

# Driving sustainable waste management: The role of local champions and social media engagement

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**Abstract.** This study explored the effects of local champions and social media on shaping perceptions and behaviors related to domestic waste management across nine villages in West and East Java, Indonesia. Employing a quantitative approach, the research engaged 245 respondents involved in a waste management assistance program. Structural Equation Modeling (SEM) analysis revealed that both local champions and social media play essential roles in enhancing waste management perceptions and behaviors. Local champions significantly influenced perceptions and behaviors, while social media had a more substantial effect on perceptions and behaviors. Social media platforms offer a cost-effective method for reaching broader audiences, facilitating real-time communication, and promoting awareness of sustainable waste management. The results emphasize the crucial significance of embedding local champions into digital platforms to promote sustainable waste management practices. This study offers important findings for government officials to strengthen waste management strategies through the synergistic use of local champions and social media engagement.

## 1 Introduction

Indonesia generated approximately 67.8 million tons of waste in 2020, with domestic waste accounting for approximately 42,1 percent of the total [1]. As global waste production continues to increase at an unprecedented rate, effective domestic waste management has become increasingly critical to ensure environmental sustainability and public health. The growing volume of household waste presents significant challenges for municipalities, necessitating innovative and community-driven solutions to address these issues effectively [2]. One such approach is the emergence of "local champions," individuals who lead and advocate for waste management initiatives within their communities. These local champions play a pivotal role in mobilizing collective action, fostering community engagement, and enhancing participation in sustainable waste management programs [2]. Concurrently, the

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rapid expansion of social media provides unprecedented opportunities to amplify waste management efforts by raising awareness, promoting best practices, and encouraging behavioral changes on a broader scale [3].

Recent research highlights social media's potential as a powerful tool for disseminating information and engaging communities in adopting proper waste disposal techniques and recycling practices [4]. Platforms such as Facebook, Twitter, and Instagram have proven effective in educating the public, fostering positive attitudes towards waste management, and increasing participation in community-based initiatives [5]. By leveraging these digital platforms, communities can amplify awareness, instill a sense of shared responsibility, and encourage sustainable waste management behaviors [6]. However, despite the growing recognition of social media's impact, there remains a lack in understanding the synergistic effects of combining local champions' efforts with digital engagement strategies, particularly in developing countries.

The primary focus of this study is addressing the persistent issue of ineffective domestic waste management in several Indonesian villages. Inefficient waste management practices in these regions contribute to environmental degradation and health risks. Existing approaches often fail to adequately engage communities, resulting in low participation rates and insufficient household-level waste segregation. This study posits that integrating the leadership of local champions with the outreach capabilities of social media can significantly improve community engagement, reshape perceptions, and enhance overall waste management outcomes.

Local champions play a pivotal role in influencing community behaviors and driving sustained engagement in waste management initiatives. They act as role models, demonstrating best practices and inspiring others to adopt similar behaviors [2]. Simultaneously, social media platforms offer a cost-effective means of reaching broader audiences, enabling real-time communication, and fostering awareness about sustainable waste management practices [3]. When combined, these strategies are expected to generate a synergistic effect, amplifying their individual impacts and resulting in more effective waste management outcomes.

Evidence from previous studies underscores the effectiveness of community-based waste management models when supported by local leadership and institutional backing [7]. For instance, in Zambia, local champions have successfully mobilized community participation in solid waste management programs [2]. By acting as intermediaries between communities and waste management authorities, these champions ensure that local needs and concerns are addressed, fostering trust and cooperation. Similarly, social media campaigns have demonstrated their ability to increase public awareness and participation in environmental initiatives, such as recycling and waste reduction, as evidenced by successful case studies in Malaysia [6]. These platforms facilitate continuous feedback and engagement, enabling the refinement of strategies to achieve better outcomes.

The combination of local champions and social media presents a promising avenue for creating sustainable and impactful waste management practices. Local champions can utilize social media to expand their influence and enhance community outreach, while social media platforms provide the tools and resources necessary for fostering meaningful community engagement [8]. Despite this potential, there is limited research exploring the combined impact of these two approaches, especially in the context of developing countries like Indonesia. Existing studies often analyze either local champions or social media independently, overlooking the contextual factors that may influence their effectiveness when integrated.

This study seeks to address this knowledge gap by conducting a comprehensive examination of how local champions and social networking platforms collectively influence

community attitudes and practices concerning household waste management. Focusing on nine villages in West and East Java, this study seeks to identify best practices and provide actionable insights for policymakers and practitioners. The research objectives are twofold: (1) to evaluate how local champions and social media influence perceptions and behaviors related to domestic waste management, and (2) to examine how these perceptions translate into actual waste management practices. By adopting a comprehensive approach that integrates community leadership and digital platforms, this study contributes novel insights into developing effective, community-centered waste management strategies. The findings are expected to inform policy development and guide practitioners in leveraging local leadership and digital engagement to address waste management challenges in diverse contexts.

## 2 Methods

This study employed a quantitative methods supported by qualitative data to enhance depth and context. The research utilized both primary and secondary data sources. Primary data were collected through field observations, in-depth interviews, and structured questionnaires administered to all members of CSR program-assisted groups in purposively selected villages. A census method was applied to ensure comprehensive coverage, yielding 245 respondents from nine villages in West and East Java. The selection of villages was based on their active involvement in a corporate CSR waste management program.

The structured questionnaire used for data collection was rigorously pre-tested to ensure validity and reliability, confirming its suitability for the study objectives. Respondents' perceptions and behaviors were measured using a Likert scale, focusing on key parameters such as the role of local champions, the use of social media, perceptions of domestic waste management, and waste management behavior. Data collection was conducted over six months, from October 2023 to March 2024.

Secondary data were sourced from relevant literature, government reports, and CSR program documentation to provide contextual and supplementary insights. The hypothetical model guiding this study is illustrated in Fig 1, serving as the analytical framework for the research.

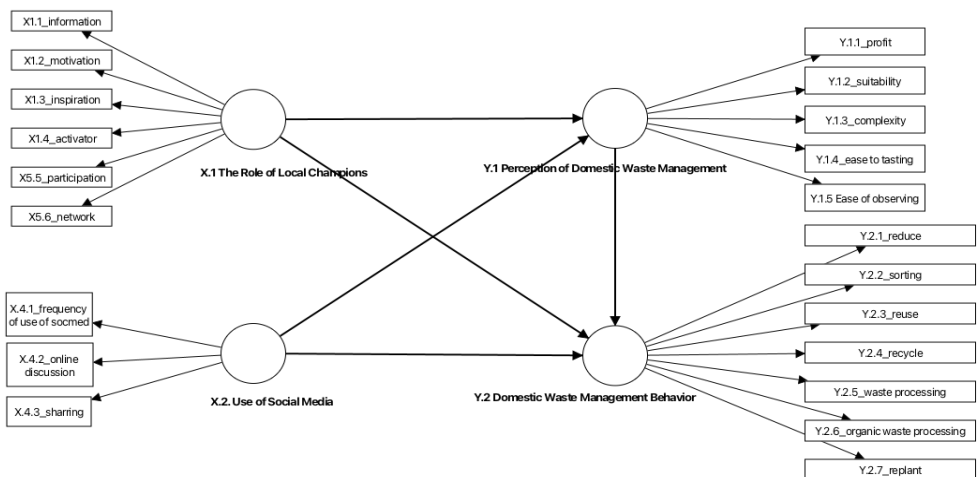


Fig. 1. Hypothetical model

### 3 Result

#### 3.1 Measurement model evaluation

The data analysis assesses the reliability and validity of key constructs within the Structural Equation Modeling (SEM) framework. Table 1 presents the measurement model evaluation, focusing on four constructs: Role of Local Champions, Social Media Use, Perceptions of Waste Management, and Domestic Waste Management Behavior. Following [9], the analysis ensures reliability, convergent validity, and discriminant validity, confirming the model's robustness and adherence to established standards.

**Table 1.** Measurement model test results

Variabel	Indicator	Outer Loading	Cronbach's Alpha	Composite Reliability	AVE
Local Champion's Role	Information	0.920	0.969	0.975	0.867
	Motivation	0.923			
	Inspiration	0.932			
	Activator	0.920			
	Participation	0.957			
	Network	0.935			
Social Media Use	Frequency of use	0.692	0.819	0.892	0.737
	Online Discussion	0.919			
	Sharring	0.942			
Perceptions on Waste Management	Profit	0.860	0.949	0.961	0.831
	Suitability	0.884			
	Complexity	0.943			
	Ease to tasting	0.932			
	Ease to observing	0.937			
Domestic Waste Behavior	Reduce	0.720	0.922	0.937	0.682
	Sorting	0.833			
	Reuse	0.801			
	Recycle	0.852			
	Non-Organic Processing	0.893			
	Organic Processing	0.813			
	Plant	0.859			

Internal consistency was assessed through Cronbach's Alpha and Composite Reliability (CR), both of which exceeded the recommended threshold of 0.7. Cronbach's Alpha values ranged from 0.819 for Social Media Use to 0.969 for Role of Local Champions, demonstrating high reliability across constructs. Similarly, CR values consistently surpassed 0.8, with the Role of Local Champions achieving the highest score of 0.975, further validating the robustness of its indicators.

Convergent validity was confirmed through Average Variance Extracted (AVE), with all constructs achieving values above the 0.5 threshold, signifying that the constructs captured a substantial proportion of variance. For example, the Role of Local Champions recorded an AVE of 0.867, supported by high indicator loadings such as Participation (0.957) and Network (0.935). Likewise, Social Media Use achieved an AVE of 0.737, driven by indicators like Information Sharing (0.942) and Online Discussions (0.919), emphasizing the significance of digital engagement in waste management initiatives.

The model's discriminant validity, evaluated using the Heterotrait-Monotrait Ratio (HTMT), confirmed the conceptual distinctiveness of the constructs, with all HTMT values below the recommended threshold of 0.85 (Table 2). The HTMT value between Social Media Use and Role of Local Champions was 0.772, demonstrating their relatedness while maintaining clear boundaries. Similarly, the HTMT value between Perception of Domestic Waste Management and Domestic Waste Management Behavior was 0.748, underscoring their differentiation despite their theoretical interconnectedness within the framework.

High outer loading values further validated the indicators' contributions to their respective constructs. For instance, Participation (0.957) was the strongest indicator for Role of Local Champions, while Information Sharing (0.942) emerged as a key indicator for Social Media Use. Indicators with slightly lower outer loadings, such as Frequency of Social Media Use (0.692) and Reduce (0.720), were still within acceptable limits, signifying their relevance in explaining the constructs.

Overall, the measurement model meets the rigorous standards for reliability, convergent validity, and discriminant validity [9]. The consistently high values of Cronbach's Alpha, CR, and AVE, coupled with robust HTMT results, demonstrate the model's quality and confirm the distinctiveness of its constructs [9]. These findings establish a solid foundation for subsequent structural model analysis and reinforce the theoretical proposition that local champions and social media play integral roles in fostering sustainable waste management practices.

**Table 2.** Value of HTMT

Variable Relationship	HTMT
Use of Social Media (X2) <-> The Role of Local Champions (X1)	0.772
Perception of Domestic Waste Management (Y1) <-> The Role of Local Champions (X1)	0.601
Perception of Domestic Waste Management (Y1) <-> Use of Social Media (X2)	0.701
Domestic Waste Management Behavior (Y2) <-> The Role of Local Champions (X1)	0.647
Domestic Waste Management Behavior (Y2) <-> Use of Social Media (X2)	0.692
Domestic Waste Management Behavior (Y2) <-> Perception of Domestic Waste Management (Y1)	0.748

### 3.2 Structural model evaluation

The evaluation of the measurement model involves two key components: The Variance Inflation Factor (VIF) analysis and hypothesis testing [9]. The VIF values presented in Table 3 evaluate the presence of multicollinearity among the predictor variables in the structural model. Multicollinearity occurs when predictor variables are highly correlated, which can compromise the reliability of coefficient estimates. The VIF value below 5 indicates that multicollinearity is not a concern, ensuring that each predictor contributes uniquely to the

model [9]. In this study, all VIF values fall well below the threshold, confirming the absence of multicollinearity and the robustness of the structural model.

For The Role of Local Champions, the VIF values for predicting Perception of Domestic Waste Management (2.050) and Domestic Waste Management Behavior (2.167) indicate that this variable provides a unique and significant contribution to both outcomes, without substantial overlap with other predictors. Similarly, the VIF values for Use of Social Media in predicting Perception of Domestic Waste Management (2.050) and Domestic Waste Management Behavior (2.393) suggest moderate correlations with other predictors, yet these values remain within the acceptable range. Additionally, the VIF for Perception of Domestic Waste Management as a predictor of Domestic Waste Management Behavior is 1.748, highlighting its independent role in explaining variations in behavior.

**Table 3.** Value of VIF

Variable Relationship	VIF
The Role of Local Champions (X1) -> Perception of Domestic Waste Management (Y1)	2.050
The Role of Local Champions (X1) -> Domestic Waste Management Behavior (Y2)	2.167
Use of Social Media (X2) -> Perception of Domestic Waste Management (Y1)	2.050
Use of Social Media (X2) -> Domestic Waste Management Behavior (Y2)	2.393
Perception of Domestic Waste Management (Y1) -> Domestic Waste Management Behavior (Y2)	1.748

Table 4 summarizes the results of hypothesis testing for the direct effects among variables in the structural model, providing valuable insights into the relationships between constructs. The analysis confirms that all hypothesized relationships are statistically significant, with p-values below 0.05, thereby validating the proposed theoretical framework.

**Table 4.** Hypothesis testing results among variables (direct effect)

Variable Relationship	Path Coefficient	T statistics	P values	Remarks
The Role of Local Champions (X1) -> Perception of Domestic Waste Management (Y1)	0.259	2.988	0.003	Significant
The Role of Local Champions (X1) -> Domestic Waste Management Behavior (Y2)	0.224	2.954	0.003	Significant
Use of Social Media (X2) -> Perception of Domestic Waste Management (Y1)	0.443	6.343	0.000	Significant
Use of Social Media (X2) -> Domestic Waste Management Behavior (Y2)	0.177	2.331	0.020	Significant
Perception of Domestic Waste Management (Y1) -> Domestic Waste Management Behavior (Y2)	0.464	5.258	0.000	Significant

The findings show that the role of local champions has a significant and positive influence on the perception of domestic waste management (path coefficient = 0.259,  $t = 2.988$ ,  $p = 0.003$ ) and on domestic waste management behavior (path coefficient = 0.224,  $t = 2.954$ ,  $p = 0.003$ ). These results indicate that local champions are instrumental in shaping community perceptions and directly influencing sustainable waste management practices. Furthermore, social media use demonstrates a strong and significant impact on the perception of domestic

waste management (path coefficient = 0.443,  $t = 6.343$ ,  $p < 0.001$ ) and a weaker but still significant effect on domestic waste management behavior (path coefficient = 0.177,  $t = 2.331$ ,  $p = 0.020$ ). This suggests that while social media is primarily effective in shaping perceptions, it also plays a role in fostering behavioral changes.

The strongest relationship observed is between the perception of domestic waste management and domestic waste management behavior (path coefficient = 0.464,  $t = 5.258$ ,  $p < 0.001$ ). This highlights the critical role of perceptions as a precursor to behavioral change, demonstrating that a positive perception of waste management practices can translate into actionable behaviors at the community level.

Table 5 presents the results of hypothesis testing for indirect effects, emphasizing the mediating role of Perception of Domestic Waste Management in the relationships between predictor variables and domestic waste management behavior. The findings reveal that perception plays a significant mediating role, enhancing the effects of both The Role of Local Champions and Social Media Use on behavior. This is supported by the significant path coefficients, t-statistics, and p-values.

The indirect effect of local champions on domestic waste management behavior through perception is statistically significant, with a path coefficient of 0.120 ( $t = 2.217$ ,  $p = 0.027$ ). This indicates that while local champions have a direct influence on behavior, their impact is amplified when they improve community perceptions of waste management. Similarly, the indirect effect of social media use on behavior through perception is stronger, with a path coefficient of 0.206 ( $t = 4.253$ ,  $p < 0.001$ ). These results suggest that the primary mechanism through which social media drives behavioral change is by shaping positive public perceptions of waste management practices.

**Table 5.** Hypothesis testing results among variables (indirect effect): Perception of Domestic Waste Management as mediation variable

Variable Relationship	Path Coefficient	T statistics	P values	Remarks
The Role of Local Champions (X1) -> Perception of Domestic Waste Management (Y1) -> Domestic Waste Management Behavior (Y2)	0.120	2.217	0.027	Significant
Use of Social Media (X2) -> Perception of Domestic Waste Management (Y1) -> Domestic Waste Management Behavior (Y2)	0.206	4.253	0.000	Significant

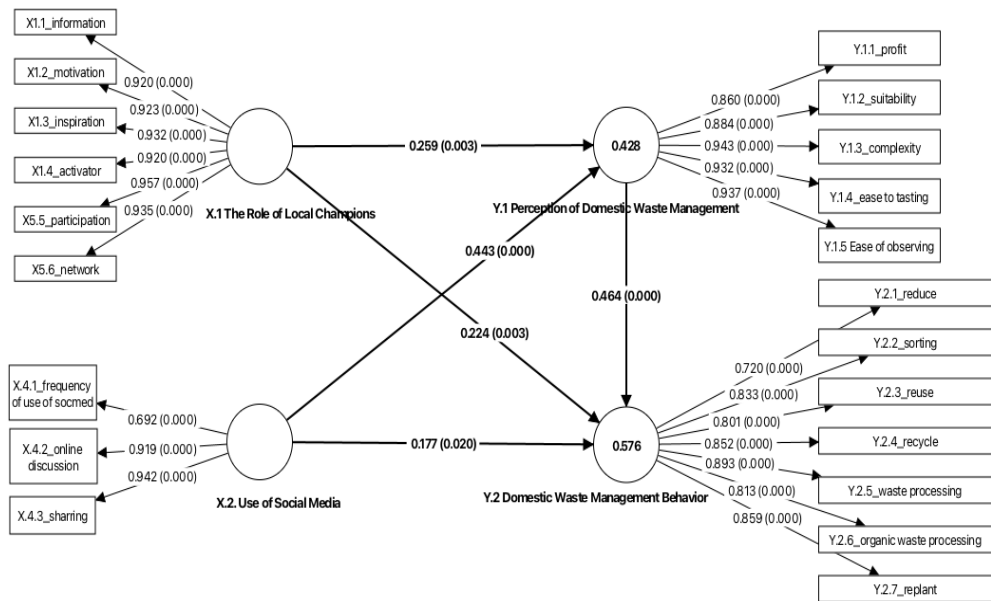
The findings underscore the pivotal role of perception as a mediating variable within the structural model. Perception serves as a bridge between the influence of local champions and social media and the behavioral outcomes associated with waste management. Local champions, through their grassroots leadership and direct engagement, significantly affect behavior but are most impactful when they enhance community perceptions of waste management. Conversely, social media proves to be an effective tool for scaling awareness and fostering favorable perceptions, which subsequently translate into behavioral changes.

### 3.3 Model quality

The quality of the model in this study is assessed using three indicators: R square value, The Standardized Root Mean Square Residual (SRMR), and Q-square predict. Based on the SmartPLS analysis, all three indicators show good values, indicating a high-quality model. The R Square value for Domestic Waste Management Behavior (Y2) is 0.576, indicating that

57.6% of the variance in Y2 can be explained by the independent variables in the model (Fig 2). The Standardized Root Mean Square Residual (SRMR) value of 0.059 indicates an acceptable model fit, as it falls below the threshold of 0.10. In line with [10]. The Q-square predict value for Domestic Waste Behavior (Y2) is 0.439, indicating a predictive accuracy of 43.9%, which is categorized as moderate [11].

The Goodness of Fit Index (GoF) is employed to assess the overall fit of the model, encompassing both the measurement and structural models. GoF is calculated by taking the square root of the product of the average communality and the average R-square values [12]. In this study, the mean communality, derived from the squared loading factors, was 0.778, while the mean R-square value was 0.502. These calculations resulted in a GoF index of 0.624, indicating that the model demonstrates good overall fit and falls within the high category [12].



**Fig. 2.** Results of measurement model and structural model evaluation

## 4 Discussion

This study provides significant insights into the roles of local champions and social media in influencing perceptions and behaviors related to domestic waste management across nine villages in West and East Java. Through Structural Equation Modeling (SEM), the analysis confirms that both local champions and social media play critical roles in enhancing community engagement in waste management practices. Local champions were found to have a meaningful positive impact on perceptions and behaviors, reflecting their trusted leadership and ability to mobilize community members effectively. Similarly, social media emerged as a powerful tool for raising awareness and fostering positive attitudes toward sustainable waste management practices. Furthermore, the study highlights the importance of perceptions as a mediating variable, bridging the influence of local champions and social media with behavioral outcomes. These findings underscore the need for targeted efforts to enhance community awareness and attitudes, which are essential for driving meaningful behavioral changes.



From a theoretical perspective, this study advances the understanding of how localized leadership and digital platforms interact to address environmental challenges. Local champions, as influential community figures, play a pivotal role in mobilizing and sustaining engagement, aligning with prior research which emphasized the importance of local leadership in fostering community participation in environmental initiatives [2]. The integration of social media into this framework adds a contemporary dimension to the traditional community-based model. Platforms such as Facebook, Twitter, and Instagram have demonstrated their effectiveness in disseminating information and encouraging public participation in environmental management [4, 13]. This combination of localized leadership and scalable digital engagement provides a comprehensive approach to waste management and can be adapted to other community-based environmental initiatives.

The findings also emphasize the strong relationship between perception and behavior, aligning with the theory of planned behavior, which posits that attitudes and perceptions are critical determinants of behavioral intentions and actions. This underscores the importance of fostering positive perceptions as a pathway to sustainable behavioral change [14]. Local champions and social media campaigns can effectively cultivate these perceptions, leading to significant improvements in waste management behaviors. The findings add to the growing body of literature on environmental behavior, highlighting how perceptions act as a key driver for translating awareness into actionable practices.

The practical implications of these findings are substantial for policymakers and practitioners. The significant influence of local champions and social media on perceptions and behaviors suggests that these elements should be systematically integrated into waste management policies and programs. Empowering local champions with resources, training, and platforms can enable them to serve as role models and effectively engage communities in sustainable practices. Their ability to inspire collective action and sustain engagement is crucial for the success of waste management initiatives.

Simultaneously, social media campaigns should be strategically employed to raise awareness and promote community involvement. Platforms like Facebook, Twitter, and Instagram can be leveraged to share best practices, address specific waste management challenges, and encourage positive behaviors. Such campaigns offer real-time communication and feedback opportunities, enabling continuous refinement of strategies to meet community needs effectively. Policymakers and practitioners should prioritize developing targeted campaigns that bridge information gaps, foster public discussions, and educate the community on sustainable waste management techniques [14].

In conclusion, this study underscores the complementary roles of local champions and social media in driving sustainable waste management practices. By integrating grassroots leadership with digital engagement strategies, policymakers and practitioners can design more effective interventions to enhance perceptions, encourage behavioral change, and promote sustainable practices across communities. This holistic approach provides a robust framework for addressing environmental challenges and advancing community-centered waste management initiatives. The findings emphasize the need for collaborative and innovative strategies that leverage both traditional leadership and modern technological tools to foster long-term environmental sustainability.

## **5 Conclusion**

This study underscores the significant roles of local champions and social media in shaping perceptions and behaviors related to domestic waste management in communities across West and East Java. The findings reveal that local champions are instrumental in driving community engagement by serving as role models and advocates for sustainable waste

management practices. Their influence encourages active participation by positively impacting both the perceptions and behaviors of community members, fostering a sense of collective responsibility toward waste management initiatives.

Similarly, social media emerges as a powerful tool for enhancing waste management outcomes. This study highlights its effectiveness in raising awareness, shaping positive attitudes, and motivating sustainable waste management behaviors. By providing real-time information, facilitating community discussions, and promoting the exchange of best practices, social media complements the efforts of local champions, creating a synergistic effect that amplifies the overall impact of waste management programs.

The integration of local champions and social media offers a comprehensive and scalable approach to addressing waste management challenges. This combined strategy demonstrates that leveraging local champions in tandem with targeted social media campaigns can lead to substantial improvements in waste management outcomes, fostering a culture of sustainability within communities.

These findings have important implications for policymakers and practitioners. To maximize the benefits of this approach, efforts should focus on empowering local champions by equipping them with the necessary resources, training, and platforms to effectively engage with their communities. Concurrently, social media should be strategically employed to disseminate information, facilitate dialogue, and bridge communication gaps, ensuring that waste management programs are accessible and impactful.

Future research should delve deeper into additional factors influencing waste management perceptions and behaviors, such as cultural norms, socioeconomic conditions, and access to resources. This expanded understanding can help develop even more robust and inclusive strategies for promoting sustainable waste management practices. By combining the strengths of traditional leadership with the capabilities of digital tools, communities can achieve significant progress toward their sustainability goals, addressing the dual challenges of environmental protection and community engagement in a holistic manner.

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