

# Ecological Justice in the Digital-Based Waste Management in Palangka Raya City: An Analysis of the Islamic and Environmental Law Perspectives

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## ABSTRACT

The environment is an interrelated system whose balance must be preserved both from the ecological and Islamic perspectives. From the perspective of Islamic Environmental Justice, balance (*mizan*) becomes the main principle in the usage of natural resources to prevent excessive exploitation that may damage the ecosystem. This research focuses on analyzing the waste management in Palangka Raya City, Central Kalimantan Province, Indonesia, especially in the implementation of the waste bank policy and the effectiveness of the *Info Bang Apul* digital platform in increasing society's awareness of waste management. The method used in this research was the empirical approach with quantitative data, supported by data from questionnaires which were spread to 136 respondents. Results of this research showed that even though there are already regulations such as Law No. 18 of 2008 on Waste Management and the Regulation of the Palangka Raya City Mayor No. 20 of 2019 on the Waste Management Policy, their implementation still faces various obstacles. The main obstacle was society's lack of understanding and involvement in waste management. If analyzed from the perspectives of environmental law and ecological justice in Islam, such a condition reflects a form of ecological injustice, where society

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still has not obtained equal access to the solution of sustainable waste management. Digital waste bank technologies such as *Info Bang Apul* have the potential to increase the effectiveness of waste management. However, there is still a need for further introduction so that society may know and widely use them. Apart from that, there needs to be an increase in *Info Bang Apul*'s features to provide more comprehensive information and add various services to increase community participation. This research recommends strategies to increase society's knowledge through education as well as the optimization of the government's role through program introduction. It is hoped that the application of the Islamic environmental justice principles and the usage of digital technologies may lead to the achievement of more sustainable waste management in Palangka Raya City, Indonesia.

**Keywords:** Islam, Policy, Waste Management, Digital Technology.

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## INTRODUCTION

The environment is a complicated order that is interrelated, where various elements, both living creatures and unliving things have an interactive relationship to maintain harmony. The relationship that happens in the ecosystem shows that all human beings' actions, either positive or negative, toward the environment will lead to consequences (Nome, Tuan, & Lawalata, 2023). Environmental destruction such as pollution and excessive exploitation will damage the ecosystem's stability and endanger the life of various creatures, including humanity. Therefore, protecting the environment is not a mere personal obligation, but rather a collective obligation that must collectively be strived for (Sardar & Hidayat, 2024).

Based on the perspective of religious teachings, the universe and all of its components did not emerge in vain. However, they are purposeful creations based on the will and design of God. Islam strengthened this perspective through several verses in the Holy Qur'an that described the process of the universe's creation as proof of Allah's greatness and oneness. Human beings are positioned as leaders on earth who are entrusted to be responsible for the preservation and usage of natural resources under the principles of justice and wisdom (Omar, Chowdhury, & Hashi, 2018). One of the main concepts of Islamic teachings that is related to the environment is Islamic Environmental Justice, which is rooted in the principle of balance (*mizan*). This principle reflects the harmony that God has determined in the order of the universe. Therefore, every action that damages the environment is deemed a form of injustice both to nature and the future generations. The *mizan* principle teaches that human beings are demanded to act with full mindfulness based on the feelings of responsibility in utilizing natural resources, as well as avoid excessive exploitation that may lead to an imbalance in the ecosystem (Dr. Agus Hermanto & Rohmi Yuhani'ah, 2023).

According to Dr. Agus Hermanto, the discussion on the environment (nature) in the Qur'an is called the *khalq* which literally means creations. In the Qur'an, it is stated that a stable and harmonious environment is the result of creations that follow the laws of the Creator to stay balanced (*mizan*). However, in the current digital era, challenges in maintaining environmental justice become more complex, especially in the context of trash and waste management.

A fundamental environmental issue in Indonesia is waste management, especially that of plastic waste which has an increasing amount each year (Malihah & Nazairin, 2024). This is supported by data from the National Waste Management Information System of the Ministry of Environment and Forestry in 2023 per July 24, 2024, which stated that the pile of unmanaged national waste reaches the staggering amount of 11.3 million tons. If linked with Law No. 18 of 2008 on Waste Management, the rate of unmanaged waste shows that the implementation of this law is still suboptimum.

With technological advancement, digitalization opens a new opportunity in the effort to increase the efficiency of waste management. Digital innovations may now be used to improve various stages, starting from waste collection and sorting to management. An example of this is the usage of smartphone applications that give society access to information on the locations of illegal waste disposals. Meanwhile, the Internet of Things (IoT) technology may be applied to monitor the amount of waste in real-time, as well as become a digital-based system that bridges society with the center of waste collection and the reprocessing sector (Setyaningsih, et al., 2023).

In Palangka Raya City, Central Kalimantan Province, Indonesia, one of the technological applications in this sector is the launching of the *Info Bang Apul* website, which provides information related to the existence of waste banks as well as the mechanism of waste collection. Even though digital innovation has been applied, waste management in Palangka Raya is still faced with various obstacles, one of which is society's low level of understanding of the urgency to correctly manage waste, which is worsened by their limited knowledge of regulations on waste bank digitalization that is currently carried out.

In this research, field data were collected through questionnaires which were spread to 136 respondents. It was shown that most of society did not have a deep understanding of digital-based waste bank policies, such as *Info Bang Apul*. This leads to the minimum use of this platform in the daily processing of waste. The lack of introduction to this platform as well as the minimum features of this service makes this platform ineffective in attracting the

participation of the wider society. Therefore, this research strives to analyze society's level of understanding of the existing policies on waste banks as well as evaluate the effectiveness of digital solutions, such as *Info Bang Apul*, in encouraging the increase in society's awareness and participation in waste management.

This action is in line with the values of environmental justice according to Islamic teachings, which highlights the urgency of protecting the creations of God (*mizan*) as well as preventing damage to nature as an ethical burden that human beings must bear in their capacity as leaders on earth. In this context, society's active participation in waste management is part of the Islamic mandate to maintain environmental preservation. Therefore, optimizing digital technologies such as *Info Bang Apul* not only becomes a technical solution but is also a form of actualization towards Islamic values in manifesting ecological justice in the modern era.

## RESEARCH METHOD

This research employed the empirical method with a quantitative approach to analyze the effectiveness of digital waste management policies as well as the application of the ecological justice principle in Islam. The main focus of this research was Palangka Raya City, with an analysis object in the form of the implementation of the *Info Bang Apul* platform which is a digital initiative of the Palangka Raya City Government in supporting waste management as well as community education through the waste bank information system. This platform was chosen as it represents a form of digital transformation in the effort to create local-level ecological justice.

The primary data were obtained through questionnaire forms which were spread to 136 participants among Palangka Raya City citizens who have direct involvement as well as potential in waste management activities. Apart from that, the authors conducted direct observation towards the features and contents of the *Info Bang Apul* website to measure how far this platform provides relevant and accessible information.

To enrich the analysis, this research utilized secondary data in the form of literary studies on applicable regulations, such as Law No. 18 of 2008 on Waste Management as well as Regulation of the Palangka Raya City Mayor No. 20 of 2019 on the Waste Management Strategy and Policies. Apart from that, the authors also used Islamic literature which discussed the principles of *mīzān*, *amanah* (mandate), and Islamic Environmental Justice as the normative bases in analyzing Islam-based ecological values (Disemadi, 2022). Through this method, it is

hoped that the research may illustrate the link between digital technologies, policy effectiveness, as well as environmental justice values within the Islamic perspective as a basis to support the just and sustainable management of waste in the Palangka Raya City area.

## **RESULTS AND DISCUSSION**

### ***A. Digital Waste Management Policies in Palangka Raya City***

Law No. 18 of 2008 on Waste Management was issued as a response to the increase in the waste volume as well as their negative influence on the environment and public health. This regulation applies sustainable management principles through the 3R (reduce, reuse, recycle) approach. The main goal of this approach is to optimize the waste management process from its origins, build societal awareness to change action patterns, minimize the impact of waste on health and the environment, as well as utilize waste as an economic potential (Hamdan, Rifani, Jalaluddin, & Rudiansyah, 2018). Law No. 18 of 2008 on Waste Management regulates the obligations that the government, society, producers, and business owners must fulfill in waste management. The government, both at the central and regional levels, are obliged to formulate national and regional strategies and policies related to waste management. Apart from that, they also have the obligation to provide the facilities, infrastructure, and integrated system of waste management (Khadijah, Karliani, & Dotrimensi, 2020).

In the concrete efforts to implement these policies, the Central Kalimantan Provincial Government launched the Waste Recycling Center in Palangka Raya City in May 2024. This facility becomes one of the steps in the effort to manifest a more optimum and environmentally friendly system of waste management with the target of maximizing the organic and inorganic waste processing to create goods with economic value. The arrival of the Waste Recycling Center opens opportunities for waste rather than only having them disposed of in landfills, as this Center recycles waste into compost, recycled materials, as well as other beneficial products, contributing to the decrease in the volume of waste that pollute the environment (Karimah, Malihah, Rahmah, & Nawiyah, 2023). Then, the Palangka Raya City Government also issued the Regulation of the Palangka Raya City Mayor No. 20 of 2019 on the Waste Management Strategy and Policies in Managing Domestic Waste and Waste Similar to Domestic Waste. This policy integrates steps to

decrease waste from its source, carry out waste sorting, as well as increase society's understanding of the importance of maintaining environmental cleanliness.

According to Law No. 18 of 2008 on Waste Management, society has an important role in two main things, namely the involvement in the waste management policy formulation process as well as the application of concrete steps in daily activities. These regulations highlight society's obligation to keep the environment clean by decreasing the piling of waste as well as independently processing them starting from the domestic level. Apart from that, society is also encouraged to contribute by giving suggestions and carrying out monitoring to the policies that are carried out by the regional government. Society's active participation in every stage of waste management is crucial to creating an efficient and sustainable management system (Ramadhanti & Aminatun, 2025).

The *Info Bang Apul* website is one of the forms of digital innovation that was developed in Palangka Raya City. This site has a role as an information platform that bridges society, waste bank services, and waste-collecting officers. Through *Info Bang Apul*, society can access data on the locations of the closest waste banks, operational hours, as well as the procedures to trade waste with certain rewards (Fithri, Setiawan, wibowo, Nugraha, & Latifah, 2024). Apart from that, it is hoped that this policy may increase society's participation in the recycling practice as well as support the government's program in achieving sustainable waste management. However, even though various policies have been applied, there are still challenges to their implementation in the field, one of which is the lack of society's awareness of the importance of good waste management as well as their lack of understanding of the existing policies on digital waste bank (Ariyadi, Ningrum, Yuskawati, Hevanda, & Devianty, 2023).

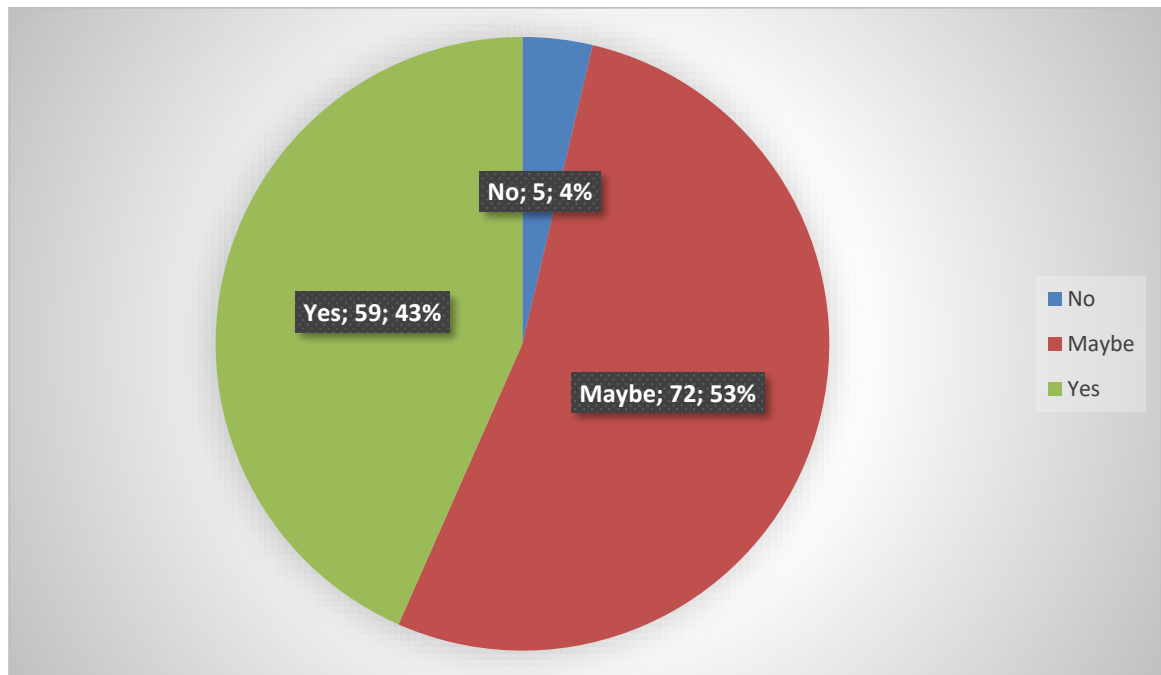
### ***B. Digital Waste Bank: Info Bang Apul***

This research was conducted using the online survey method by utilizing questionnaires which were spread through the Google Form platform. Survey participants were Palangka Raya City citizens who were chosen using the random sampling method through the sharing of the questionnaire link via several social media platforms. Based on the data collected from these questionnaires, it was found that 136 people completed the forms and became part of this study. The respondents consist of 67 women (50.7%) and 69 men (49.3%), reflecting a relatively balanced participation between the two genders. This

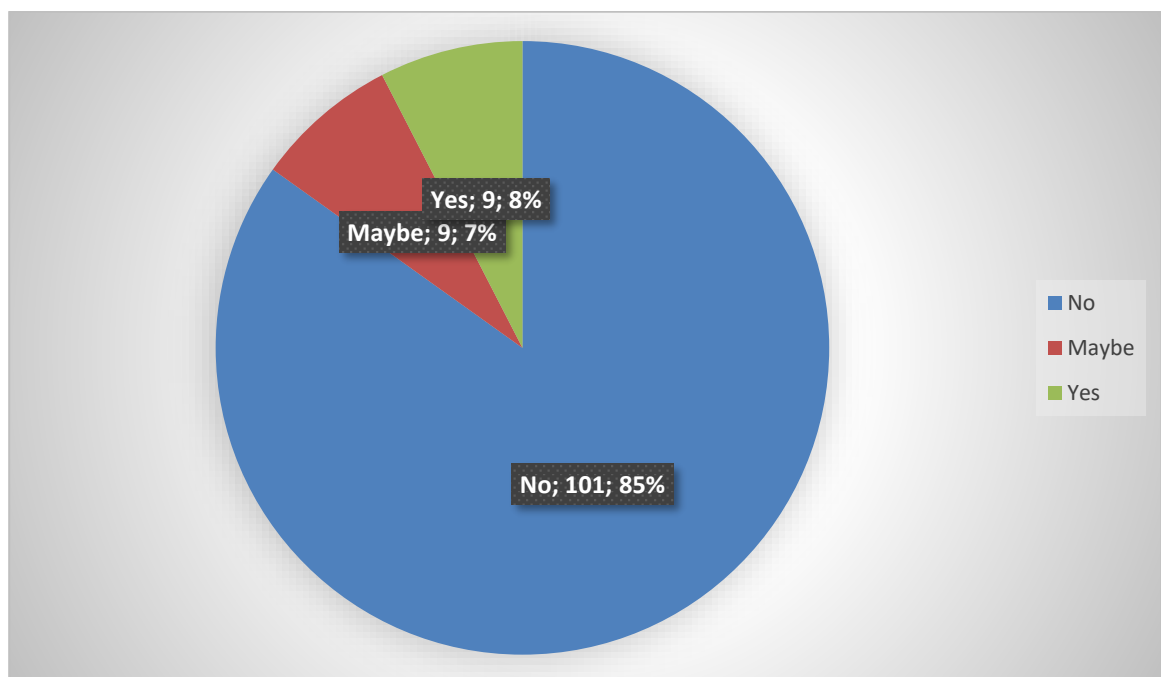
balance shows that the attention towards the waste management issue does not only attract the interest of a certain group but has attracted a collective care. In other words, both men and women have a similar interest in expressing their thoughts on waste management in Palangka Raya City.

Based on age, most respondents originate from the 17–25-year-old group, amounting to 88 people (68.2%), showing that the majority of respondents were young people. Then, the 36–45-year-old group was placed in the second position of the most respondents with a percentage of 15.7%. Meanwhile, based on occupation, the majority of respondents were students and college students, with a total of 84 people (65.1%), followed by State Civil Apparatus with a total of 19 people (15%). This data strengthens the fact that most respondents were young people who were still studying. This opens an opportunity for the government and environmental institutions to target the young group through introduction and education so that they may become agents of change in waste management (Pratiwi, Yunarti, & Komsiah, 2023). However, there must also be attention to the participation of older age groups with approaches that are aligned with their habits and character, such as conducting face-to-face meetings and introduction programs.

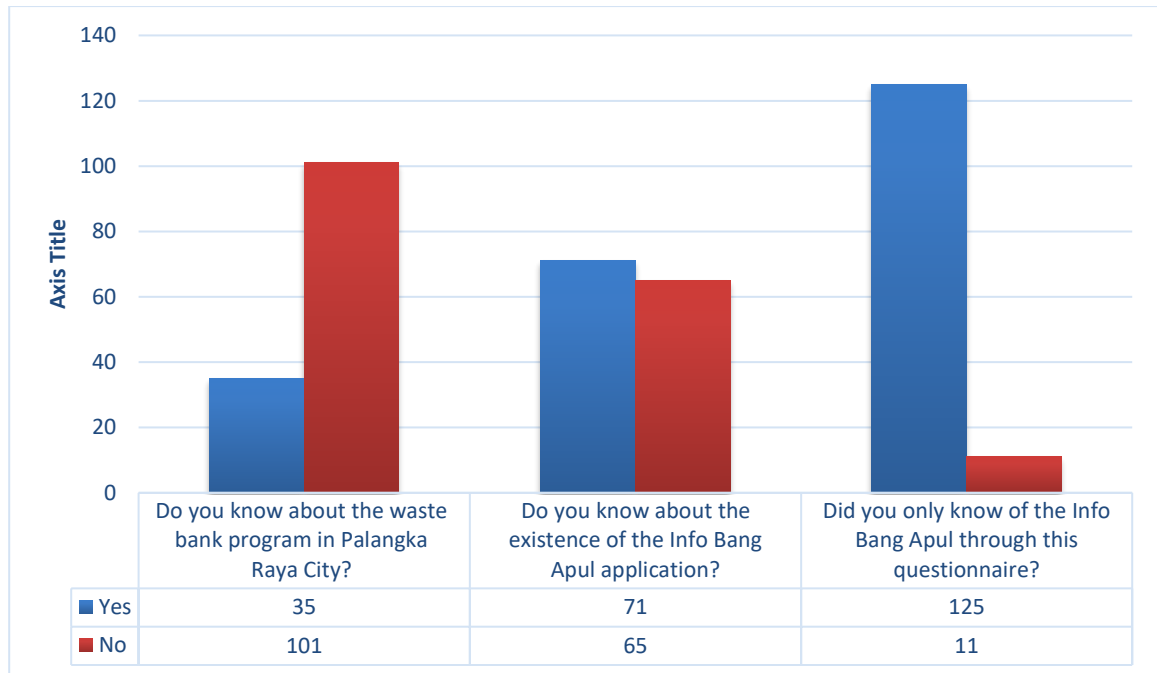
To support this research, the authors designed some general questions, namely: (1) How often do you sort domestic waste? (2) Have you ever heard of digital waste banks? (3) Do you know about the waste bank program in Palangka Raya City? (4) Do you know about the existence of the *Info Bang Apul* application? (5) Did you only know of the *Info Bang Apul* through this questionnaire? and (6) Are you interested in participating in using that application?



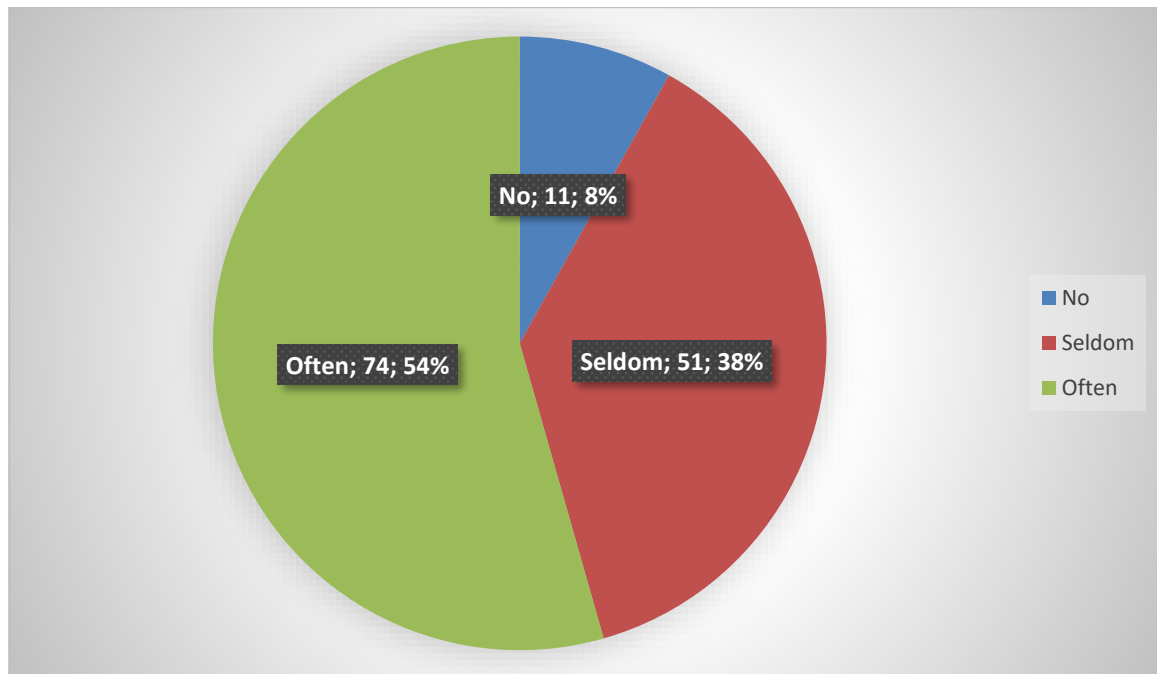
**Figure 1.** Respondents' Answers to How Often They Sort Domestic Waste.



**Figure 2.** Respondents' Answers to Whether or Not They Have Ever Heard of Digital Waste Banks



**Figure 3.** Respondents' Answers to Several Yes/No Questions in the Questionnaire Related to Waste Bank and the *Info Bang Apul* Application



**Figure 4.** Respondents' Answers to Whether or Not They Are Interested in Participating in Using the *Info Bang Apul* application

Based on the results of the questionnaire, it can be found that 74 respondents routinely sort waste, 51 do it once in a while, and 11 respondents never sort waste. This data shows that part of society already has the habit of sorting waste, while others only carry it out with a low frequency. These findings indicate that the awareness of sorting waste has started to grow, even though it still needs to be strengthened to transform it into a consistent habit in society.

Regarding the people's knowledge of the digital waste bank concept, 71 respondents admit to already knowing of it, while 65 other respondents have never heard of it. This shows that part of the respondents are already familiar with and already have an understanding of that concept, although almost half of all respondents still do not know of it.

Society's level of knowledge of the digital waste bank program in Palangka Raya is shown as follows:

- 1) 101 people (74.3%) still do not know of the existence of the digital waste bank program in Palangka Raya area.
- 2) 118 people (86.8%) still do not know of the existence of the *Info Bang Apul* program that is available in Palangka Raya.
- 3) 125 people (91.9%) have only known of the *Info Bang Apul* program after participating in this survey.

Concerning their interests, 59 respondents have expressed their interest in utilizing the digital waste bank application. Meanwhile, 72 respondents are still uncertain, while 5 of them admit to not being interested at all. Even though part of society shows their interest, the high rate of uncertainty or doubt (52.9%) shows that there are still obstacles in developing society's interest on the usage of technologies for waste management.

Table 1 shows additional data which were obtained from several other essay questions in the questionnaire.

**Table 1.** Survey Results Data

No.	Question's Main Idea	Survey Results
1.	Obstacles in Waste Management	92 of 136 people answered that the main obstacle to waste management is the lack of temporary waste disposal facilities.

No.	Question's Main Idea	Survey Results
2.	Society's Opinion on Digital Waste Bank	119 of 136 people believe that digital waste banks will ease waste management.
3.	Society's Opinion on the Obstacles of Digital Waste Bank	Most of society gave opinions that obstacles include society's lack of knowledge and awareness as well as inadequate websites/applications that must be improved.
4.	The Government's Role in Increasing Community Participation	Society gave suggestions such as giving education and introduction to society and improving the facilities to make them more appropriate.

In an observation which was conducted on the *Info Bang Apul* website, it was found that there were some limitations which showed that the information services that this platform provides are still suboptimum. Even though in general this platform aims to give society easy access to information regarding the existence and activities of waste banks in Palangka Raya City, in practice, the scope of information presented is still limited. This application has not fully answered society's need in a comprehensive manner.

Based on the analyzed data and the interface appearance, *Info Bang Apul* has not been supported by an adequate digital system, both from the aspect of design and the speed of access. The available features are also still minimal and lack interaction; thus, they fail to provide a good user experience. Apart from that, there are no adequate explanations of the comprehensive method of how the digital waste bank system works, such as the procedures of user registration, the process of weighing and exchanging waste, the incentive or reward system applied as well as the report or consultation mechanism in case of any obstacles. Information on the concrete benefits that users may obtain is still not presented in an attractive and informative manner (Utami, Rialmi, & Nugraheni, 2022). These factors become obstacles in increasing society participation as prospecting users need clarity and transparency before deciding to be actively involved.

### ***C. The Concept of Islamic Ecological Justice in the Digital Waste Management***

In environmental management, especially related to waste, the Islamic Environmental Justice concept is crucial. The Islamic religion emphasizes that human beings are given the responsibility in this world to preserve the environment and avoid

actions that may damage it. This value is not a mere morality but is an important part of the whole Islamic teachings that emphasize balance and harmony between human beings and nature (A'isy, Ernawati, Komalasari, & Gunawan, 2022).

The idea of ecological justice according to Islamic teachings is closely related to the *Maqashid Sharia* principle, which is the main target in the implementation of Islamic sharia. This principle emphasizes the mutual virtue of humankind as well as environmental preservation. In this context, *Maqashid Sharia* has the role of guidelines to determine the steps that are according to Islamic teachings, which regulate the wise and accountable usage of natural resources. In *Maqashid Sharia*, a crucial factor is maintaining environmental preservation by rejecting all types of excessive exploitation of nature. The aim of this protection is to maintain the sustainability of the natural richness to be enjoyed and used by future generations (Rohmy & Nihayaty, 2025). The Holy Qur'an also explains the importance of balance in managing nature as stated in Chapter *Ar-Ruum* (The Romans) verse 41:

ظَهَرَ الْفَسَادُ فِي الْبَرِّ وَالْبَحْرِ بِمَا كَسَبَتْ أَيْدِي النَّاسِ لِيُذِيقَهُمْ بَعْضَ الَّذِي عَمِلُوا لَعَلَّهُمْ يَرْجِعُونَ

Translation: Corruption has spread on land and sea as a result of what people's hands have done, so that Allah may cause them to taste 'the consequences of' some of their deeds and perhaps they might return 'to the Right Path' (The Holy Qur'an, Chapter *Ar-Ruum* (The Romans) verse 41).

The above verse states that environmental destruction is the consequence of human beings' actions. Therefore, the Islamic community needs to understand that every action which disturbs nature will certainly bring negative impacts, not only to the environment but also to the welfare of human beings. For example, air pollution will lead to health issues; water pollution may disturb the ecosystem's balance and cut the supply of clean water; while incorrectly managed plastic waste may pollute the sea and threaten the lives of the creatures that live in it (Amiruddin, Syam, & Arsyad, 2024).

Waste management is a crucial issue, especially amid the current digital era that is marked by the increase in the amount of waste, especially plastic waste. Without correct management, such wastes may potentially pollute the environment and threaten the continuity of the ecosystem (Nanda, et al., 2023). From the perspective of Islamic law,

ineffective waste management may be perceived as a form of ecological injustice, as human beings fail to correctly manage the environment that they have been entrusted with (Utami, Wijayanto, & Supratiwi, 2024).

However, this research found that even though the ecological justice concept in Islam has often been theoretically discussed, its implementation in handling digital-based waste management in Palangka Raya City is still suboptimum. Society's low level of understanding of this concept becomes the main challenge in the application of Islamic Environmental Justice in the waste management aspect (Kadir, et al., 2022). Therefore, there needs to be a more intensive educative approach to make society realize the benefits of preserving the surrounding nature as a component of collective obligation. By integrating the values of environmental justice from the Islamic law perspective and the environmental law, waste management can be manifested using a more efficient and responsive approach (Jacky & Tjenreng, 2025).

## CONCLUSION

A just and sustainable waste management is not a mere technical issue that may be resolved through policies and technological innovation. However, it encompasses the aspects of society's moral, spiritual, and social responsibility to the environment. The ecological justice principle teaches that damaging the environment is a form of injustice, both to nature and to future generations.

Palangka Raya City Government has shown progressive steps by developing the *Info Bang Apul* digital platform as one of the forms of digitalization in the waste management system. However, based on the survey results with 136 respondents, it was found that more than 90% of respondents only knew of the existence of the *Info Bang Apul* digital platform through the questionnaire, indicating the very low level of introduction and usage of this platform amidst society.

Questionnaire results show that even though Palangka Raya City citizens have generally had an awareness of the importance of waste management, their understanding of the digital waste bank system and how it works is still very limited. Their interest in using this digital service is deemed low, showing that the emergence of technological innovations has not fully been followed by public readiness and acceptance. This reflects the existence of a gap between

governmental policies and the implementation reality in the field in terms of society's information access, understanding, as well as active participation.

The lack of features and informative content in *Info Bang Apul* shows that technological developments have not fully collaborated with effective public communication strategies. There are no features such as waste collection schedules or user contribution statistics which should ideally become important components in the digital-based waste management platform. Therefore, there needs to be the renewal and strengthening of the *Info Bang Apul* platform's system so that it may become more responsive and inclusive to support the achievement of the sustainable waste management goals in Palangka Raya City. If perceived from the perspective of environmental law and ecological justice in Islam, this situation reflects a form of ecological injustice, where society has not obtained equal access to the solution to sustainable waste management. The unequal access and information may potentially worsen environmental issues if they are not immediately resolved using a more inclusive approach.

To make *Info Bang Apul* more effective as an instrument of social behavior change, the government needs to carry out several strategic steps, including expanding the scope of socialization to society through social media and environmental education at the school level; enriching the platform's contents with clear technical information on the work procedures of the digital waste bank, the economic benefits obtained, as well as the interesting incentive mechanism; as well as adding interactive features such as user dashboard which show the data on waste contribution, point obtainment, as well as the environmental benefits of the users' activities.

Through policy optimization, the strengthening of the technological system, as well as the integration of environmental justice values in Islam, it is hoped that the digital waste bank program may have an effective role as an instrument to develop the public understanding of the important values of just and sustainable waste management in Palangka Raya City.

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