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IMPLEMENTATION OF THE "JEMPUT SAMPAH TERIMA DUIT" (JUMPA MADU) WASTE COLLECTION APP TO PROMOTE CLEANLINESS IN LUBUK PAKAM SUBDISTRICT, DELI SERDANG REGENCY

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Abstract

Waste management in Indonesia has become increasingly complex due to population growth, lifestyle changes, and inadequate source-based management. In response, the Deli Serdang Regency government introduced a digital innovation, *Jumpa Madu* (Jemput Sampah Terima Duit), to enhance waste management efficiency through a technology-based system combined with economic incentives. This study aims to examine the implementation of the Jumpa Madu application in Lubuk Pakam District, focusing on community participation, implementation effectiveness, and the challenges encountered. A descriptive qualitative method with a case study approach was employed. Data were collected through observations, interviews, and documentation involving key stakeholders, including the Environmental Agency, the BERSERI central waste bank, and community users. The findings indicate that community participation is relatively high, particularly among active users who recognize the economic benefits of waste sorting. The application effectively facilitates waste collection scheduling and increases the economic value of segregated waste. However, several challenges persist, including limited digital literacy, constrained technical resources, and uneven access to information. This study concludes that Jumpa Madu represents a promising innovation in strengthening circular economy-based waste management at the local level. Its optimal implementation requires stronger cross-sector collaboration, continuous public education, and improved regulatory and digital infrastructure support.

Keywords: Waste Management, Digital Innovation, Circular Economy, Community Participation, Jumpa Madu

INTRODUCTION

Waste management has become one of the most pressing environmental issues in Indonesia, driven primarily by rapid population growth and increasing urbanization. Based on national data, Indonesia's population reached 280.73 million in 2023, with an estimated waste generation rate of 0.5 kg per capita per day. This condition results in approximately 420.10 million kilograms of waste being generated daily, the majority of which originates from household activities. The increasing volume of waste poses significant challenges for local governments, particularly in managing waste effectively and sustainably. At the regional level, Deli Serdang Regency reflects similar conditions, where population growth directly contributes to the rise in waste generation. In 2023, the total population reached over 2 million people, with Lubuk Pakam District as one of the administrative centers experiencing significant population density. Specifically, Lubuk Pakam recorded 91,981 residents, producing an estimated 46 tons of waste per day. This growing volume of waste has exceeded the capacity of conventional waste management systems, which still rely heavily on collection and disposal methods without adequate waste reduction or recycling processes. Furthermore, data indicate that a significant proportion of waste in Deli Serdang remains unmanaged, highlighting inefficiencies in the existing system. The dominance of household waste, combined with low levels of community awareness and participation in waste sorting, exacerbates environmental problems such as pollution and landfill overcapacity. This condition underscores the urgent need for innovative and sustainable waste management solutions that actively involve the community. In response to these challenges, the government of Deli Serdang Regency has introduced the JUMPA MADU (Jemput Sampah Terima Duit) application as a form of digital-based innovation in waste management. This application is designed to facilitate waste collection services, connect communities with waste banks, and provide economic incentives for sorted waste. By integrating digital technology into public services, JUMPA MADU aims to enhance efficiency, transparency, and community participation in waste management practices. The implementation of digital innovation in public services aligns with the broader concept

of e-governance and sustainable development, where technology plays a crucial role in improving service delivery and addressing environmental challenges. However, the success of such innovation is not solely determined by technological advancement, but also by the level of community engagement, institutional capacity, and policy support. Previous studies have shown that low public awareness, limited digital literacy, and weak coordination among stakeholders often hinder the effectiveness of policy implementation in environmental management. Based on these conditions, this study aims to analyze the implementation of the JUMPA MADU application in Lubuk Pakam District, focusing on three main aspects: (1) the level of community participation in waste management, (2) the effectiveness of the application in supporting waste management processes, and (3) the factors that hinder its implementation. By addressing these aspects, this research is expected to contribute to the development of more effective and sustainable waste management strategies, particularly through the integration of digital technology and community-based approaches.

LITERATURE REVIEW

Waste management is a critical issue that continues to be a focus of various studies, particularly in developing countries like Indonesia, which is experiencing rapid population growth. According to various studies, population growth directly leads to an increase in the volume of waste generated daily. This is supported by the concept put forward by the WHO, which states that each individual generates an average of approximately 0.5 kg of waste per day. With a large population, waste generation poses a serious challenge that requires systematic and sustainable management. Previous research indicates that waste management systems in Indonesia are still dominated by conventional approaches, namely collection, transportation, and disposal at Landfills (LFs). According to Sari (2024), this approach has a major flaw because it does not solve the problem at its source but merely shifts the problem to another location. Furthermore, research by Burhanuddin (2024) highlights the low level of public awareness regarding waste sorting and management as a key factor exacerbating the national waste management situation.

From a theoretical perspective, modern waste management is based on the waste management hierarchy, which emphasizes reduction, reuse, and recycling before waste is disposed of in landfills. This concept aligns with the sustainable development approach, which aims to maintain a balance between human needs and environmental conservation. Additionally, behavioral change theory serves as a crucial foundation for understanding how public awareness and participation can be enhanced in waste management. However, in practice, there remain various differences and debates in the literature. Some studies emphasize that the main problem lies in the lack of waste processing infrastructure and technology, while others argue that social factors such as public behavior and a lack of environmental education are actually the primary causes. On the other hand, there are also differing views regarding the effectiveness of government policies in addressing waste issues, particularly in the implementation of community-based management programs. Based on the existing literature review, it can be concluded that there remains a gap between the ideal concept of waste management and actual practices in the field. The lack of integration between policy, technology, and community participation remains an unresolved issue. Therefore, this study aims to bridge this gap by offering a new perspective on more effective waste management strategies, particularly in enhancing public awareness and engagement as well as optimizing source-separated waste management systems.

METHOD

This study employs a qualitative approach with a descriptive research design, aimed at analyzing the implementation of the JUMPA MADU (Jemput Sampah Terima Duit) application innovation in realizing environmental cleanliness in Lubuk Pakam District, Deli Serdang Regency. The research design is systematically arranged through several stages, including problem identification, data collection, data processing, analysis, and conclusion drawing. This approach is chosen to provide an in-depth understanding of community participation, application optimization, and the inhibiting factors in the implementation of the program.

The target subjects of this study are the community of Lubuk Pakam District as users of the JUMPA MADU application, as well as related stakeholders such as the Environmental Agency, the Communication and Informatics Office, and the BERSERI Main Waste Bank management. The selection of informants uses purposive sampling, based on specific criteria such as direct involvement in the program, experience in using the application, and roles in waste management. This ensures that the collected data are relevant to the research objectives. The materials and tools used in this study include interview guidelines, voice recording devices, cameras or smartphones for documentation, and field notes. In addition, secondary data such as official documents, institutional reports, and

statistical data related to waste management in Deli Serdang Regency are also utilized. The research instruments are designed based on key variables, including community participation, application effectiveness, and implementation constraints. The instrument design is carried out by developing structured and in-depth interview guidelines. The performance and validity of the instruments are ensured through data triangulation techniques, by comparing results from interviews, observations, and documentation. This approach is used to ensure the reliability and accuracy of the data in reflecting actual field conditions. Data collection techniques in this study include in-depth interviews, direct observation, and documentation. Interviews are conducted with key informants to obtain detailed information regarding the implementation of the JUMPA MADU program, while observations are carried out to examine actual waste management practices and community participation levels. Documentation serves as supporting data to strengthen the research findings. As an overview of the research context, the following table presents population data of Deli Serdang Regency, which contributes to increasing waste generation:

Table 1. Population by Gender in 2023

District	Male 2022	Male 2023	Female 2022	Female 2023	Total 2022	Total 2023
Gunung Meriah	1,685	1,736	1,569	1,637	3,254	2,874
S.T.M Hulu	6,710	6,898	6,942	7,171	13,652	14,023
Sibolangit	9,920	10,189	10,133	10,441	20,053	22,476
Kutalimbaru	18,046	18,571	18,404	18,968	36,450	40,656
Pancur Batu	47,108	48,522	47,064	48,542	94,172	96,288
Namo Rambe	19,888	20,453	19,983	20,578	39,871	41,479
Lubuk Pakam	44,284	45,605	44,877	46,253	89,161	91,981
Deli Serdang	983,675	1,014,629	970,311	1,003,535	1,953,986	2,012,411

(Source: BPS Deli Serdang, 2024)

Furthermore, the following table presents waste management data at the provincial level:

Table 2. Managed Waste Data in North Sumatra Province (2023)

Region	Waste Generation (Ton/Day)	Reduction (%)	Handling (%)	Managed (%)	Unmanaged (%)
Deli Serdang	1,126.61	21.87	40.85	62.72	37.28
Medan City	1,226.07	9.62	72.81	82.43	17.57
Pematang Siantar	241.43	22.98	72.39	95.37	4.63

(Source: SIPSN, 2023)

The data indicate that Deli Serdang Regency still has a relatively high percentage of unmanaged waste, highlighting the need for innovation such as the JUMPA MADU application in community-based waste management. Data analysis in this study uses qualitative descriptive analysis techniques, including data reduction, data presentation, and conclusion drawing. The collected data are categorized based on research themes, namely community participation, application optimization, and inhibiting factors. The results of the analysis are then used to answer the research questions systematically.

In this study, the relationship between variables can be simply illustrated by the following equation:
$\alpha + \beta = c$ ..... (1)
Where:
α = community participation
β = effectiveness of the JUMPA MADU application
c = success level of waste management

Equation numbering is written sequentially and aligned to the right. Mathematical notations used in this study will be explained at the end of the article before the bibliography, following the International System of Units (SI).

RESULTS AND DISCUSSION

This section presents the empirical findings derived from the research context outlined in the introduction, followed by an in-depth discussion that critically interprets the results in relation to relevant theoretical perspectives and prior studies. The analysis focuses on the dynamics of waste generation, community participation, and the implementation of the JUMPA MADU (Jemput Sampah Terima Duit) application as a form of digital-based public service innovation in waste management.

Waste Generation and Community Participation in Lubuk Pakam

The findings demonstrate that population growth constitutes a significant driving factor in the escalation of waste generation. Nationally, Indonesia's population reached 280.73 million in 2023, with an estimated waste generation rate of 0.5 kg per capita per day, resulting in approximately 420.10 million kilograms of household waste generated daily. This macro-level condition is reflected at the regional level, particularly in Deli Serdang Regency, including Lubuk Pakam District. At the local level, Lubuk Pakam recorded a population of 91,981 inhabitants in 2023, contributing to an estimated daily waste generation of approximately 46 tons. This substantial volume indicates a growing burden on the local waste management system. Furthermore, the predominance of household waste, coupled with limited public awareness regarding waste sorting and recycling practices, exacerbates the inefficiency of waste management processes. The persistence of unsorted waste at the source suggests that the existing system remains largely dependent on conventional approaches, particularly collection and disposal to landfills.

From an analytical standpoint, these findings reinforce the theoretical premise that community participation is a critical determinant of effective waste management. The absence of active public engagement undermines the implementation of sustainable waste management principles, such as waste reduction, reuse, and recycling. Consequently, behavioral transformation and environmental awareness emerge as key components in addressing the structural challenges of waste management. This aligns with prior studies emphasizing that socio-cultural factors significantly influence environmental program outcomes. The findings demonstrate that population growth constitutes a significant driving factor in the escalation of waste generation. Nationally, Indonesia's population reached 280.73 million in 2023, with an estimated waste generation rate of 0.5 kg per capita per day, resulting in approximately 420.10 million kilograms of household waste generated daily. This macro-level condition is reflected at the regional level, particularly in Deli Serdang Regency, including Lubuk Pakam District.

At the local level, Lubuk Pakam recorded a population of 91,981 inhabitants in 2023, contributing to an estimated daily waste generation of approximately 46 tons. This substantial volume indicates a growing burden on the local waste management system. Furthermore, the predominance of household waste, coupled with limited public awareness regarding waste sorting and recycling practices, exacerbates the inefficiency of waste management processes. The persistence of unsorted waste at the source suggests that the existing system remains largely dependent on conventional approaches, particularly collection and disposal to landfills. From an analytical standpoint, these findings reinforce the theoretical premise that community participation is a critical determinant of effective waste management. The absence of active public engagement undermines the implementation of sustainable waste management principles, such as waste reduction, reuse, and recycling. Consequently, behavioral transformation and environmental awareness emerge as key components in addressing the structural challenges of waste management. This aligns with prior studies emphasizing that socio-cultural factors significantly influence environmental program outcomes.

Implementation of the JUMPA MADU Application and Its Challenges

The results further indicate that the JUMPA MADU application represents a strategic innovation in integrating digital technology into waste management practices. Developed and managed by the Communication and Informatics Office of Deli Serdang Regency, with operational support from the BERSERI Main Waste Bank, the application provides a platform for facilitating waste collection services, monitoring waste transactions, and generating economic incentives for users. The implementation of this application signifies a transition from conventional waste management systems toward a more integrated and technology-driven approach. In this context, the application embodies the principles of digital governance and public service innovation, aiming to enhance efficiency, transparency, and accountability. Moreover, the system contributes to the development of a circular economy model by transforming waste into an economic resource, thereby incentivizing community participation.

However, despite its potential, the findings reveal several critical challenges in its implementation. One of the primary constraints is the relatively low level of public engagement in utilizing the application. This limitation is influenced by several factors, including insufficient socialization, limited digital literacy, and entrenched behavioral patterns that do not prioritize waste sorting at the source. Additionally, the effectiveness of the application is contingent upon the coordination and synergy among stakeholders, including government agencies, waste management operators, and the community.

From a critical perspective, these findings suggest that technological innovation alone is insufficient to ensure the success of waste management programs. Instead, a multidimensional approach that integrates technological advancement with social, institutional, and behavioral interventions is required. Strengthening stakeholder collaboration, enhancing public awareness through continuous education, and improving system usability are essential strategies to optimize the effectiveness of the JUMPA MADU application. In broader terms, this study highlights that while digital-based innovations hold significant potential in addressing environmental challenges, their success is highly dependent on contextual factors, particularly community readiness and institutional capacity. Therefore, a holistic and adaptive approach is necessary to achieve sustainable waste management outcomes in Lubuk Pakam District.

CONCLUSION

This study aimed to analyze the implementation of the JUMPA MADU (Jemput Sampah Terima Duit) application as a digital-based innovation in improving waste management in Lubuk Pakam District, Deli Serdang Regency. As outlined in the Introduction, the increasing population growth has significantly contributed to the escalation of waste generation, creating serious challenges for local waste management systems. The findings confirm that the dominance of household waste, combined with limited public awareness and participation, remains a major obstacle in achieving effective and sustainable waste management.

The results and discussion demonstrate that the JUMPA MADU application has considerable potential to enhance waste management practices through the integration of digital technology and community-based approaches. The application facilitates waste collection services, promotes transparency, and provides economic incentives that encourage public involvement. However, its implementation has not yet reached optimal effectiveness due to several constraints, including low levels of community participation, limited digital literacy, insufficient program socialization, and the need for stronger coordination among stakeholders.

Therefore, it can be concluded that while technological innovation such as JUMPA MADU represents a progressive step toward sustainable waste management, its success is highly dependent on the synergy between technology, community behavior, and institutional support. Without active public engagement and effective governance, the potential benefits of such innovation cannot be fully realized. In terms of future development, several strategic efforts are recommended to improve the implementation of the JUMPA MADU application. These include enhancing community education and awareness programs, expanding digital literacy initiatives, strengthening stakeholder collaboration, and continuously improving the application system to ensure user accessibility and efficiency. Furthermore, integrating the application with broader environmental policies and waste management frameworks can support the development of a more comprehensive and sustainable waste management system. Overall, this study highlights the importance of adopting a holistic approach that combines technological innovation, social participation, and institutional capacity to address the growing challenges of waste management in Lubuk Pakam District and similar contexts.

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