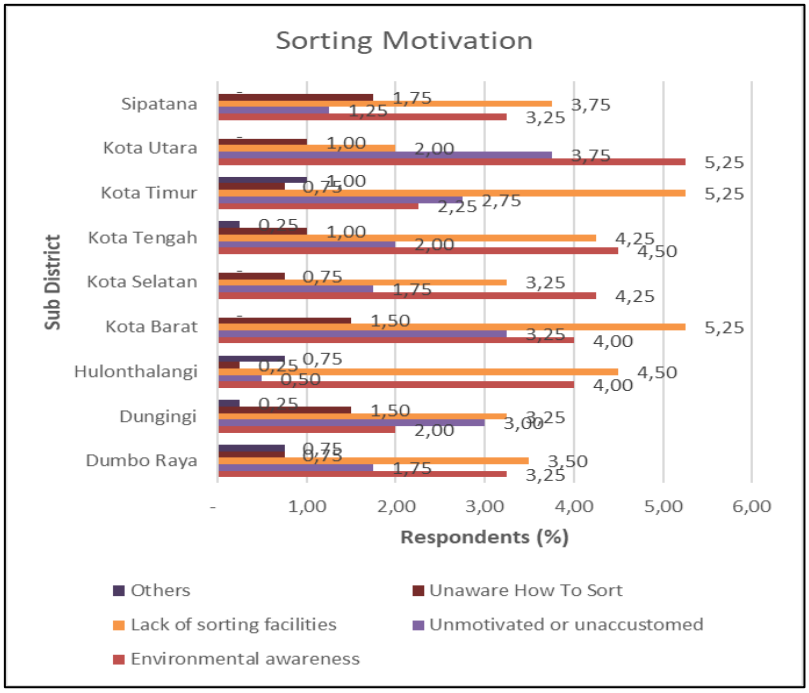

Figure 3. *Chart of Community Motivation for Waste Sorting*

Referring to Figure 3, the majority of respondents stated that the lack of facilities was the main reason (35%), followed by environmental awareness (32.75%) and lack of habits or motivation (20%). People who already have environmental awareness will not act if the system does not support it. In the context of Gorontalo City, this shows the need for intervention in the

aspect of strengthening the synergy between environmental education and the provision of public facilities simultaneously. This is in line with the recommendation of (Liu et al., 2022), improving waste sorting facilities to support household sorting convenience. Community preferences for the form of incentives that can encourage them to sort waste are visualized in Figure 4.

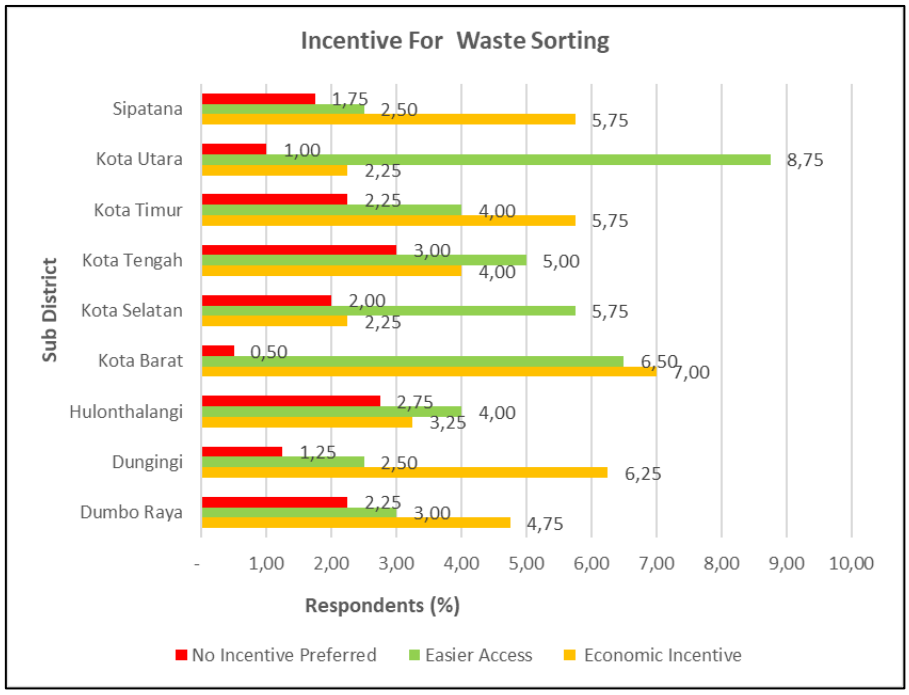

Figure 4. *Chart of Community Preference for Waste Sorting Incentives*

Based on Figure 4, respondents were almost evenly divided between those who preferred economic incentives (41.25%) and those who favored easier access to sorting facilities (42%). Only 16.75% stated that they did not require any incentives. This distribution suggests that a locally tailored incentive-based approach could be an effective strategy to encourage active participation. Financial incentives, such as reduced service fees or point-based reward systems, may appeal to lower- and middle-income groups, while the provision of adequate facilities would support individuals who are already motivated. Public perceptions of the difficulty of waste sorting are illustrated in Figure 5.

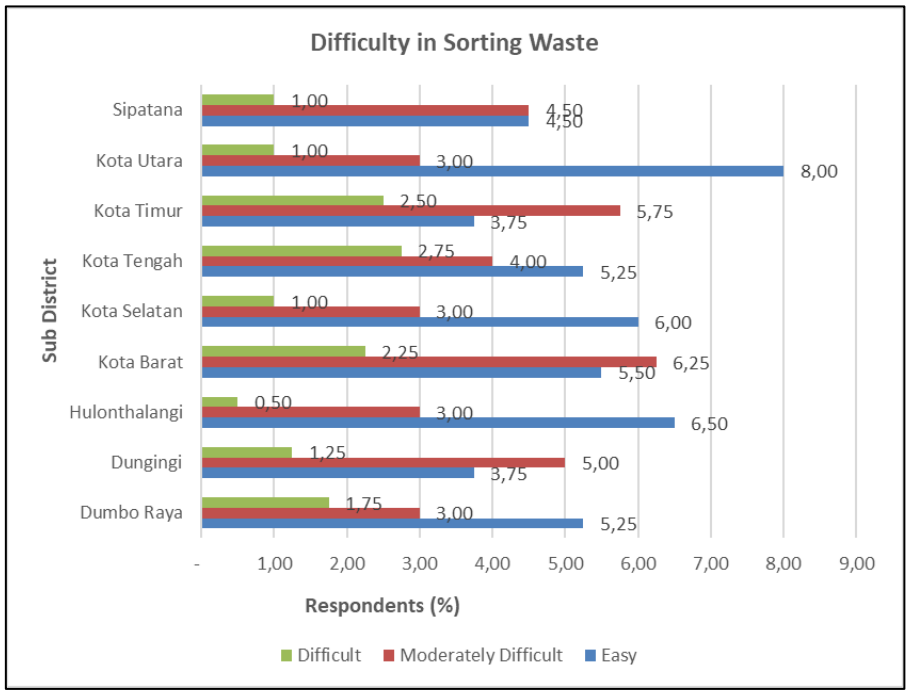

Figure 5. *Chart of Perceived Difficulty in Waste Sorting*

Figure 5 indicates that nearly half of the respondents (48.5%) perceive waste sorting as an easy activity, while 37.5% consider it moderately difficult, and 14% regard it as difficult. This data suggests a gap between perception and action. Although most respondents feel capable of sorting waste, they do not do so consistently. This inconsistency may be attributed to contextual factors such as the unavailability of separate waste bins, the absence of waste collection services that support sorting, or unclear waste processing systems at the municipal level. Figure 6 presents a visualization of community waste sorting habits.

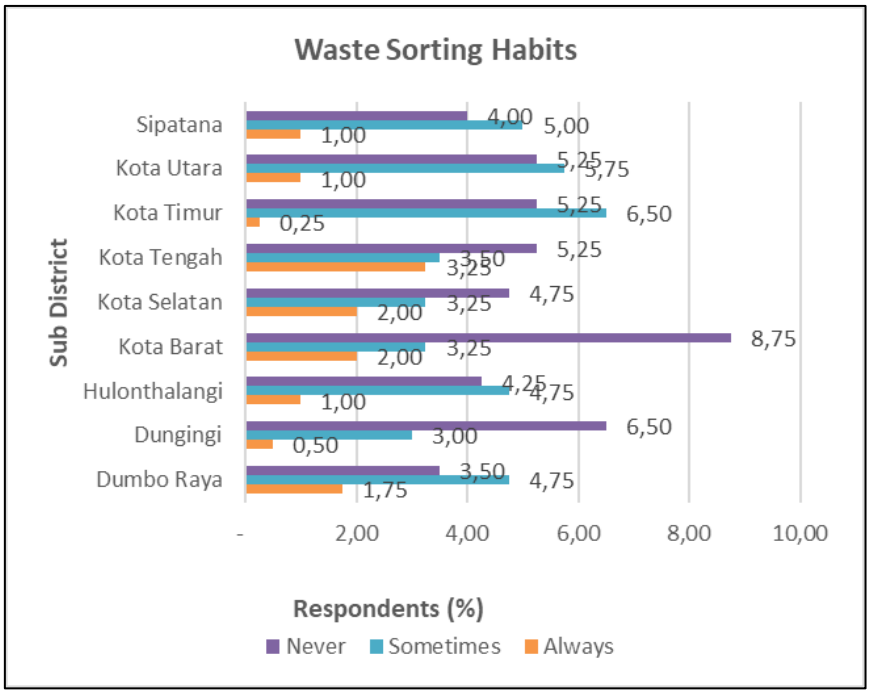

Figure 6. *Chart of Community Waste Sorting Habits*

Figure 6 shows that most respondents admitted to never sorting waste (47.5%), while only 12.75% always do so. The percentage of respondents who sort sometimes (39.75%) shows the potential for strengthening behavior if supported by an adequate system.

The research findings show that the success of household waste sorting is not only about increasing knowledge, but also building a supportive system and incentives. (Doudou, 2024) and (Kihila et al., 2021) suggests that incentives motivate individuals to make waste sorting a routine habit. The community has the potential to actively contribute, but a comprehensive intervention is needed that includes education, infrastructure, and incentives. This is in line with the conclusion of (Konstantinidou et al., 2024) and (Sembiring et al., 2024) that education and campaign in waste issues is needed. A community-based approach and the implementation of a zone-based strategy can be concrete steps in increasing the effectiveness of the policy. Establishing pilot projects in sub-districts with high levels of awareness and providing priority facilities can be a strategic starting point.

D. Conclusion

This study found that household waste sorting practices in Gorontalo City remain low: only 12.75% consistently practiced household waste sorting, while 39.75% sorted waste occasionally, and 47.5% never engaged in sorting. Although 73.75% of respondents were aware of the environmental and economic benefits of waste sorting, this awareness has not translated into practice, highlighting a significant knowledge–action gap. Major barriers include inadequate sorting facilities and weak sorting habits. Preferences for incentives were almost evenly split between economic compensation (41.25%) and improved access to sorting infrastructure (42%). This research was limited to household waste behavior in a medium-sized urban area and did not include institutional or commercial waste sectors. Future studies should explore these sectors to provide a more comprehensive understanding. These findings suggest that contextual barriers, such as inadequate infrastructure and unclear municipal systems, play a role in limiting household waste sorting practices. Altogether, the data emphasize the importance of integrated policy interventions that combine education, infrastructure provision, and community-driven incentives. Developing adaptive and participatory waste management strategies is essential to promote more consistent and sustainable sorting behavior in urban areas like Gorontalo City.

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