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Transformation of Domestic Wastewater Management Policy in Malang

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Abstract

This study reexamines the implementation of Malang City's Local Regulation No. 2 of 2017, which addresses the management of domestic wastewater. The research investigates the factors supporting and hindering the policy's execution and assesses the effectiveness of the local government's strategies. Using a qualitative approach through interviews and observations, the findings reveal that the policy fulfills several key elements necessary for successful implementation, including well-defined target groups, programs, and administrative structures. However, communication gaps and limited public understanding present challenges to full compliance. This study highlights the importance of public engagement and improved information dissemination for more sustainable wastewater management practices in urban settings.

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1. Introduction

Domestic wastewater management in urban areas has become a critical issue in the context of public health and environmental sustainability, especially in developing countries such as Indonesia. Domestic wastewater consists of two main types, namely black water produced from toilet sanitation systems and grey water, which comes from daily activities such as washing and bathing (Li et al., 2024; Nurul Jannah, 2023). Both types of wastewater contain hazardous pollutants, such as nutrients, heavy metals, pathogens, and chemicals that can increase biological and chemical oxygen demand in water bodies, and pose a threat to aquatic life (Agarwal et al., 2022). If not managed properly, these pollutants can damage ecosystems and spread waterborne diseases, such as typhoid, cholera, and hepatitis, which can endanger public health, especially in dense urban areas ("Sustainable Cities and Domestic Wastewater Treatment," 2023). In the urban context, domestic wastewater is often the main cause of surface water pollution, including rivers used as a source of clean water by local communities. Therefore, sustainable wastewater management becomes important, not only for public health but also to maintain the sustainability of water and energy resources in the future (Agarwal et al., 2022).

Based on data from the Central Statistics Agency (2020), around 57% of households in Indonesia still dispose of their domestic waste directly into water bodies without going through a prior processing process (Indonesia, 2020). This phenomenon is also seen in Malang City, where the wastewater treatment system has not fully covered the entire population, causing pollution that has the potential to endanger public health and overall environmental quality. One of the factors that

influences waste management behavior is public education and knowledge. Studies show that higher levels of education and better knowledge correlate with better waste management practices, especially among housewives (Nanda et al., 2024). In addition, the availability of adequate facilities is essential to encourage effective waste management behavior, but in some areas, only a small proportion of the population has access to adequate facilities (Nanda et al., 2024). Technical challenges are also a inhibiting factor, as seen in Cahaya Abadi Housing, Palembang City, where technical inefficiencies in wastewater treatment plants exacerbate waste management problems (Bachri et al., 2024). Stronger institutional support and improvements to the institutional framework are also needed to improve the performance of waste management systems in Indonesia (Ahmad Ramadhan Haedaryanto et al, 2024).

The Malang City Government has attempted to address the problem of domestic wastewater management through the implementation of Regional Regulation No. 2 of 2017 concerning Domestic Wastewater Management. This regulation aims to regulate wastewater management, including the responsibilities of the community and government in reducing negative impacts on the environment. This regulation provides guidance on wastewater disposal procedures and the provision of adequate sanitation systems, especially in densely populated urban areas. However, the implementation of this policy still faces significant challenges, including in terms of communication and public awareness. The Malang City Government has been criticized for the lack of an effective communication strategy to raise public awareness of the importance of proper wastewater management (Secilya Maharani et al., 2024) . Inadequate infrastructure is also a major obstacle to the implementation of this policy, with insufficient facilities and resources to support effective wastewater management (Anisykurlillah et al., 2024). In addition, despite increased efficiency in budget allocation for environmental policies, more sustainable and targeted budgeting is needed to support these initiatives more optimally (Nusba Aini et al., 2023). Efforts to increase public engagement through education campaigns and infrastructure improvements are important steps in overcoming these barriers (Secilya Maharani et al., 2024).

Malang City, as one of the urbanization centers in Indonesia, has experienced a significant population increase over the past few decades. This population increase is accompanied by housing growth and economic activities, which directly increase the amount of domestic wastewater produced by households. However, the development of wastewater management infrastructure is not comparable to population growth and demand for sanitation services. Many areas in Malang City still use traditional wastewater disposal systems, where wastewater is discharged into open drains without going through a treatment process. This condition creates serious problems for public health, especially in densely populated areas with limited access to modern waste management systems (Novita et al., 2024). The increase in built-up areas in Malang City due to urbanization has increased the runoff coefficient, indicating an increasing demand for an effective wastewater management system (Darmawan et al., 2024). Although sanitation service coverage in Indonesia has reached 74.58%, many wastewater treatment facilities, including in Malang City, have not been operating optimally, exacerbating public health risks in areas with limited access to modern sanitation systems (Ahmad Ramadhan Haedaryanto et al, 2024). Community participation in the maintenance of sanitation facilities is an important key to improving sanitation conditions in the area (Maulana, 2024).

Research shows that the lack of sanitation infrastructure in urban areas such as Malang results in increased pollution of surface water and rivers, which are used by some communities as a source of clean water. Untreated wastewater often contains dangerous pathogens such as Escherichia coli, which are associated with infectious diseases such as diarrhea. In Malang, there was a significant correlation between E. coli content in water and diarrhea incidence, especially in areas with poor sanitation facilities (Rischa Dwitasari et al., 2023). In addition, wastewater pollution also impacts river ecosystems, where the influx of untreated wastewater disrupts aquatic life and reduces water quality, exacerbating the water crisis in urban areas (Diana Putri Wijayanti et al., 2023). Pollution by antibiotic-resistant bacteria in rivers near hospitals in Malang is also worrying, with studies showing the presence of bacteria that have a broad antibiotic resistance profile, which increases public health risks (Lelitawati et al., 2024). Inadequate sanitation infrastructure, such as open drainage systems, exacerbates environmental degradation, which is also seen in other cities such as Bandung, where wastewater is often disposed of in open channels (Hasbiah et al., 2023).

This phenomenon is exacerbated by low public awareness of the importance of proper wastewater treatment. Many communities do not fully understand the dangers of discharging wastewater without proper treatment. In addition, low public trust in water management authorities can hinder public participation in waste management initiatives, so effective engagement strategies such as direct outreach are needed to increase public awareness and participation (Gul et al., 2024). Educational strategies that take into account cultural and religious aspects are also important to increase public knowledge about proper wastewater management (Gul et al., 2024). Negative attitudes towards waste management often arise from a lack of knowledge and understanding, as seen in a study of waste management in Iraq, which suggests a broader environmental awareness problem (Shaker et al., 2024).

Since the implementation of Regional Regulation No. 2 of 2017, Malang City has made various efforts to improve the domestic wastewater management system, including by building several small and medium-scale wastewater treatment plants (IPAL). However, the biggest challenge in implementing this Regional Regulation lies in policy communication and public understanding. Studies show that ineffective communication between the government and the community is often a major obstacle in the implementation of environmental policies, including wastewater management (Mujahidah et al., 2024). Door-to-door socialization and targeted education efforts have proven effective in increasing public understanding and support for wastewater management, as in Bandung (Mujahidah et al., 2024). Malang City also faces infrastructure and financial challenges, which are exacerbated by the lack of community participation in waste and wastewater management, requiring a larger budget allocation and improved facilities (Anisykurlillah et al., 2024). Successful policy implementation requires clear communication, participation of various community actors, and an understanding of the benefits of the policy (Zumar Syafiq, 2024).

One of the main problems in wastewater management in Malang City is the lack of policy socialization. Although the government has set clear regulations, most people do not fully know or understand the contents of the Regulation. The lack of effective communication and socialization has been a significant obstacle in increasing community participation, as also observed in Bandung, where door-to-door socialization and targeted education efforts are recommended to increase public support for wastewater infrastructure (Mujahidah et al., 2024). The low level of community participation in Malang is also exacerbated by the limited supporting facilities, such as wastewater treatment plants that do not yet cover the entire city area. An evaluation of waste management policies in Malang shows that the lack of adequate infrastructure is a major obstacle to effective waste management (Anisykurlillah et al., 2024).

Inter-agency coordination is also a challenge in implementing wastewater management policies in Malang City. Lack of coordination between related agencies, such as the Public Works and Spatial Planning Agency and the Environmental Agency, results in overlapping programs that cause inefficiencies in wastewater management. Policy evaluation in Malang City shows that the lack of synergy between agencies and the lack of adequate budget allocation are the main obstacles in implementing regional sanitation programs (Anisykurlillah et al., 2024). In addition, this coordination challenge is also exacerbated by the weak involvement of local governments in managing water resources, which requires more integrated and collaborative governance to achieve more optimal results (Novita et al., 2024).

This study aims to evaluate the implementation of Regional Regulation No. 2 of 2017 concerning Domestic Wastewater Management in Malang City. Specifically, this study will examine how this policy is communicated to the public, the extent to which the public understands their responsibilities in wastewater management, and the challenges faced by local governments in implementing this policy. By evaluating aspects of policy communication, community participation, and inter-agency coordination, this study is expected to provide more specific recommendations to improve the effectiveness of wastewater management in Malang City.

This research is expected to provide benefits, both practically and theoretically. Practically, the results of this study are expected to help local governments in identifying obstacles faced in the implementation of Regional Regulation No. 2 of 2017 and provide relevant recommendations to improve the effectiveness of the policy. In addition, this study can also help increase public awareness

of the importance of domestic wastewater management, so that it can encourage more active participation from the community in maintaining environmental cleanliness.

Theoretically, this study is expected to contribute to the development of public policy implementation theory, especially in the context of environmental management in developing countries. By analyzing the factors that influence the success or failure of wastewater management policy implementation, this study can be a basis for further studies in the field of environmental and sanitation policies.

This study focuses not only on the technical evaluation, but also on the social and administrative aspects of domestic wastewater management, which is expected to make a significant contribution to the development of more effective environmental policies in the future. This study offers novelty in two main aspects. First, this study focuses on the evaluation of policy communication as a key factor in the successful implementation of wastewater management policies. Although many previous studies have examined the technical aspects of wastewater management, very few studies have specifically highlighted the role of policy communication and community participation in the successful implementation of sanitation policies. (Mujahidah et al., 2024). In Bandung, for example, targeted education efforts and door-to-door outreach have proven effective in increasing community involvement in supporting wastewater management. This study provides a new perspective on the importance of policy communication in increasing the effectiveness of environmental management through active community participation and inter-agency collaboration (Mujahidah et al., 2024).

Second, this study offers a comprehensive evaluation of inter-agency coordination in the implementation of wastewater management policies in Malang City. As a large city with high bureaucratic complexity, challenges in inter-agency coordination are important issues that are often overlooked in previous studies. This study focuses on improving inter-agency cooperation as a key to overcoming policy barriers, where better planning and selection of effective policy instruments can enhance collaboration and more successful policy implementation (Pfeiffer & Cundari, 1999). In addition, overcoming barriers such as conflicting policy objectives and inconsistent policies requires a new approach in inter-agency planning and coordination to improve the effectiveness of environmental policies at the local level (Johnson et al., 1987).

In general, domestic wastewater management in Malang City still faces various challenges that require further attention. These challenges are mainly related to the lack of effective policy communication, low levels of community understanding and participation, and weak coordination between agencies. To overcome these problems, strengthening local institutional capacity and identifying coordination mechanisms between agencies are essential to improve effective environmental management (Bartone et al., 1994). Through this study, it is hoped that more specific and relevant solutions can be found to overcome these obstacles, so that they can encourage more effective policy implementation in the future.

2. Methods

This study uses a qualitative approach that aims to deeply understand the implementation of domestic wastewater management policies in Malang City, especially Regional Regulation No. 2 of 2017. The qualitative approach was chosen because it allows researchers to explore social phenomena holistically, as well as obtain rich and in-depth data through direct interaction with respondents.

Research Design

This study uses a qualitative descriptive design that aims to comprehensively evaluate the implementation of domestic wastewater management policies in Malang City. This approach was chosen because it is able to dig up a deep understanding of the factors that support and hinder the implementation of the policy, as well as see the level of public understanding and participation in the policy. This study is also designed to analyze how the policy has been accepted and operationalized by stakeholders. The descriptive approach allows researchers to document the phenomena that occur in detail and provide a comprehensive picture of the reality on the ground. Through this approach, research can provide relevant insights for improving policy implementation in the future.

Research Location

The research was conducted in Malang City, East Java, with the main focus on related government agencies, namely the Public Works and Spatial Planning Agency (DPUPR). The selection of Malang City as the research location was based on its status as a large city with complex urban environmental challenges, especially in domestic wastewater management. In addition, several urban areas in Malang that were directly affected by wastewater management policies were also used as observation locations. Observations were conducted at wastewater treatment plants that had been built by the government, as well as areas that still used traditional methods of waste disposal. This variety of locations provided rich and contextual data on policy implementation in various geographic and social conditions.

Figure 1. Picture Caption
Source: (Google Maps, 2019)

Data Collection Techniques

Data collection in this study was carried out using three main techniques:

1. In-depth Interviews : Interviews were conducted with DPUPR officials of Malang City who were directly involved in the implementation of Perda No. 2 of 2017. In addition, interviews were also conducted with the community targeted by the policy to explore their understanding of the policy, as well as the extent to which they participated in the domestic wastewater management program. These interviews aimed to identify factors that support and hinder the success of the policy, as well as community perceptions of the impact of the policy.
2. Field Observation : Observations were conducted at domestic wastewater management locations that had been built under the supervision of the Malang City PUPR. Observations aimed to assess how policies were implemented directly, including the physical condition of wastewater treatment installations (IPAL), the effectiveness of their use, and operational challenges in the field. With this technique, researchers can directly see the real conditions and how policies are implemented in the community.
3. Documentation : Documentation techniques are carried out by collecting various relevant documents, such as annual reports from DPUPR, statistics related to the use of wastewater treatment plants, and news articles from local media. This data is used to strengthen the results of interviews and observations, as well as provide additional perspectives on policy implementation in terms of quantitative data.

Data Analysis Techniques

The data analysis technique used in this study is thematic analysis, which aims to identify, analyze, and report patterns (themes) that emerge from qualitative data. Thematic analysis provides a flexible framework for finding meaning behind rich qualitative data, thus providing a comprehensive picture of the phenomenon being studied. The following are the steps taken in the data analysis technique:

1. Data Transcription : The first step in data analysis is the transcription process. Data collected through interviews are transcribed verbatim to obtain complete and detailed written text. Transcription is done carefully to capture all information conveyed by the informants, including non-verbal expressions or significant pauses. This process is very important to maintain data accuracy and allow for more in-depth analysis. Transcription does not only involve copying words literally, but also includes interpretation of certain nuances in the language used by the informants.
2. Reading and Familiarization : Once the transcription is complete, the next step is to reread the entire data to improve understanding and gain an initial sense of possible patterns. At this stage, the researcher attempts to fully immerse themselves in the data, by reading the transcripts in

their entirety several times. This process helps the researcher recognize key topics that begin to emerge, as well as identify data that is relevant to the focus of the study.

3. Coding : Coding is the process of identifying and labeling important segments in the data that are relevant to the research question. Each meaningful segment of data is assigned an appropriate code, such as “enabling factors,” “inhibiting factors,” or “community participation.” These codes are created to facilitate grouping similar information and separating dissimilar information. In this stage, coding is done inductively, where codes are created based on what emerges from the data, not based on the researcher’s initial assumptions. This coding can be done manually or with the help of qualitative analysis software such as NVivo.
4. Grouping Codes into Themes : Once the data has been coded, the next step is to group the codes into larger, meaningful themes. Themes are broader patterns found in the data that reflect important aspects of the research problem. For example, the theme “factors supporting policy implementation” may include several smaller codes such as “budget support,” “clear bureaucratic structure,” or “community participation.” These themes are identified based on their frequency of occurrence, the narrative strength demonstrated by the data, and their relevance to the research question.
5. Review and Refining Themes : After the initial themes have been identified, the next step is to review the themes. The researcher re-checks whether the themes that have been identified have covered all relevant data, and whether each theme has a strong basis based on sufficient evidence from the data. Themes that are too broad can be broken down into more specific sub-themes, while overlapping or less significant themes can be combined or deleted. This review process aims to ensure that the resulting themes truly reflect the data as a whole and have good clarity.
6. Conclusion Drawing : After the relevant themes have been determined, the final stage is drawing conclusions based on the findings. The researcher analyzes the relationships between themes and how these themes answer the research questions or lead to new findings related to the implementation of domestic wastewater management policies in Malang City. In this stage, the researcher also considers the context in which the themes emerge and tries to relate them to relevant literature or theories. The conclusions drawn from this process are used as a basis for providing recommendations regarding policy improvements or the implementation of better practices in the field.

Validity and Reliability

The validity and reliability of the data in this study were guaranteed through the application of triangulation techniques. Triangulation was carried out by comparing the results of interviews, field observations, and documentation collected from various sources. This technique aims to ensure the consistency and credibility of research findings, as well as reduce subjective bias that may arise in the process of data collection and analysis. In addition, researchers also rechecked with key informants to validate the results of the transcribed interviews, thus ensuring that the data obtained was accurate and accountable.

3. Results and Discussion

Results

This study produced a number of important findings that can be divided into three main themes, namely supporting factors, inhibiting factors, and community participation in the implementation of Regional Regulation No. 2 of 2017. The results of this study were obtained through interviews with officials of the Public Works and Spatial Planning Agency (DPUPR) of Malang City and the community who were the targets of the policy. These findings are reinforced by relevant observation and documentation data.

The following is a flowchart that describes the stages of implementing domestic wastewater management policies in Malang City, based on the results of interviews, observations, and documentation.

Figure 2. Domestic wastewater management policy implementation process
Source: Processed Data by Researchers

1. Supporting Factors for Policy Implementation

Based on the results of interviews with officials of the Malang City PUPR, several factors were found that supported the successful implementation of Regional Regulation No. 2 of 2017. First, a clear and effective bureaucratic structure is one of the main pillars in policy implementation. The PUPR has a division of responsibilities that are clearly distributed across several work units, especially the Drinking Water, Wastewater, and Water Resources (AMAL) Section. This allows domestic wastewater management to run more orderly and efficiently. Each unit has specific duties and authorities, so that the policy implementation process can be followed properly by all related parties. This well-organized bureaucratic structure also facilitates coordination between sections so that policies can be implemented smoothly.

The second supporting factor is adequate budget support. The Wastewater Treatment Plant (IPAL) development program, which is an important part of this policy, is supported by funding from the Regional Revenue and Expenditure Budget (APBD) and the Special Allocation Fund (DAK). This adequate budget support allows for a more sustainable program implementation, because there is sufficient funding allocation for the development and maintenance of wastewater management facilities. In addition, an adequate budget also allows this program to cover a wider area and involve more people.

Consistent policy socialization is also a significant supporting factor. DPUPR routinely conducts socialization to the community, both through direct counseling and campaigns on social media. This counseling helps increase public understanding of the importance of good domestic wastewater management. In addition, through social media campaigns, information about the dangers of wastewater and how to manage it can be reached by more people, so that their participation in this program increases. Consistency in providing education and information plays an important role in changing public behavior towards this policy.

Table 1. Supporting Factors for Policy Implementation

Supporting Factors	Description
Bureaucratic Structure	A clear organization with adequate SOPs facilitates policy implementation.
Budget Support	APBD and DAK support funding for wastewater management programs and IPAL construction.
Socialization Program	Socialization through direct meetings and online campaigns helps increase public awareness of the importance of domestic wastewater management.

Source: Processed Data by Researchers

2. Factors Inhibiting Policy Implementation

Despite various supporting factors, this study also found a number of obstacles in the implementation of Regional Regulation No. 2 of 2017. One of the main inhibiting factors is the low

level of community participation. Based on interviews with the community, it was found that many residents were not fully involved in the wastewater management program. This low level of participation is largely due to a lack of understanding of the benefits of the Wastewater Treatment Plant (WWTP) and a lack of trust in the positive impacts of the facility. The community is still hesitant to participate in this program, because they are worried about the additional costs that must be incurred for WWTP maintenance, as well as the potential for unpleasant odors from the installation. This shows that even though socialization has been carried out, there are still challenges in convincing the community about the importance of participating in this program.

In addition, this study also found problems in internal communication at DPUPR. Ineffective communication between field staff and management resulted in delays in the implementation of several IPAL projects. In some cases, information that was not conveyed properly led to miscommunication and inefficiency in the field. This shows that good communication between all parties involved is essential to ensure smooth policy implementation. Failure to maintain effective communication can slow down project progress and reduce public trust in the program.

Limited facilities in some areas are also an obstacle in implementing this policy. Several areas in Malang City have difficult-to-access topography or high population density, making it difficult for the government to build IPAL in these areas. These limited facilities cause several areas to be inaccessible to the program, which ultimately has an impact on inequality in the implementation of wastewater management policies. Geographic factors and limited infrastructure are major challenges that need to be overcome by the local government to ensure that this program can be implemented evenly throughout the city.

Table 2. Factors Inhibiting Policy Implementation

Inhibiting Factors	Description
Low Participation	The community has little understanding and involvement in wastewater management programs due to concerns about costs and odors from wastewater treatment plants.
Internal Communication	There is an information gap between management and implementing staff which hampers project implementation.
Limited Facilities	Certain areas experience geographical constraints and inadequate infrastructure for implementing wastewater management programs.

Source: Processed Data by Researchers

Note: This diagram illustrates the comparison between supporting and inhibiting factors that influence policy implementation.

3. Community Participation in Policy Implementation

This study also highlights the importance of community participation in the successful implementation of domestic wastewater management policies. From the results of interviews and observations, it was found that in several areas that received intensive socialization, the community began to show positive behavioral changes in wastewater management. They began to use septic tanks and participate in local sanitation programs organized by the government. Public awareness of the importance of domestic wastewater management has increased, especially in areas that are actively involved in outreach programs.

However, public perception of the Wastewater Treatment Plant (WWTP) is still a challenge. Most people are still hesitant to participate in this program, because they are worried about negative impacts such as the odor that may be caused by the installation, as well as additional costs that must be incurred for maintenance. These concerns indicate that there needs to be a more inclusive approach in policy socialization, which does not only focus on technical aspects, but also addresses public concerns regarding the environmental and economic impacts of using WWTP. A more intensive socialization program involving local community leaders can be one solution to overcome this negative perception.

Table 3. Level of Community Participation in Wastewater Management Program

Participation Category	Description
Tall	Areas with intensive socialization showed high participation in the program, especially in the use of septic tanks.
Low	In areas without strong socialization, communities tend to be hesitant to participate in the program due to concerns about the costs and negative impacts of IPAL.

Source: Processed Data by Researchers

4. Evaluation of the Socialization Program

One of the important aspects evaluated in this study is the effectiveness of the socialization program carried out by the Public Works and Spatial Planning Agency (DPUPR) of Malang City. Policy socialization is a strategic step in the implementation of Regional Regulation No. 2 of 2017 concerning Domestic Wastewater Management. The purpose of this socialization program is to increase public awareness and understanding of the importance of good and proper wastewater management, and to invite them to actively participate in the domestic wastewater management program.

The results of the study show that the socialization carried out by DPUPR has achieved some success in certain areas, especially in areas that receive special attention and intensive socialization. In these areas, the community has begun to show changes in attitudes and behavior in wastewater management, such as the use of septic tanks and active participation in sanitation programs driven by the local government. Consistent socialization, both through direct meetings and campaigns on social media, has proven to be able to increase public awareness of the dangers of domestic wastewater that is not properly processed.

Although socialization programs in several areas have succeeded in increasing community participation, this study also found that many people still do not fully understand the benefits of good domestic wastewater management. Especially in areas that do not receive intensive socialization, the level of community understanding of this policy is still low. This is reflected in the low community participation in the wastewater management program, as well as hesitation to participate in the IPAL (Wastewater Treatment Plant) program due to concerns about maintenance costs and negative impacts such as odors.

Another obstacle found in the evaluation of the socialization program was the gap in the distribution of information between areas that received intensive socialization and areas that had not been touched by the program. This uneven socialization caused an imbalance in the level of community participation, where areas with strong socialization showed a high level of participation, while in areas that did not receive enough attention, participation tended to be low. This shows that the socialization carried out has not touched all levels of society evenly, so there are still challenges in reaching certain areas that are difficult to access or have populations that are more reluctant to participate in this program.

To overcome this problem, more intensive and sustainable efforts are needed in implementing socialization programs. The government should consider using a more inclusive approach, which does not only rely on formal meetings or social media campaigns, but also involves local community leaders, social institutions, and community organizations that can act as intermediaries for communication between the government and the community. This participatory approach can help expand the reach of socialization and ensure that the messages conveyed can be better received by the community.

In addition, the socialization program also needs to be combined with direct demonstrations in the field, where the community can see for themselves how the wastewater treatment plant works and its positive impacts on the environment. This is important to reduce public doubts and concerns about negative impacts such as odors or additional costs that they must pay. Involving the community directly in the process of monitoring and maintaining the wastewater treatment plant can also help increase their sense of responsibility for the environment and strengthen participation in the long term.

This study also shows that socialization on social media needs to be strengthened. Social media can be a very effective tool for disseminating information to young age groups and urban communities who tend to be more active on digital platforms. Therefore, DPUPR needs to utilize more digital channels to disseminate information, such as educational videos that explain the process of managing domestic wastewater in a simple way, infographics on the importance of sanitation, and campaigns

involving influencers or local figures who are widely known by the community. With this strategy, it is hoped that public awareness can be increased and negative perceptions about wastewater management can be minimized.

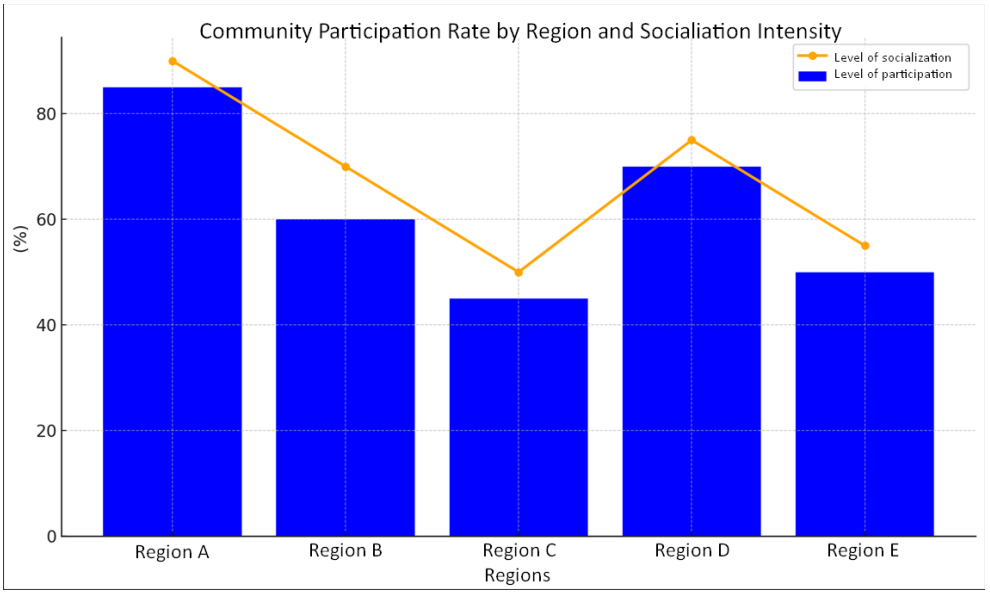

Figure 3. Level of Community Participation Based on Socialization Area
Source: Processed Data by Researchers

Note: This figure shows the level of community participation in various regions based on the intensity of socialization carried out.

Discussion

Community Participation in Domestic Wastewater Management

The research results in Figure 2 indicate that the level of community participation in domestic wastewater management is highly influenced by the intensity of socialization carried out in each area. Areas that receive intensive socialization tend to show higher participation compared to areas that receive less socialization. This emphasizes the importance of government efforts to conduct widespread and sustainable socialization to the community. Proper socialization can increase public understanding of the importance of proper domestic wastewater management, which in turn increases their participation in government programs. Without adequate socialization, the public may not fully understand the benefits of the program and may be reluctant to get involved.

High community participation in areas with intensive socialization reflects a better understanding of the benefits of domestic wastewater management. People in these areas are more aware of the importance of maintaining environmental cleanliness and the positive impact of participating in government programs. For instance, the community starts to realize that proper wastewater management can reduce the risk of waterborne diseases such as diarrhea or cholera. This shows that successful socialization programs not only explain the technical aspects of wastewater management but also convey the direct impact on public health and well-being.

Conversely, in areas with less optimal socialization, community participation remains low. This is likely due to a lack of understanding or doubts about the programs offered. Some community members may not be convinced of the benefits of wastewater treatment facilities or may be concerned about the additional costs they will have to bear for the maintenance of these facilities. Additionally, negative perceptions, such as concerns about foul odors from the wastewater treatment plants, may also hinder public participation. Therefore, it is important for the government to design more inclusive and participatory communication strategies.

A more inclusive approach to socialization can involve local community leaders, social institutions, or community organizations that are trusted by the local population. By involving these entities, the government can reach a broader group and strengthen their trust in the programs being offered. Socialization conducted directly in the field, such as demonstrations of how the wastewater treatment plant operates, can help reduce public doubts and increase their participation. Direct experiences like these can provide concrete evidence that the wastewater treatment plant does not have the negative impacts they fear.

Moreover, the use of social media as a tool for socialization needs to be strengthened to reach younger populations and urban communities who are more active on digital platforms. Social media can be an effective tool for spreading information about the importance of domestic wastewater management. Educational videos, infographics, or campaigns involving local influencers can raise public awareness and minimize negative perceptions. With this strategy, it is expected that community participation in domestic wastewater management will increase significantly.

Evaluation of the Impact of Socialization on Community Participation

The socialization program carried out by the Public Works and Spatial Planning Agency (DPUPR) of Malang City has achieved some success, particularly in areas that receive special attention and intensive socialization. In these areas, the community has begun to show changes in attitudes and behavior regarding domestic wastewater management, such as the use of septic tanks and active participation in sanitation programs driven by the government. Consistent socialization, both through direct meetings and social media campaigns, has proven effective in raising public awareness about the dangers of improperly treated domestic wastewater.

However, many people still do not fully understand the benefits of proper domestic wastewater management, especially in areas that do not receive intensive socialization. The level of public understanding in these areas remains low, as reflected in their low participation in wastewater management programs. Concerns about maintenance costs and the negative impacts of wastewater treatment facilities, such as odors, remain major barriers. Therefore, more intensive and continuous socialization efforts are needed to increase public participation in these areas.

More inclusive and sustained socialization strategies, as mentioned earlier, should be implemented to reach a wider audience. The government could also consider combining socialization programs with direct demonstrations in the field, so that the community can see firsthand how the wastewater treatment plant works and its positive environmental impact. Initiatives like this would help reduce public skepticism and encourage more active participation in domestic wastewater management programs.

Utilizing Social Media and Digital Campaigns

As part of the effort to increase community participation, the use of social media as a tool for spreading information about the importance of domestic wastewater management needs to be enhanced. Social media has great potential to reach younger audiences and urban communities who are active on digital platforms. Therefore, the Public Works and Spatial Planning Agency (DPUPR) of Malang City needs to utilize more digital channels to disseminate information, such as educational videos that explain the process of wastewater management in simple terms, infographics that highlight the importance of sanitation, and campaigns involving local influencers who are widely recognized by the community.

By using the right strategies, it is hoped that public awareness of the importance of domestic wastewater management will increase, thus minimizing negative perceptions about wastewater management. Additionally, engaging local influencers who have significant influence in the community can help convey messages about the importance of public participation in domestic wastewater management programs. These influencers can act as a bridge between the government and the public by delivering information that is more easily accepted by the public.

4. Research Implications

Improving inter-agency coordination is essential for effective policy implementation, particularly when dealing with complex, multi-faceted issues like environmental management. One effective strategy is to establish clear communication channels between agencies. This includes having regular meetings and briefings where representatives from all relevant departments come together to discuss progress, address challenges, and align their goals. By fostering open communication, agencies can prevent misunderstandings and ensure that everyone involved is on the same page. Additionally, setting up a centralized communication platform, such as a shared project management system, can help streamline updates and feedback, making it easier to track progress and address issues in real-time.

Another critical strategy is to define roles and responsibilities clearly across agencies involved in a project. Without clarity on who is responsible for specific tasks, overlapping duties or gaps in

accountability can arise, leading to inefficiencies and delays. A well-structured framework for assigning responsibilities helps each agency focus on its core tasks while ensuring that all aspects of the project are covered. Developing a standard operating procedure (SOP) for collaborative work can further reinforce this, as it outlines the processes and protocols that all parties must follow. This standardization helps in reducing confusion and creating a consistent workflow across different agencies.

In addition to clear communication and defined roles, joint training and capacity-building initiatives can significantly enhance inter-agency coordination. When personnel from different agencies undergo training together, they develop a shared understanding of the project's goals, challenges, and best practices. This collective learning experience can foster stronger professional relationships, leading to better collaboration. Joint capacity-building efforts also ensure that all agencies are equipped with the skills and knowledge necessary to carry out their roles effectively. Moreover, it creates a sense of unity and shared purpose, which is critical for achieving long-term success.

Another strategy that can improve inter-agency coordination is integrated planning. Rather than working in isolation, agencies should collaborate from the planning stage to ensure that their actions are aligned and complementary. This approach reduces the risk of conflicting objectives or duplicated efforts, which often occur when agencies operate independently. Integrated planning encourages a holistic view of the project, allowing agencies to anticipate challenges that might arise from their interactions and work together to mitigate them. It also facilitates better resource allocation, as agencies can pool their resources and expertise to achieve common goals.

Lastly, leadership and oversight play a pivotal role in enhancing inter-agency coordination. Having a dedicated coordinating body or leader responsible for overseeing the collaboration between agencies ensures that the project stays on track. This leader acts as a mediator, resolving disputes, and ensuring that all agencies are fulfilling their roles. Strong leadership also ensures that accountability is maintained, with regular evaluations to track progress and address any inefficiencies. This oversight mechanism provides a structure for addressing potential conflicts and adjusting strategies as needed, ensuring that all agencies are aligned in working toward the overall objectives of the policy.

5. Conclusion

This study has evaluated the implementation of Regional Regulation No. 2 of 2017 on domestic wastewater management in Malang City, focusing on three main aspects: supporting factors, inhibiting factors, and community participation. Based on the results of the study, several important findings have been identified, which provide an in-depth understanding of the challenges and successes in implementing this policy.

First, in terms of supporting factors, this study found that a clear and effective bureaucratic structure in the Public Works and Spatial Planning Agency (DPUPR) of Malang City played an important role in the successful implementation of the policy. The well-organized division of tasks and responsibilities within work units, such as the Drinking Water, Wastewater, and Water Resources Sections, enabled the policy to be implemented efficiently. Adequate budget support from the APBD and DAK also strengthened the implementation of the program, especially in terms of the construction of the Wastewater Treatment Plant (IPAL). In addition, consistent policy socialization through outreach and campaigns on social media helped increase public understanding of the importance of good domestic wastewater management.

However, this study also revealed a number of inhibiting factors in policy implementation. One of the main obstacles is low community participation. Many residents do not fully understand the benefits of domestic wastewater management, so their participation in this program is still low. Community doubts mainly arise from concerns about the cost of maintaining the IPAL and the potential negative impacts, such as the odor caused by the installation. In addition, ineffective internal communication at the PUPR DPU is also an obstacle, where information is not conveyed properly between field staff and management, causing delays in the implementation of several projects. Limited facilities in several areas, especially areas with difficult to access topography or high population density, also hamper the implementation of the program evenly.

This study also highlights the importance of community participation in the successful implementation of domestic wastewater management policies. The results of interviews and observations show that in areas that received intensive socialization, the community began to show positive behavioral changes in managing wastewater. However, in areas that received less socialization attention, community participation was still low. Community concerns about the additional costs and environmental impacts of the WWTP indicate that there is still a need for a more inclusive and comprehensive socialization approach.

In the context of evaluating the socialization program, this study found that although the program has succeeded in increasing public awareness in several areas, there are still gaps in the distribution of information. More intensive and sustainable socialization is needed, especially in areas that have not been touched by this program. Involving local community leaders and direct demonstrations in the field can help increase public understanding of the benefits of domestic wastewater management and reduce their concerns about negative impacts. In addition, the use of social media as a communication tool also needs to be strengthened to reach urban communities and young age groups who are more active on digital platforms.

Overall, this study provides important insights into the implementation of domestic wastewater management policies in Malang City. These findings are expected to be the basis for local governments in improving policies and increasing the effectiveness of wastewater management programs in the future. In addition, this study also contributes to the development of public policy implementation theory, especially in the context of environmental management in developing countries. Efforts to improve policy communication, increase community participation, and strengthen inter-agency coordination will be important steps in ensuring the long-term success of this policy.

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