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# ANALYSIS OF THE IMPACT OF PENALTY POLICY AS AN INSTITUTIONAL INSTRUMENT OF THE BUDUK VILLAGE WASTE BANK PROGRAM IN BADUNG REGENCY

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**Abstract**: Buduk Village is one of the villages in Mengwi District that actively develops a waste bank program as an alternative solution to waste management issues, especially since the absence of an Integrated Waste Disposal Site (TPST) since 2021. In practice, the waste bank in Buduk Village is operated by cadres from the PKK in each banjar. The problem arises when the level of community participation in depositing waste during each scheduled opening of the waste bank is low, which is often caused by moral hazard. To address this issue, several waste banks in Buduk Village implement a disincentive mechanism in the form of a penalty policy for community members who do not routinely deposit waste. This study uses a quantitative approach with the Mann-Whitney Test to analyze the difference in waste deposit frequency between waste banks that implement and do not implement the penalty policy. The analysis results show a very significant difference, where waste banks with a penalty policy consistently exhibit higher deposit levels ($Z = -5.832$; $p = 0.000$). In addition, the Spearman Rho correlation test shows a fairly strong positive relationship between the penalty policy and the frequency of waste deposits by customers ($r = 0.6016$; $p = 0.000$), indicating that the more firmly the penalty policy is implemented, the higher the tendency of the community to routinely deposit waste. These findings indicate that the implementation of a disincentive in the form of penalties can serve as an effective instrument to increase community compliance and participation in waste management based on waste banks at the village level.
**Keywords:** Waste Bank, Penalty Policy, Deposit Frequency.

## INTRODUCTION

Waste is the residual output of human activities or natural processes that is considered to have no economic value and often generates negative environmental impacts (Yuliastuti, 2013; Dewilda et al., 2014; Sucipto, 2009). Waste problems in Indonesia have reached an emergency level, where as of 2024, as many as 92% of households still have not conducted waste sorting at the source. This condition is exacerbated by the lack of properly functioning waste management infrastructure, with 35% of TPS3R facilities reported as inactive. As a result, most domestic waste still ends up in Final Disposal Sites (TPA), the majority of which use open dumping methods, causing soil, water, and air pollution (Ministry of PPN/Bappenas, 2024).

The waste management paradigm in Indonesia is still dominated by the collect–transport–dispose pattern, with the waste collection rate at only around 60%

of total national waste generation (Enri Damanhuri, 2010). Meanwhile, the volume of domestic waste is projected to continue increasing from 70 million tons in 2023 to more than 82 million tons in 2045, thereby necessitating more sustainable management strategies (Bappenas, 2024).

Bali Province is one of the regions with serious waste issues. Based on data from the Ministry of Environment and Forestry (KLHK), Bali generated around 915.5 thousand tons of waste in 2021 and ranked eighth as the province with the largest waste generation in Indonesia. Most waste in Bali comes from households and religious ceremony activities (INSPD, 2007 in Sutrisnawati and Purwahita, 2018). In 2022, the total waste generation in Bali Province reached 1,112,356.84 tons per year, with 247,176.66 tons of it remaining unmanaged (SIPSN, 2022).

Badung Regency is one of the largest contributors to waste in Bali, amounting to 119,474.58 tons per year. Mengwi District, as one of the largest districts in Badung Regency, recorded waste production of 292.55 $m^3$ per day, with around 4,858.62 $m^3$ per year remaining unmanaged (DLHK Badung, 2022). Nevertheless, Mengwi District demonstrates relatively good waste management performance compared with other areas, partly through the development of waste banks as a means of reducing waste at the source.

Waste banks function as collection centers for sorted waste with economic value to be recycled, while also supporting the implementation of a circular economy (Ministry of PPN/Bappenas, 2024). The implementation of waste banks has been regulated through the Minister of Environment Regulation No. 13 of 2012 and strengthened by Minister of Environment and Forestry Regulation No. 6 of 2022, and is implemented at the regional level through Badung Regent Regulation No. 48 of 2018 on Guidelines for 3R Implementation through Waste Banks. This program is expected not only to reduce waste generation but also to empower communities and provide economic benefits.

In Mengwi District, waste bank management is actively carried out by the Family Welfare Empowerment (PKK) cadres in each village. Data from USAID Selaras (2024) show that there are 85 active waste banks in this district, with Buduk Village being one of the most active in implementing the program. Since 2022, Buduk Village has established 10 waste bank units in each banjar, managed by five PKK cadres as the main facilitators. This program serves as a strategic effort by the village to address the absence of an Integrated Waste Disposal Site (TPST) since 2021, as well as to strengthen the role of women in environmental management.

However, the success of waste bank programs heavily depends on the level of community participation. In practice, not all community members actively deposit waste regularly, leading to problems of information asymmetry and moral hazard in the relationship between the administrators (principal) and the community (agent). To address this issue, several waste banks in Buduk Village implement a disincentive mechanism in the form of penalties for members who do not routinely deposit waste. This policy is expected to increase community compliance and the effectiveness of waste bank programs.

Penalties in the institutional context function as a behavioral control instrument and a mechanism for aligning goals between administrators and participants. However, the effectiveness of penalty policies in increasing community participation still requires empirical examination. A system without penalties provides flexibility for the community but risks lowering participation levels; conversely, a system with penalties is expected to enhance compliance, although it may generate social resistance if not properly regulated.

Based on this background, this study aims to analyze the effect of penalty policies as an institutional instrument in the waste bank program in Buduk Village, Badung Regency. Specifically, this study focuses on: (1) analyzing the difference in waste deposit frequency between waste banks that implement penalty policies and those that do not; and (2) analyzing the relationship between penalty policies and the frequency of waste deposits by the community.

This study is expected to contribute theoretically to the development of environmental economics literature and institutional theory, particularly regarding the application of incentive and disincentive mechanisms in community-based waste management. Practically, the study findings are expected to serve as a reference for waste bank administrators and village governments in formulating effective policies to increase community participation in sustainable waste management.

## LITERATURE REVIEW

### Institutional Theory

Institutional theory explains that institutions are a set of rules, norms, and values that regulate interactions among individuals in society. North (1990) defines institutions as "the rules of the game" that shape economic, social, and political behavior. In the context of local economic development, institutional theory emphasizes the importance of social structures and regulations in facilitating collaboration and reducing uncertainty. In the context of waste bank programs, institutions (such as PKK, village governments, and community groups) play an important role in shaping individual behavior toward waste management. Strong institutions with clear rules can increase community participation and foster collective responsibility for the environment. Institutions also function as social control mechanisms that enforce compliance through norms, sanctions, and incentives.

### Agency Theory

Agency theory, developed by Jensen and Meckling (1976), explains the relationship between the principal (mandate giver) and the agent (mandate executor). This theory arises due to potential conflicts of interest and information asymmetry between the two parties. In the context of waste bank programs, the village government or PKK institution acts as the principal, while the waste bank administrators and cadres act as agents who implement policies and operational activities in the field. Agency conflicts may arise when agents do not perform their duties in accordance with the principal's interests, such as being less active in

encouraging community participation or lacking transparency in managing the proceeds from waste sales. To minimize these conflicts, an appropriate system of incentives and disincentives is required, such as providing bonuses for active cadres and applying penalties for community members who do not participate. Thus, agency theory helps explain how monitoring mechanisms and motivation structures can improve the effectiveness of waste bank institutions.

**Pigouvian Tax Theory**

Pigouvian Tax Theory was first introduced by Arthur Cecil Pigou (1920), who explained that governments can correct negative externalities by imposing taxes or disincentives on actors who generate social or environmental impacts. The aim of Pigouvian taxes is to internalize the cost of externalities, meaning that the social costs of an activity become reflected in the private costs of the actor. In the context of waste management, penalties imposed on community members who do not sort or do not deposit waste in the waste bank can be considered a form of Pigouvian tax. Such penalties function to alter community behavior so that they become more responsible for the waste they generate. Conversely, incentives for residents who actively deposit waste can be seen as a compensatory mechanism that supports pro-environmental behavior. Thus, the application of Pigouvian theory in waste bank programs helps achieve a balance between economic efficiency and environmental sustainability.

**Waste Bank Concept**

The waste bank concept is a social innovation in community-based waste management. According to the Ministry of Environment and Forestry (2012), a waste bank is a place collectively managed to collect, sort, and distribute waste with economic value such as plastic, paper, and metal thereby increasing community income while maintaining environmental cleanliness. Waste banks function similarly to financial institutions, where community members "save" their waste and receive monetary value in return. This activity is not only economically oriented but also encompasses strong social and environmental dimensions, as it can encourage participation, build ecological awareness, and strengthen social solidarity. Most of the waste sorted at the household level is deposited in the waste bank to then be sold to collectors or recycling industries. In this process, PKK cadres act as facilitators and supervisors to ensure that the community consistently sorts and deposits waste. Penalty mechanisms for residents who do not participate and incentives for active participants serve as important instruments for maintaining program sustainability. Therefore, the waste bank concept is relevant not only from an economic perspective but also from institutional, agency, and Pigouvian perspectives, as it reflects a social system that encourages behavioral change through structured incentives and regulations.

## RESEARCH METHOD

This study employs a comparative quantitative approach to analyze the difference in waste deposit frequency between waste banks that implement a penalty policy and those that do not in Buduk Village, Mengwi District, Badung Regency. This location was selected because it exhibits variations in the implementation of disincentive policies within waste bank management, allowing for empirical comparative analysis.

The object of this study is the community's participation behavior in waste deposit activities at the waste bank, measured through the deposit frequency over the past six months. The independent variable in this study is the penalty policy, expressed in the form of a dummy variable (1 = implementing penalties; 0 = not implementing penalties), while the dependent variable is the waste deposit frequency (Y).

The research population includes all waste bank customers in Buduk Village, totaling 1,030 households out of 2,102 households. The sample size was determined using the Slovin formula with a 10% margin of error, resulting in 95 respondents. The sampling technique used was Stratified Random Sampling based on the distribution of customers in each waste bank unit.

The data used consist of primary data obtained through questionnaires and interviews, as well as secondary data sourced from operational documents of the waste bank. Data analysis was conducted in two stages, namely the Mann–Whitney U Test to identify differences in deposit frequency between waste banks with and without penalties, and the Spearman–Rho Correlation Test to analyze the relationship between the penalty policy and customer deposit frequency. Both tests were conducted with a 5% significance level to ensure that the analysis results are objective and statistically measurable.

## DISCUSSION RESULTS

### Differences in Waste Deposit Frequency Between Customers of Waste Banks That Apply Penalty Policies and Those That Do Not Apply Penalty Policies in Buduk Village

The Mann–Whitney U test was used to compare the frequency of waste deposits between customers of waste banks that apply penalties and those that do not. The analysis results show a Z value of –5.832 with a p-value = 0.000, which indicates a significant difference between the two groups. Thus, H0 is rejected, so it can be concluded that the application of penalties has an effect on the difference in waste deposit frequency in Buduk Village.

This finding is consistent with the study by Kartika and Jember (2017), which shows that customary sanctions have a significant effect on the performance of village financial institutions. This reinforces that the presence of sanctions can increase compliance and individual responsibility in a community-based program.

**Table 1. Results of the Mann–Whitney U Test**

| WASTE DEPOSIT FREQUENCY | |
|---|---|
| Mann – Whitney U | 782.5 |
| Wilcoxon W | 3777.5 |
| Z | -5,832 |
| Asymp. Sig. (2-tailed) | 0.0000 |

Group Variables: Penalty Policy of Waste Bank

Source: Processed Data, 2025

Interview results show that the penalty policy in Buduk Village initially came as a recommendation from the Waste Bank Induk Bali Lestari Kita and was implemented by seven out of ten banjars through a deliberation mechanism. In banjars that apply penalties, rule enforcement is carried out socially, for example by announcing inactive customers during PKK meetings, creating a combination of economic sanctions and social control.

However, comparative findings from Kekeran Village reveal that high community participation can be achieved even without penalties. The village has household waste-sorting facilities, a village waste bank, TPS3R, and strong institutional support. These factors shape a collective commitment within the community, enabling them to maintain regular waste-deposit participation without sanctions.

Overall, although the quantitative analysis shows that the application of penalties correlates with increased waste deposit frequency, the qualitative findings highlight that adequate infrastructure, institutional support, and community social values also play important roles and can serve as sustainable alternatives in encouraging community participation in waste management.

**Correlation Between Penalty Policies and Waste Deposit Frequency Among Waste Bank Customers in Buduk Village**

The Spearman Rho correlation test was used because the variables in this study are non-normally distributed and partly ordinal in scale. The results of the analysis show a moderately strong positive relationship between the penalty policy and the waste deposit frequency, with a correlation coefficient of 0.6016 and a significance value of 0.0000. This indicates that the implementation of penalties is associated with an increase in the frequency of waste deposits by waste bank customers.

**Table 2. Spearman Rho Correlation Test Results**

| | | | Penalty Policy | Deposit Frequency |
|---|---|---|---|---|
| Spearman Rho | Penalty Policy | Correlation Coefficient | 1,000 | 0.6016 |
| | | Sig. (2-tailed) | — | 0.0000 |
| | | N | 95 | 95 |

| | | | | |
|---|---|---|---|---|
| | Deposit Frequency | Correlation Coefficient<br>Sig. (2-tailed)<br>N | 0.6016<br>0.0000<br>95 | 1,000<br>—<br>95 |

Source: Processed Data, 2025

These findings indicate that penalties function as an effective disincentive instrument in improving customer discipline. The significant correlation supports the hypothesis that sanctions can encourage more active participation in the waste bank program.

Theoretically, this result is consistent with Principal–Agent Theory, particularly the concept of moral hazard, wherein agents (customers) tend to reduce effort when there are no consequences for non-compliance. The implementation of penalties serves as a control mechanism to reduce moral hazard through financial pressure, thereby aligning customer behavior with the objectives of the waste bank management.

**CONCLUSION**

1) The results of the Mann–Whitney test indicate a highly significant difference in waste deposit frequency between waste banks that implement penalty policies and those that do not in Buduk Village. Waste banks that enforce penalty policies tend to have consistently higher waste deposit rates. This shows that penalty policies function as an effective disincentive in increasing community compliance with waste bank–based waste management programs.

2) The results of the Spearman Rho correlation test show that penalty policies have a significant effect on waste deposit frequency, with a correlation coefficient of 0.6016 and a very low p-value (0.0000). This indicates that the stricter the penalty policy is implemented, the higher the likelihood that customers will deposit their waste more frequently. Strictly enforced penalty policies can reduce non-compliant behavior and encourage an increase in waste deposit frequency among waste bank customers.

**RECOMMENDATIOS**

Based on the research findings, the village government and waste bank managers in Buduk Village are advised to conduct further evaluations of the implementation of penalty policies to ensure they are more effective and do not generate dissatisfaction within the community. Strengthening socialization and education efforts is necessary, as well as ensuring that penalties are applied fairly and proportionally to the violations committed. This step is important so that penalty policies continue to support the main goals of the program without generating resistance.

In addition, waste bank managers need to consider developing more attractive incentive programs to encourage active participation in both waste sorting and waste deposits. Incentives may be offered in the form of rewards, reduced fees, or other benefits for customers who consistently participate. A balanced combination of incentives and penalties is expected to create a more efficient, adaptive, and sustainable waste management system.

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