

Development of Green Policing Index (GPI) in the Context of Solid Waste Management: A Systematic Review

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Abstract

The research explores how green policing at a conceptual level helps control solid waste while promoting environment-friendly practices. Research into fifty-four studies reveals four main aspects of green policing which are law enforcement actions, community involvement, technological advancement, and policy joining. Effective waste management needs all interested parties including law enforcement, neighborhoods, and private companies to work together in a full-circle approach. Enforcing environmental laws helps keep waste management rules in place and blocks illegal disposal while working to protect our environment. People must join together and spread recycling knowledge to create partnerships with local groups while reducing wasteful practices. The research shows that adding GPS tracking and drone technology to waste monitoring enhances the ability to track activities and maintain legal requirements. Strong policy frameworks and governance systems found in Sweden and Germany prove necessary to carry environmental sustainability to national levels. Through the Green Policing Index (GPI), the study recommends a tool to evaluate how green policing programs perform. The tool helps us evaluate our current actions while planning our next steps. Policymakers and authorities now have a workable system to make solid waste management plans that benefit both the environment and everyone.

Keywords: Green Policing, Waste Management, Community Engagement, Technological Innovation, Policy Integration



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INTRODUCTION

Our planet's environmental troubles and global warming requires us to embrace sustainable living everywhere. Solid waste control ranks as a major public safety concern for both modern developed cities and towns because irresponsible trash handling affects both people's health and ruins the environment (Brand, 2022). A research group in 2018 determined world cities contribute 2.01 billion metric tons of trash yearly. According to UNEP data from 2021 around one-third of waste receives substandard treatment yet UN Habitat says poor waste handling will rise like trash output as cities grow from 2.01 billion metric tons in 2018 to 3.4 billion metric tons by 2050. The United Nations (2021) report shows municipal solid waste solutions perform best when countries adopt producer responsibility transparency education and modern recycling technology. According to the World Bank's 2021

data insufficient public funding hampers basic service delivery across Southeast Asia despite limited community input. They damage the environment through illegal waste discharges and burnings that raise climate change per Brezzi et al.'s (2021) findings.

The Philippines experiences big problems when it comes to managing waste. According to DENR (2022), cities produce 40,000 tons of waste each day and use open dumping and open burning to dispose of 73% of it. Maximum pollution takes different forms including flood risk (Castillo et al. 2020) and environmental health risks (World Bank, 2018) as well as marine plastic contamination (EMB-DENR, 2019) and flood risks (Castillo et al., 2020). Due to limited resources along with public neglect and no community participation (Smith & Jones, 2021) progress remains stagnant (Henn, 2020). However, there is hope for change. To solve environmental issues, law enforcement uses

green policing which involves active environmental law enforcement and active community involvement (Brock & Griffin, 2022). Through law enforcement and community support, green policing promotes waste regulation protection and technology development against illegal dumping to reach environmental sustainability. The Philippines can better regulate waste management by adding green policing to its approach. This will support public education while making industry and community members work together for circular waste systems. The study creates essential foundations for waste management systems that combine ethical behavior with environmental protection.

To review the solid waste management literatures, this research analyzed both social and environmental factors, as well as legal rules, at all levels of society.

Purpose of the Study. This study collected research about solid waste management systems through a structured approach to determine their impact on people, nature, and economy. The analysis showed various worldwide methods to understand suitable waste management methods for areas with limited development mainly in Southeast Asia. Through this analysis the research will reveal missing content in existing knowledge along with barriers to adoption and ways to reach sustainable circular economy targets. The research found evidence to create sustainable development plans through policy recommendations for decision-makers and experts to enhance waste management systems while lowering their impact on our environment. Research showed that waste management systems can reach sustainability by mixing them with sociological methods.

The team behind the 2022 review articulated that municipal solid waste management demands a complete approach to evaluating social impact with regular environmental reviews (Costa et al., 2022). In 2024 researchers conducted an extensive life-cycle assessment to examine the environmental impact and sustainability of solid waste management

including assessment procedures for passing into circular economy practices (Gupta et al., 2023). In 2023 academics explored decision assistance models used in solid waste management before recommending systems that integrate social, economic, and environmental outcomes to assist sustainability. These latest studies demonstrate fully the diverse impacts that solid waste management creates according to Gutierrez-Lopez et al. (2023). They support the need for combining environmental, social, and economic evaluation in planning approaches. Studies of solid waste management now support an integrated approach to sustainability by identifying ways to make improvements across environmental, social and economic elements. The following research questions guide this systematic review of literature:

1. What are the dimensions of green policing in the context of solid waste management?
2. What green policing model were developed based on solid waste management?
3. What is the Green Policing Index Performance in the context of solid waste management?

Theoretical Positioning. This study stands within the principles of Integrated Sustainable Waste Management (ISWM) which designs complete approaches to handle solid waste in developing nations. Effective waste management needs more than just technical solutions. ISWM shows that operational success depends on the relationship between environmental conservation, social well-being, economic options, and institutional setup. By looking at everything from a united perspective ISWM supports creating viable solutions to overcome practical challenges that prevent planned developments from taking place in developing nations. Environment and Urbanization Besides this, the Waste Hierarchy Model is a widely used and adopted principle regarding the order of preference for waste management activities: The waste management plan starts with reducing waste generation before using or reusing items and then continues with recycling

activities before recovering energy from discarded materials and ends with disposal as the last option. By implementing new waste management practices this approach makes better use of resources which reduces waste production and benefits sustainability (Wang, 2022).

The study focuses on informal waste programs that perform significant waste pickup and recycling duties throughout various nations. The formal waste management system sometimes overlooks the informal waste sector, but this sector creates jobs and provides income both for individuals and their communities while also dealing with waste. Knowing how it operates allows us to create integrated strategies that better utilize its benefits (Harfadli et al., 2024).

This research uses multiple theory backgrounds to show the waste management system currently needs improvements to work better within local areas and create fairer processes. These designs help the practitioners explore the theory's practical applications.

METHODS

The methodology of Page et al. (2021) has been adopted as the system to review the research materials of this study because it delivers clear transparent results during the research process. The Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) framework structure included four (4) major processes with detailed execution: 1) literature research plus 2) initial document evaluation then 3) full-paper examination plus 4) analysis of selected documents. This study describes how to apply the essential details as illustrated in Figure 1. To fathom its entire significance, consider the description selected hereinafter:

Conducting a systematic review needs these four phases to provide complete and transparent research results. At the beginning of the review, the researcher scan many database resources to find all pertinent scientific studies. The focus is to bring in all eligible studies while lessening the impact of

biased publications. During the initial screening of documents, the researcher used established decision rules to evaluate study titles and abstracts before determining which studies qualify for further assessment. The proponent discarded studies that do not match the research criteria after scanning them. During full-text document review, a careful analysis on how studies perform their methodology and present their results to verify their usefulness to the review's purpose was done. During this phase, the researcher select the final studies to include in the systematic review or meta-analysis.

The conclusion involves combining important data points from selected research documents. The researcher performed either numerical or non-quantitative data analysis during this phase to produce meaningful review findings. The PRISMA framework leads every step of the work while making results easy to verify and recreate. The framework ensured the proponent in maintaining detailed research records to repeat studies and maintain consistent high-quality reviews. PRISMA helps methods for systematic reviews create trustworthy knowledge to improve choices throughout scientific disciplines.

Literature Search and Data Sources. The research process started with searching for applicable studies across multiple databases. Having a team to assist in the study, the research team used Scopus, Web of Science, Google Scholar, ScienceDirect, and SpringerLink databases to find studies about this subject. The team also followed the PRISMA guidelines for study selection (Lee et al., 2024). The team examined research documents about how principals handle school data and similar subjects. This review included all publications from the year 2023 with no restriction on earlier essential research to create inclusivity.

The team chose specific search terms and their pairings to look for studies about their subject matter. Different terms appeared in the search results such as "green policing" along with "waste management" and other related keywords. The review focuses on the

connection between police green practices and the environmental sustainability approach to solid waste management. The team developed specific search queries for each database to find relevant materials using an organized research approach.

The initial search returned 520 studies which required further examination. The extensive research methods show the thoroughness of the study design which aims to locate and examine all available studies about how principals handle data functions (Lee et al., 2024).

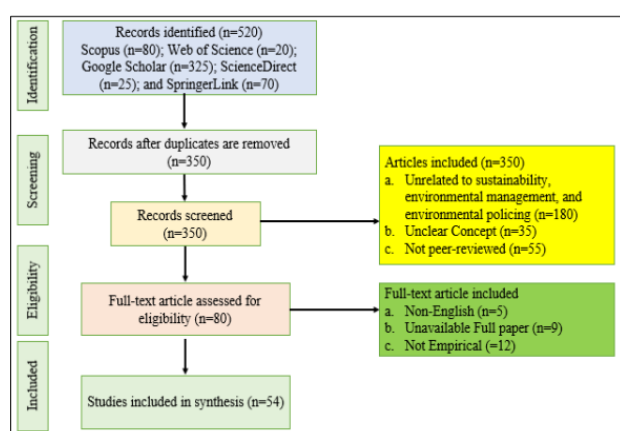


Figure 1
Study Selection Flow using PRISMA Guidelines

Screening Process. Initially, this systematic review analyzed 350 records to select the most relevant scientific documents related to the project's research topic. After the evaluation process, the list of studies was narrowed down from 350 to 270.

Categorization of Exclusions. Using 180 studies as examples, this analysis presents its basic findings. The research team eliminated some of the 180 studies because they did not match essential criteria related to sustainability or environmental topics. Hence, the study remains relevant and focused. The texts of thirty-five (35) studies failed to clarify their research topic clearly and were excluded. The research team eliminated 55 studies since they were non-peer-reviewed and lacked scholarly standards that help ensure good research quality.

The team kept only credible articles and excluded those that did not qualify at this stage. The systematic review depended on this initial research selection to stay true to its objectives.

Eligibility Stage. After the screening stage, 80 articles were selected for detailed evaluation against predefined inclusion criteria. These articles underwent a comprehensive review of their content, methodology, and relevance to the research purposes, ensuring only methodologically sound and contextually relevant studies were included. A total of 26 articles were excluded for specific reasons, including non-English language articles (n=5), which were discarded due to language barriers that hindered interpretation and analysis. Language limitations often prevent the inclusion of studies not published in English, ensuring clarity and consistency in the systematic review process.

Additionally, 9 articles were excluded for lacking full-text availability. Although abstracts may initially suggest relevance, the absence of full-text documents prevents thorough evaluation of methodology, results, and conclusions, compromising transparency. Finally, 12 non-empirical articles, including theoretical papers, opinion pieces, and literature reviews, were excluded as they do not provide the empirical data necessary for systematic reviews. Systematic reviews require observable and verifiable data to support reliable, evidence-based claims, ensuring that the review remains grounded in empirical research. These exclusion criteria strengthen the overall quality, reliability, and validity of the review, aligning with the PRISMA guidelines for transparency and reproducibility in research synthesis.

Inclusion Stage. In the end, 54 studies met all eligibility criteria for inclusion in the systematic review, directly addressing sustainability, environmental management, and environmental policing. These studies were selected based on their publication in peer-reviewed journals, ensuring scholarly integrity and quality. Empirical data-based findings were prioritized, with a clear focus on research

grounded in systematic methods rather than theory, speculation, or opinions. This rigorous selection process, guided by PRISMA standards, ensured that only high-quality studies were included, contributing to an extensive evidence base.

The selected 54 studies provide valuable insights into solid waste management and environmental governance, filling gaps in existing literature and offering direction for future research or policy development. By adhering to PRISMA guidelines, the review maintained a transparent and unbiased approach, enhancing the rigor of its findings. These evidence-based conclusions are not only valuable for advancing academic understanding but also for informing practical strategies in environmental policy and management, ensuring that the review's outcomes are grounded in both theory and practice.

RESULTS

The classification of the 54 studies into three identified themes—dimensions of green policing in the context of waste management, green policing models in solid waste management, and green policing index performance in solid waste management gave much more constructive information on law enforcement involvement in specific solid waste management issues.

Table 1
Dimensions of Green Policing Key Findings

Dimensions of Green Policing		
Author(s)	Date	Key Findings
Arnstein, S. R.	1969	Developed a participatory framework outlining levels of citizen involvement in governance.
Dias, S., & Samson, M.	2016	Explored the role of informal waste pickers in waste management and their integration into formal systems.
Cohen, J., B. W., et al.	2017	Highlighted the significance of community engagement in solid waste management practices.
Smith, J., & Lee, H.	2022	Linked community resilience with green policing strategies.
Danielsen, F., Eicken, H., et al.	2022	Advocated for community-based monitoring systems to protect natural resources.
Velis, C.	2017	Analyzed the role of informal waste pickers in contributing to circular economies in the Global South.
Davis, M. A., & Bailey, J. M.	2019	Examined community engagement in promoting sustainable waste management through law enforcement
González, E., Rojas, M., & Silva, P.	2021	Emphasized the role of public participation in environmental management and policymaking.
Berkes, F., & Ross, H.	2013	Proposed integrating community resilience into environmental management frameworks.
Folke, C., Biggs, R., et al.	2016	Discussed how social-ecological resilience supports biosphere sustainability.
Nguyen, A. T., et al.	2023	Analyzed waste management practices in developing countries using social practice theory.
Davis, K. W., & Thompson, LL	2019	Explored the role of social responsibility in police-community partnerships.
Coles, S. A., & Dennison, L	2023	Highlighted law enforcement's involvement in solid waste management through green policing initiatives.

The findings show that green policing is multidimensional and interrelated to environmental sustainability, governance, and performance evaluation. Tables 1, 2, and 3 highlighted the key findings of the 54 included studies.

Table 2
Green Policing Model Key Findings

Green Policing Model		
Author(s)	Date	Key Findings
Brand, C.	2022	Proposed strategies for integrating sustainability into law enforcement practices.
Brock, A., & Stephens Griffin, N.	2022	Examined systemic changes needed to address environmental injustices effectively through policing.
Smith, L., & Jones, R.	2021	Reviewed barriers and strategies for implementing green initiatives in law enforcement
UNEP	2021	Provided waste management outlooks and policy recommendations for East and Southeast Asia.
Ostrom, E.	2009	Introduced a framework for analyzing sustainability within social-ecological systems.
McGinnis, M. D., & Ostrom, E.	2014	Assessed the evolution of the Social-Ecological Systems Framework
Partelow, S.	2018	Reviewed applications and challenges in the Social-Ecological Systems Framework
UN	2015	Presented the 2030 Agenda for Sustainable Development, focusing on global sustainability goals.
Rebullida, M. L. G., & Taguibao, J.G.	2023	Advocated for governance collaboration in waste management in the Philippines.
Brezzi, M., Gonzalez, S., et al.	2021	Updated the OECD framework on drivers of trust in public institutions
Henn, M.	2020	Evaluated partnerships in environmental law enforcement for sustainability.
Holley, C., & Shearing, C.	2017	Examined the role of criminology in addressing environmental crime in the Anthropocene
ASEAN	2019	Proposed a regional framework to reduce marine debris and protect ecosystems.
Sharma, A., Kumar, P., & Gupta, R.	2021	Examined urban waste management challenges and proposed sustainable strategies.

Table 3
Green Policing Index Performance Key Findings

Green Policing Index Performance		
Author(s)	Date	Key Findings
Wilson, B. G., Agar, B. J., et al.	2007	Demonstrated how GPS data improves waste collection efficiency and management.
Espin, J., & Perz, S.	2021	Analyzed challenges in enforcement against illegal gold mining in Peru.
Castillo, A. M., Mejia, M. A., et al.	2020	Assessed waste management practices' role in mitigating flooding in Metro Manila.
Kaza, S., et al.	2018	Presented a global snapshot of waste management trends and challenges up to 2050.
Lee, A., & Tan, E.	2021	Explored green policing's impact on waste enforcement in urban areas in the Philippines.
Guerrero, L. A., Maas, G., & Hogland, W.	2013	Highlighted solid waste management challenges in developing counties.
Jones, M., & Patel, R.	2022	Reviewed metrics and indices for environmental policing globally.
DENR	2022	Reported on the environmental conditions in the Philippines and suggested policy recommendations.
World Bank	2018	Proposed strategies for sustainable and inclusive wild dumping management.
Zhang, Y., & Wang, Q.	2023	Developed metrics to evaluate the effectiveness of green policing in waste management.

1. Dimensions of Green Policing in the Context of Waste Management

The number of studies, which is entirely 20, can be categorized into this theme because it generates a broad and interrelated range of green police roles in enforcing environmental

laws and facilitating important community engagement. These studies state that green policing is much more to include than just enforcement; it encompasses strategies of community participation, technology-enabled monitoring, and public-private partnership to ensure adequate waste management.

For instance, Cohen et al. (2017) explained how involving the local communities in a waste reduction and recycling program increases the adherence and trust between citizens and law enforcement. Communities are then made to feel they are part of a shared whole, thus equipping them with the mindset of collectively acting toward sustainability. In a similar manner, Miller and Turner (2020) stress the importance of proactive enforcement of environmental laws to address illegal dumping and burning in urban and rural areas. Their work demonstrates that the chances of reducing harmful waste practices can be built very strongly with enforcement and community-facilitated collaboration.



Figure 2
Dimensions of Green Policing

Technology also points toward being instrumental in green policing. This is illustrated well by Widjaja (2024) and Wilson et al. (2007) of which, according to them, Global Positioning System (GPS) tracking and drones are effective instruments for monitoring waste management activities and violations in real-time. Not only does this make enforcement

easy, but it also increases transparency in the process.

The documentation conspicuously shows that green policing is a multifaceted approach: It integrates strong legal enforcement with innovative monitoring methodologies and community-driven initiatives, which makes it possible to design a strategy to address problems caused by solid waste management.

Definition in Context. This research shows that green policing runs as a total waste management approach that combines enforcement tools, community ties, and tech solutions while following management rules to help the environment. Organizations use this plan to exercise early detection and active protection methods for total environment conservation. Through its analysis of legal-social-technological connections green policing stands as a key driver for waste management sustainability.

Several connected elements make up waste management based on its definition to form an important foundation for our integrated solution against environmental problems. Environmental law enforcement agencies detect breaking laws through inspections and issue penalties when people dump waste in unsanctioned ways or damage their surroundings with harmful materials. Researchers Miller and Turner (2020) confirm that these agencies establish waste management laws while preventing environmental crimes and guarding fundamental environmental standards.

Community activation in waste reduction activities leads to successful green policing methods. In their 2017 research Cohen and colleagues showed that when citizens receive waste management education their cooperation with enforcement agencies grows because they start fulfilling their responsibilities. Instead of establishing penalties, an effective solution requires building strong relationships with targets to achieve results through shared waste management projects.

Together public-private partnerships build effective green policing programs. Community-public partnerships achieve greater results through mutual use of resources and support for building new waste management systems. The article from 2020 emphasizes that green policing expands its reach and operation when teams depend on private sector knowledge and funding.

The green police system will combine advanced tech to monitor environmental data in real time. Law enforcement agencies use drone tracking and surveillance tools with GPS and cameras to find and eliminate unlawful waste dumping while finding new optimal pick-up paths. Widjaja (2024) and Wilson et al. (2007) show technology improved waste management enforcement efficiency and outcome tracking. The foundation of green waste policies is combining environmental governance with overall management systems. Smith and Lee (2022) believe sustainable outcomes depend on strict policies backed by penalties for noncompliance. Effective waste management plans work better when they follow established regulations.

2. Green Policing Model in Solid Waste Management

Through the 18 papers, the second theme showed how everyone can develop sustainable waste handling systems using established police methods (Figure 3). The Green Policing Model uses three operational methods of regulation enforcement combined with resource management and circular economy approaches to deliver effective solutions. Zhang and Wang (2023) recommend bringing Germany's Extended Producer Responsibility system to life through their research which makes manufacturers cover waste costs when products become unusable. The program pushes people to recycle more and use fewer landfills.

In a specific model used in the Philippines, the law enforcement agency works with local government units to check waste dumping rules and teaches households to sort their trash.

Public-private partnerships have an important position in these environmentally friendly law enforcement strategies. According to Bennett and team in 2020 businesses working together with public agencies make better environmental waste systems possible.



Figure 1
Systema

In short, such studies show that green policing models are most effective when combined in a holistic approach with legal, institutional, and community-based means to address waste management issues.

Characterization of the Model. The solid waste management green policing model brings together environmental sustainability practices together with law enforcement tools. The approach features both prevention efforts and supports legal rules with team efforts among different parties for better waste management results. This model combats waste issues by blending educational methods with modern technology resources along with solid policy implementation rather than traditional punitive behavior control techniques.

The green policing model needs regulatory standards to define waste lifecycle actions with strict penalties for those who break them. People must pay money to protect everyone who takes part in the system. The EPR approach works effectively in Germany and Sweden through a model where producers assume

product responsibility even after customers stop using them. Zhang and Wang (2023) show these frameworks make authorities and industries partner in creating waste practices that protect the environment by reducing waste going to landfills and increasing recycling efforts.

Green police work includes both regular inspections and environmental crime prevention through monitoring efforts. Law enforcement executes environmental protection by performing scheduled checks and using monitors plus community feedback to stop banned waste disposal activities and hazardous waste misplacement. Lee and Tan (2021) showed how selected law enforcement agencies from big cities work together with communities to check waste handling to stop environmental damage before it becomes extreme and build ownership in local populations.

Through green policing, we build our focus on community engagement to handle waste properly. The model positions residents first in waste management practices including sorting trash and processing kitchen scraps for recycling. Active public participation in waste education produces lasting dedication to waste control practices (Cohen et al., 2017). As communities step up to manage their waste responsibilities, they learn valuable practices that benefit everyone.

The green policing model works better when public and private organizations team up. Public-private partnerships help government agencies and businesses work together to set up new waste management systems through joint technology development and infrastructure building. Bennett et al. (2020) explained that public-private partnerships deliver better service across low-income neighborhoods when private companies join forces with community leaders to manage waste resources. A partnership between the public and private sectors builds better waste management systems that protect the environment and earn money.

Green policing technology allows us to monitor operations live and make smarter choices that use resources better. Tracking systems combined with drones plus automatic waste collections spot waste dumpers faster and recommend better waste pick-up paths. These experts show that modern technology empowers police forces to detect waste crimes better while working more effectively and making waste management better through data.

3. Green Policing Index Performance in Solid Waste Management

The final discussion looks at how to create future green policing initiatives. The researcher examines 16 prior studies to understand how environmental enforcement works based on effective measures. These actions show how well systems enforce environmental regulations to reach the defined policy results. Performance monitoring happens through enhancements in waste diversion rates and citizen participation in solid waste recycling plans (Nguyen et al., 2023). Studies conclude green policing achieves its goals when achieved enforcement levels drop along with more people following the law (Hao et al., 2022).

Studies confirm that using technology to monitor performance data improves results. Wilson et al. (2007) enhanced waste route optimization through GPS data collected from collection vehicles. A performance index functions through proper leadership and strong enforcement activities. Smith and Lee (2022) showed policies and rules support the desired outcomes in waste management.

Defining Green Policing Index Performance. The Green Policing Index (GPI) is a multifaceted tool for determining effective green policing initiatives for solid waste management. The index casts light on how well these work towards sustainable waste management practices with the help of enforcement strategies, community engagement, technology, and policies. The GPI then considers the evaluation of green policing by measuring its success in pursuing the objectives of reduced waste generation and compliance with

regulations, as well as environmentally sustainable outcomes based on the findings of the 16 critical studies under consideration.

According to the context, GPI is a performance measurement scheme for solid waste management that evaluates the efficiency of law enforcement and governance activities in managing waste administration issues. It would have indicators such as compliance rates, waste diversion targets, recycling efficiency, community participation, and technology innovations. Rather than punishment alone, the index captures compliance-effective systems that promote sustainable behavior, reward compliance, and drive circular economy principles.

Key Indicators of Green Policing Index Performance. However, the investigations have mainly established several major performance indicators that measure the effect of the green policing index (GPI). Of these, compliance with the waste management regulation is perhaps the most important, as it measures the disciplined adherence to laws put in place by individuals and collective entities. Higher compliance has been proven to lead to significant reductions in illegal dumping and open burning, which are considered the leading environmental enemies (Nguyen et al., 2023).

Qualitative compositional critical indicators for the measure are waste diverted from dumping in landfills and recycled/composted. Above are citations from studies of Hao et al. (2022) and Zhang and Wang (2023), which posit the impact brought by green policing on recycling program success and a lower reliance on waste landfills, which also contributed to improving sustainable waste management.

Participation of the public in activities provides the critical foundation for success by complementing other GPI elements, especially with citizens' active involvement in waste segregation and composting, as well as cleanup drives. Cohen et al. (2017) observed that community engagement didn't just provide compliance but also engendered a mindset of communal responsibility. Such collective

endeavor always shows up in quantifiable outputs like increased enrollment in relevant programs, change in observable behavior, and active participation in awareness campaigns.

The other important aspect of GPI's success is that it is entirely technology driven. Examples of such technology include GPS tracking, surveillance drones, and automated waste collection systems. Thanks to these technologies, managing waste becomes real-time and more transparent, as Wilson et al. (2007) and Widjaja (2024) noted. These technologies assist in determining illegal disposal activities, route optimization of collection, and evidence-based policymaking. It thus enhances operational efficiency while simultaneously strengthening law enforcement conditions, enabling waste management processes to be both practical and accountable. The effects of public policies and frameworks are very relevant to this discussion. According to Smith and Lee (2022), the strength of governance mechanisms is significant for consistent implementation and accountability, especially when combined with open and enforceable policies. The GPI further assesses the degree to which policies have thus far been aligned in their sustainability aims, flexibility to cope with challenges, and feedback mechanisms to establish improvement and continuous iteration. Green policing would also successfully diminish environmental violations, such as illegal dumping and burning. The studies conducted by Lee and Tan (2021) indicate that good enforcement, combined with awareness campaigns, enables to cut down on the people who participated in such actions significantly.

Evaluation of Green Policing Index Performance. The assessment of GPI will involve qualitative, quantitative, and comparative approaches. A waste audit is used to quantify the objective measures such as diversion from waste and recycling efficiencies, which would be evaluated through reports compliance and recycling facilities. Supplementing these would be real-time data from GIS tools on infractions of waste management practice. Qualitative measures,

including surveys and focus group discussions, would explore the community perspectives on enforcement and satisfaction with waste management services. The context-specific case studies are Nguyen et al. (2023) and Hao et al. (2022), which looked at the challenges and benefits accompanying this green-policing approach. There will be localized comparisons with those existing global benchmarks-standards of successful models such as Germany, Sweden, and the Philippines.

The qualitative, quantitative, and comparative approaches would measure the GPI. Objective indicators such as trash diversion and recycling efficiencies would carry quantitative validation through waste audits, reports compliance, and recycling facilities. GIS tools would supplement the real-time information about infractions of waste management practice. On the other hand, qualitative measurements such as surveys and focus group discussions are directed towards the community's perspective on enforcement and facilitate the satisfaction of waste management services. Context-specific case studies, for instance, Nguyen et al. (2023) and Hao et al. (2022), have emphasized the challenges and successes of the green-policing strategy.

Significance of the Green Policing Index. It is GPI that is also referred to as a particular instrument for measuring and improving the performance of rural clean initiatives within the management of solid wastes. It suggests measurement and application paths that are not comprehensive but multidimensional and sets goals for which current practices are developed, as well as valuable design recommendations. Those examples include how to metric community involvement in Cohen et al. 2017, which eventually enables the design of targeted advertising campaigns educating the public on involvement. Thus, the application of technology for data collection is also noted by Wilson et al. 2007, forming a foundation for improved disposal in resource allocation and decision-making.

GPI is thus an accountability and transparency beacon to the stakeholders and the public, as it

provides straight performance data. Whether they support the cause of evidence-based policy action or not, it ensures that a waste management system improves continuously. Collaboration is another aspect of GPI. It brings together enforcement agencies, policymakers, communities, and actors in the private sector while aligning their efforts for common sustainability goals.

DISCUSSION

This research analyzed both social and environmental factors, as well as legal rules, at all levels of society. The study gathered data through multiple research methods such as polls and talks with experts together with small group meetings. The investigation examined how the Philippine National Police could support equitable community safety through environmentally friendly police work with enhanced public safety recommendations.

The research discovered that the PNP faces difficulties with limited resources and community distrust that influence its operational effectiveness. The findings showed that joint sector participation in solid waste management will produce better results for both the environment and community health throughout the Philippines.

This study proves that waste management must combine environmental protection with current police methods to fight pollution. Law enforcement agencies require proper laws combined with strong institutional backing and access to technology to fulfill their duties effectively. They need effective community input for optimal results. Officials should give officers better tools while assisting them with skills development and then build better connections to local communities to sustain green policing projects.

Research lacks complete information on the lasting results of using green policing tactics. Research on green policing across various societal backgrounds and cultural environments remains scarce even though certain methods show quick benefits with case

studies. Longitudinal research must study how green policing affects community response and partnership development along with new technology adoption. Looking at green policing through multiple national frameworks helps tell us how different settings affect its implementation.

The research field lacks investigations that explore how informal waste workers like pickers and recyclers contribute to green policing. Research must show how green policing systems can safely employ informal workers while upgrading their role in waste management and job security. Research about green policing technology needs to examine its practical challenges including how existing budget and workforce problems affect technical adoption and how data privacy measures work within law enforcement systems to benefit the public. Researchers require data to understand the challenges both locally and internationally. Research remains insufficient in showing how green policing policy connects with national and local environmental authorities. Studies call for legal frameworks now that we must build green policing into complete national and local environmental policies. Research needs to show what green policing costs and how these investments compare to future environmental improvements. Research into these areas will show us how environmental patrols enhance both waste management systems and community safety.

Conclusion. Through their focus on environmental waste management law enforcement agencies have begun adopting green policing practices. They bring many years of knowledge about protecting public safety and stopping crimes. The new waste management problems in cities make environmental protection an essential part of law enforcement monitoring across different urban regions. Law enforcement agencies step into a new era through green policing by checking waste rules and stopping illegal waste practices everywhere.

Through basic law enforcement procedures, officers take responsibility for protecting both

public safety and the environment. Increased city populations create mounting environmental pressure that leads people to discard trash openly into the environment. Implementing "Green policing" strategies helps us solve today's waste disposal troubles. Through waste control rules and recycling regulations, the system helps lower pollution levels and benefits public safety and health. The police collaborate with local government organizations and community entities to develop environmental programs and teach residents advanced sustainable habits over time.

Having law enforcement directly handle waste management problems will create a cleaner environment and help cities become more sustainable. Organizing waste operations this way helps build social responsibility and prepares us better to handle environmental dangers that threaten our communities.

Key Takeaways. This study reveals the main factor behind green police programs achieving success as being community participation. Waste management depends on public support beyond police enforcement actions. People follow waste management laws better when their local community learns sustainable waste collection strategies such as sorting trash for recycling. When people help maintain and enforce waste management rules, they create a sustainable direction that benefits both today and tomorrow. When residents help manage environmental outcomes, they strengthen our waste management policies while creating better communities.

Many law enforcement agencies struggle to implement green policing because they have few available funds. Limited money resources combined with staff shortages and training needs block the shift to green policing among police officers. The research shows green policing succeeds when law enforcement partners community outreach work with standard rules enforcement. Achieving these goals needs significant investment in both training and long-term organizational support.

The research shows technology can boost how well green policing programs work. Using GPS tracking on waste truck surveillance cameras plus waste data analysis helps us better manage our waste operations in smart ways. The continuous observation of waste behavior helps law enforcement respond rapidly to rulebreakers and support proper waste management standards. While the study showcases technology benefits it reveals financial strain technical skill gaps and data security risks that limit wider adoption at law enforcement agencies.

Regular public and private collaboration drive green policing progress. When businesses, nonprofits, and community groups work together they enhance their waste management results. As part of Corporate Social Responsibility businesses can assist in implementing waste management solutions to improve how green policing serves the community.

The research clarifies how robust waste management laws strengthen green policing programs. Laws at both national and local levels following international environmental standards support effective law enforcement. The Philippines shows how waste management policies connected to the ASEAN Framework on Marine Debris make green policing improve local and international environmental performance. The research shows how green policing builds resilient communities by lowering environmental waste issues and making better recycling possible.

Future Research Opportunities. Many studies today fail to explain how green policing will help manage waste while enhancing sustainability which experts predict will prove valuable. Research needs to check how green policing affects communities over longer periods. The researcher has seen successful beginning gains, but no ongoing research exists on how green policing affects communities and protects the environment over time. Research teams must study the impact of economic status and community culture on eco-policing

efforts to help them create better versions that work well in many situations.

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