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LEGAL POLICY ANALYSIS: PLASTIC BAG WASTE REDUCTION STRATEGY WITH NOKEN BAGS IN JAYAWIJAYA REGENCY

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ABSTRACT
Jayawijaya Regency faces a serious problem related to increasing plastic waste. The use of Noken as an environmentally friendly bag is seen as a strategic alternative to plastic bags that needs to be analyzed from a legal policy perspective. This study aims to examine plastic waste reduction policies, assess the effectiveness of Noken as an alternative, and identify implementation challenges. The method used is qualitative research with legal policy analysis and a public perception survey. The results show that the plastic waste problem in Jayawijaya is urgent due to limited infrastructure. Noken has the potential to be an environmentally friendly solution, but is still constrained by production and price. A comprehensive strategy is needed, including strengthening regulations, waste management, the 3R program, education, and economic support, so that Noken can become a sustainable solution.
***Keywords**: Legal Policy; Plastic Waste; Plastic Bag Waste; Noken; Jayawijaya Regency.*

ABSTRAK
Kabupaten Jayawijaya menghadapi persoalan serius terkait peningkatan sampah plastik. Penggunaan Noken sebagai tas ramah lingkungan dipandang sebagai alternatif strategis pengganti kantong plastik yang perlu dianalisis dari perspektif kebijakan hukum. Penelitian ini bertujuan mengkaji kebijakan pengurangan sampah plastik, menilai efektivitas Noken sebagai alternatif, serta mengidentifikasi tantangan implementasinya. Metode yang digunakan adalah penelitian kualitatif dengan analisis kebijakan hukum dan survei persepsi masyarakat. Hasil penelitian menunjukkan bahwa permasalahan sampah plastik di Jayawijaya bersifat mendesak akibat keterbatasan infrastruktur. Noken memiliki potensi sebagai solusi ramah lingkungan, namun masih terkendala produksi dan harga. Diperlukan strategi komprehensif berupa penguatan regulasi, pengelolaan sampah, program 3R, edukasi, dan dukungan ekonomi agar Noken dapat menjadi solusi berkelanjutan.
Kata Kunci: Kebijakan Hukum; Sampah Plastik; Sampah Kantong Plastik; Noken; Kabupaten Jayawijaya.

INTRODUCTION

The problem of plastic waste has become a pressing global issue, with Indonesia recording the second-largest contribution of plastic waste to the ocean, after China.[1]Plastic waste is a type of inorganic waste that is produced annually worldwide.[2] There are many reasons why efforts to reduce plastic waste are crucial, one of which is the negative impact of carelessly disposed plastic waste that can pollute the soil, water, and air.[3] Microplastics can enter the human body through consumption of seafood and drinking water. Furthermore, exposure to hazardous chemicals contained in plastic, such as bisphenol A (BPA) and phthalates, has the potential to cause various health problems, ranging from hormonal disorders to cancer and reproductive problems.[4] Research from Environment International (2023) found that the average adult consumes 50,000 to 70,000 microplastic particles per year from drinking water and food alone. Microplastics can transfer hazardous chemicals, such as phthalates, bisphenol A (BPA), and poly(chloroethylene), which are toxic, endocrine disruptors (hormone disruptors), and potentially carcinogenic (cancer-causing). Plastic waste entering the body can cause digestive irritation, metabolic disorders, and increase the risk of chronic inflammation. Diseases that can be caused include diarrhea and gastrointestinal infections, cholera, skin and eye infections, hormonal and fertility disorders, cancer, and lung disease/tuberculosis if inhaled.[5]

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[2] Aurelia Dwi Permata, Aprilia Putri Malaya, Ubaidillah Kamal, "Strategi Pengurangan Penggunaan Plastik Melalui Implementasi Zero Waste Menuju Gaya Hidup ramah Lingkungan", Jurnal Multidisiplin Ilmu Akademik. 1(3), 2024, hlm. 371–383.

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[4] Wifa Rasuna Yasmin, Masitah, Zenia Lutfi Kurniawati, Ruqoyyah Nasution, "Analisis Kandungan Mikroplastik pada Saluran Pencernaan Ikan di PPI Selili Kalimantan Timur", Jurnal Biosense. 7(1), 2024, hlm. 175–188.

[5] Giuseppina Zuri, Angeliki Karanasiou dan Sílvia Lacorte, Karanasiou, "Microplastics: Human exposure assessment through air, water, and food", Jurnal Environment International. 2023, hlm. 179

Based on data from the Ministry of Environment and Forestry, Indonesia is among the largest producers of plastic waste in the world.[6] It is estimated that around 3.22 million tons of plastic waste are produced annually, representing 10.1% of the planet's total waste, originating in Indonesia. Most of this waste ends up in landfills, polluting the surrounding environment. A World Economic Forum report estimates that by 2050, the amount of plastic waste in the ocean will outnumber fish by a ratio of 3:1.[7]

Many regions in Indonesia still lack effective waste management facilities, such as landfills and recycling facilities.[8] Preliminary analysis indicates that the landfill in Jayawijaya Regency is often overloaded. When the waste is transported to the landfill, it is separated into types, for example, plastic waste is burned, and when the burned plastic remains are excavated with heavy equipment and buried. "We have encountered several obstacles in managing waste in Jayawijaya Regency. These include very limited facilities, a lack of a waste disposal site (TPST), and a problematic landfill due to frequent community rejection. There is no 3R (Reduce, Reuse, Recycle) approach. We lack a weighbridge. Since the formation of the Papua Pegunungan Province, the volume of waste has doubled due to population growth. The calculation of tons of waste per year is based on standards set by the Ministry of Environment and Forestry.

Data on waste generation in Jayawijaya Regency over the past three years shows 56,940 tons in 2022, 61,688 tons in 2023, and 71,905 tons in 2024, with a daily waste generation of 197 tons.[9]

The word "policy" comes from the English word "policy," which is defined as general principles that serve to guide the government's efforts to

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[6] Lanto Ningrayati Amali, Indhitya R. Padiku, Aprilia M. Hunta, "Development of Integrated Waste Management Information System to Support Sustainable Development", Jambura Journal of Informatics. 6(1), 2024, hlm. 14–25

[7] Yunisa Zahrah, Jeongsoo Yu, and Xiaoyue Liu, "How Indonesia's Cities Are Grappling with Plastic Waste: An Integrated Approach towards Sustainable Plastic Waste Management", Sustainability (Switzerland). 16(10), 2024, hlm. 1–32.

[8] Leny Julia Lingga, Melta Yuana, Nisa Aulia Sari, Hanifa Nur Syahida, Cristin Sitorus, Shahron Shahron, Lingga, L., Yuana, M., Aulia Sari, N., Nur Syahida, H., & Sitorus, C. , "Sampah di Indonesia: Tantangan dan Solusi Menuju Perubahan Positif", INNOVATIVE: Journal Of Social Science Research. 4(4), hlm.12235–12247.

[9] Dinas Lingkungan Hidup Kabupaten Jayawijaya, (Sistem Informasi Persampahan Kabupaten Jayawijaya 2022-2024), 2025.

achieve public welfare.[10] Public participation in the policy of using environmentally friendly shopping bags is an important step that demonstrates active participation and engagement in efforts to reduce plastic waste.[11]Several policies implemented by the Indonesian government in general to reduce plastic waste, such as those stipulated in Government Regulation Number 22 of 2021 concerning Waste Management[12], also apply in Jayawijaya Regency. This policy sets a target of reducing plastic waste by 30% by 2025 and requires a reduction in the use of single-use plastics in the retail and restaurant sectors. However, these efforts have not been effective in reducing the amount of plastic waste in Jayawijaya Regency. Noken is a handicraft made from woven tree bark, shaped like a bag with a strap that can be carried around the neck or slung over the forehead, draped over the back, similar to a typical bag.[13] The uniqueness of the Noken bag has been internationally recognized, leading to its designation as an intangible cultural heritage by UNESCO.[14] Papuan tribes have various ways of referring to this bark bag, or Noken. For example, the Dani tribe in Jayawijaya Regency calls it "Noken Su," the Biak tribe calls it "Noken Inokson," the Moor tribe calls it "Noken Aramuto," and the Marind tribe in Merauke Regency calls it "Noken Mahyan".[15] Despite the different names and types of tree bark used, the process of making Noken holds sacred significance in Papuan culture.

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[10] Irna dan Hospirene Theresia Simamora, "Bentuk Kebijakan Hukum Atas Penyalahgunaan Lem Aibon Dikalangan Anak Di Papua Pegunungan" Jurnal Honai. 4(1), 2024, hlm. 14–25.

[11] Diny Widya Evriyanti Simarangkir, Cindy Valentina Natasya Sianturi, Febriyana Nur Aziza Sagita Sari, "Implikasi Hukum Lingkungan terhadap Pengelolaan Limbah Plastik dengan Recycle Waste : Studi kasus Gunung Sampah TPST Bantargebang" Jurnal Pendidikan Dan Sosial Humaniora. 1(5), 2024, hlm. 173–182.

[12] Tuti Setiawati, Tawil Muzakir, Nasrullah, & Muhammad Irfan Mufti, "Implementasi Kebijakan Peraturan Wali Kota Palu Nomor 40 Tahun 2021 Tentang Pembatasan Penggunaan Plastik Sekali Pakai dan Styrofoam di Kelurahan Palupi Kecamatan Tatanga", Jurnal Syntax Imperatif : Jurnal Ilmu Sosial Dan Pendidikan. 6(1), 2025, hlm. 18–24.

[13] Tati Haryati, Atinus Mirin & Wahyuni Sulistiowati, "Pemberdayaan Usaha Mikro, Kecil, dan Menengah Pembuatan Tas Noken Sebagai Budaya dan Kearifan Lokal Papua Pegunungan", Journal of Innovation Research and Knowledge. 4(4), 2024, hlm. 2447–2466.

[14] Decky Wospakrik dan Elias Hence Thesiar, "Perlindungan Noken Papua Sebagai Warisan Budaya Takbenda", JIHHP : Jurnal Ilmu Hukum, Humaniora Dan Politik. 5(2), 2024, hlm. 1616–1631.

[15] Natasha Aulia Husain, Muhammad Yusuf, Ahmad Kadir, dan Rachmad Surya Muhandy, "Tas Tradisional "Noken" Solusi Mengatasi Limbah Kantong Plastik" , Ganaya : Jurnal Ilmu Sosial Dan Humaniora. 6(1), 2023, hlm. 229–240.

The urgency of developing Noken bags as an alternative to plastic bags still requires effective legal policy support. The Jayawijaya district government has an important role in this matter, for example through regulations that encourage the use of alternative materials such as noken bags.

RESEARCH METHODOLOGY

This research employed a qualitative approach through policy analysis, reinforced by a quantitative survey to capture public perceptions. Data were collected through purposive sampling of key informants, such as government officials, community leaders, and bag users. Data collection techniques included in-depth interviews, observation, document review, and questionnaire distribution in three large supermarkets (Yudha, Ropan, Holandia) and three main markets (Potikelek, Pasar Baru, and Sinakma) to map public preferences for Noken bags.

Data analysis was conducted systematically through the stages of data collection, reduction, presentation in narrative or tabular form, and drawing inductive conclusions validated through field verification. This research integrated primary data (interviews, observations, surveys), secondary data (regulations and previous research), and tertiary data to strengthen the socio-cultural and legal context. This approach aimed to explore the effectiveness of Noken bags as a sustainable solution for comprehensively reducing plastic waste, as described by Miles & Huberman (1992) in (Juriko, 2025).[16]

RESULT AND DISCUSSION

The Problem of Plastic Bag Waste in Jayawijaya Regency

The problem of plastic waste, particularly single-use plastic bags, has become a serious challenge, impacting not only the global scale but also deeply felt in Jayawijaya Regency. The high volume of plastic waste generated, limited management facilities, and weak policy implementation indicate that plastic waste reduction remains far from ideal. Its negative impact on the environment further emphasizes the urgency of comprehensive and sustainable management.

[16] Juriko Abdussamad, Imam Sopingi, Budi Setiawan dan Nurhikmah Sibua, "Metode Penelitian Kuantitatif, Kualitatif, Dan Mixed Methode", Cetakan ke 1. Medan : PT Media Penerbit Indonesia. 2024, hlm. 74

The plastic bag waste problem in Jayawijaya Regency is highly concerning, characterized by a significant increase in waste volume and fundamental challenges in its management. A documentary study at the Jayawijaya Regency Environmental Agency office revealed that waste generation data for the past three years (2022-2024) indicates a significant spike. Total annual waste jumped from 56,940 tons in 2022 to 61,688 tons in 2023, peaking at 71,905 tons in 2024. While this data does not specify the type of waste, plastic bags, as a vital and most persistent component of the plastic waste stream, can be assumed to contribute significantly to this increase in volume, indirectly exacerbating the environmental burden.

This increase in waste volume is exacerbated by various systemic operational constraints in waste management in Jayawijaya Regency, as revealed in interviews with waste officers from the Environmental Agency**.**

"We face many obstacles in waste management, due to a lack of facilities and infrastructure, which leads to the community's unfulfilled hopes for a clean environment. The Jayawijaya Environmental Agency (DLH) has no TPST (traditional waste processing facility), no 3R (recycling system), no weighbridge, no waste bank. The landfill is full and frequently protested by the community. We have requested it be relocated to a new area, but negotiations are still underway with the indigenous community owners regarding land acquisition. There are only 15 garbage trucks serving Jayawijaya Regency and Wamena City, the provincial capital. The amount of waste generated by the community increases daily due to the increase in family members since becoming a province." (Employee from the Waste Management Department, Jayawijaya Regency DLH)

Limited infrastructure is a major obstacle. Jayawijaya Regency lacks an Integrated Waste Processing Facility (TPST), which hinders the effective sorting and recycling of plastic bags. Furthermore, the existing Final Processing Facility (TPA) is often problematic and faces community resistance, further compounding the problem of waste disposal. The absence of the 3R (Reduce, Reduce, Recycle) program Formal waste management (Reuse, Recycle) also exacerbates the situation, causing single-use plastic bags to continue to accumulate without an effective processing cycle to mitigate their impact. This problem is exacerbated by the absence of weighbridges, which makes it difficult to measure waste volume precisely, thus inaccurately planning and evaluating waste management policies. Demographic factors also play a crucial role. Since the formation of the Papua Highlands Province

in 2022, waste volume has reportedly doubled due to population growth, which directly explains the significant increase in total waste and, of course, a significant impact on the quantity of plastic bag waste generated. Data on waste generation in Jayawijaya Regency over the past three years can be seen in the following table and graph.

Table 1. Table of Waste Generation in Jayawijaya Regency 2022-2024

No	Years of service	Ton	Ton/month	Ton/year
1	2022	156	1872	56.940
2	2023	169	2028	61.688
3	2024	197	2.364	71.905

Source: Data from the Jayawijaya Regency Environmental Service Office, 2025

The table above shows that waste volume increased by 8.34% from 2022 to 2023. From 2023 to 2024, the increase was even more significant, at 16.55%. Cumulative increase from 2022 to 2024. Overall, waste volume increased by 26.28% over the two years. This graph clearly illustrates a consistent and accelerating trend of increasing waste volume from year to year in Jayawijaya Regency. This demonstrates the importance of a more effective waste management strategy going forward.

Thus, it can be concluded that the plastic bag waste problem in Jayawijaya Regency is very serious and urgent. The increase in total waste volume, driven by population growth, combined with limited infrastructure, the absence of a 3R program, and a lack of accurate measurement tools, creates an environment conducive to the accumulation and negative impacts of plastic bag waste. Without comprehensive and coordinated interventions, ranging from inadequate facilities, implementation of the 3R program, and public education, this problem will continue.

The Negative Impact of Plastic Bag Use on the Environment and Public Health in Jayawijaya Regency

The widespread use of plastic bags in Jayawijaya Regency negatively impacts health and the environment due to inadequate management systems. People's indiscriminate plastic disposal and overloaded landfills have led to piles of waste in open areas and waterways. This accumulation of non-

biodegradable plastic blocks rivers and ditches, a major cause of periodic flooding in various residential areas.

a. The Impact of Plastic Bags on the Environment

Based on the results of a survey of 30 informants and open-ended interviews, informants consistently identified various negative impacts of plastic bags on the environment. Themes that emerged from the interviews included:

Table 2: Respondent Data Regarding the Negative Impact of Plastic Bags on the Environment

Emerging Themes	Main Content from Respondents	Environmental Implications
Causes of Flooding	Plastic bags are explicitly cited as clogging waterways, making them a major contributing factor to flooding.	It obstructs water flow, increases the frequency and intensity of flooding, damages infrastructure, and threatens public safety.
Water and Soil Pollution	Accumulated plastic waste pollutes surface and groundwater sources, disrupting ecosystem quality.	Chemical radiation (e.g., phthalates, BPA) can leach into soil and water, threatening flora and fauna, and the health of humans who depend on these resources.
Plastic Waste	The phrase "plastic waste" appears repeatedly, indicating the volume of unmanaged waste.	The accumulation of plastic in the environment prolongs decomposition times (hundreds of years), placing additional strain on already weak waste management systems.

Source: Data processing of survey results and interviews with 30 informants (2025)

In conclusion, informants consistently highlighted plastic bags as a major contributor to flooding, water and soil pollution, and the accumulation of unmanaged plastic waste.

These findings underscore the need for concrete measures, such as reducing plastic bag use through bans or tariffs, and promoting environmentally friendly alternatives. Improving waste management systems (waste banks, recycling facilities, and increasing the number of waste collectors) to prevent waste accumulation. Public education on the environmental and health impacts of plastic, as well as the importance of proper disposal practices, is crucial.

Respondents identified health impacts. Although open-ended questions tended to focus more on environmental impacts, health issues

also emerged as both implicit and explicit concerns. Diseases caused by a dirty environment, indirectly, include flooding and pollution caused by plastic, which can trigger various diseases. As found by (Nizar et al., 2025) in an article entitled "Plastic Waste as a Threat to the Environment."

The people of Jayawijaya Regency are highly aware of the negative impacts of plastic, particularly regarding pollution and flooding risks. However, this awareness requires the support of a comprehensive approach that focuses not only on education but also on the provision of affordable alternatives such as eco-friendly bags and waste bank infrastructure to prevent illegal dumping. The effectiveness of plastic restriction policies depends heavily on strategic collaboration between the government, the private sector, and the community in creating an accessible and sustainable waste management system. (Wahyudin et al., 2023)[17] found that policies involving cross-sectoral collaboration, such as the Asri Tanpa Plastik (Antik) Program in Bogor Regency, can encourage public participation and garner private sector support in reducing plastic use. Active participation from various stakeholders allows for the development of educational programs and the provision of infrastructure that supports plastic reduction policies.

Regarding the negative impact of plastic bags on public health, field observations revealed that almost every corner of Wamena City, Jayawijaya Regency, is filled with piles of garbage. The three most common areas for garbage are Jalan Hom-Hom, Jalan Safri Darwin, and Jalan Bhayangkara. The trash was left scattered around awaiting its scheduled transport to the landfill.

The persistent accumulation of waste confirms that Jayawijaya Regency does not yet have a Waste Bank as an integrated management facility. This situation arises because the waste management system in this region is not well-structured.

[17] Wahyudin, Oetje Subagdja, & Abubakar Iskandar, "Desain Model Collaborative Governance Dalam Penanganan Pengurangan Penggunaan Plastik", Jurnal Governansi. 9(2), 2023, hlm. 151–162

b. The Impact of Plastic Bags on Health

Based on documentation study data conducted at Wamena Regional General Hospital and linking it to the literature, by (Albazoni et al., 2024)[18] in their article entitled A Review of Microplastic Pollution: Harmful Effect on Environment and Animals. Remediation Strategies that "microplastics are easily carried by water and air so they can be found in rivers, lakes, seas, air, and in the human body (organs and blood) and understanding the impact of plastic bags, conceptually of the many diseases treated by Wamena Regional General Hospital, the following can be displayed in a table related to the top ten types of diseases that have a direct relationship with poor waste management in Wamena, Jayawijaya Regency in the last three years. The data can be seen in the following table.

Table 3.
Data on Diseases Treated by Wamena Regional Hospital (2022-2024)

No	Type of Disease	Number of Cases (2022)	Number of Cases (2023)	Number of Cases (2024)
1	Pneumonia	165	235	318
2	Typhoid Pever and Paratyphoid	100	177	180
3	Pulmonary TB	403	459	756
4	Gastroenteritis and Kolitis Infeksius	73	101	216
5	Asthma	57	188	754
6	ISPA (Acute Respiratory Tract Infection)	293	353	587
7	Low Birth Weight Newborns	48	72	166
8.	Infected/Exposed to TB	2334	2344	2197
9	Viral and Parasitic Infections	95	161	165
10	Care for Mothers with Fetal	48	57	65

[18] Hamah Jasim Albazoni, Muhmmad Jawad salih Al-Haidarey & Afyaa Sabar Nasir, "A Review of Microplastic Pollution: Harmful Effect on Environment and Animals, Remediation Strategies" Journal of Ecological Engineering. 25(2), 2024, hlm. 140–157

	Abnormalities			
TOTAL		**3616**	**4147**	**5404**

Source: Data from Wamena Regional Hospital, Jayawijaya Regency, 2025

Throughout the 2022–2024 period, there was a significant spike in health cases, particularly in asthma, gastroenteritis, acute respiratory infections (ARI), and low birth weight (LBW), all of which recorded an extreme increase of 100%. A similar trend was also seen in other respiratory and infectious diseases, with pneumonia cases surging 92.73%, followed by pulmonary tuberculosis (TB) at 87.59%, with the majority of the increase occurring in the last year. Furthermore, typhoid cases increased 80%, parasitic infections increased 73.68%, and fetal abnormalities increased 35.42%. Amid this upward trend, only cases of exposure to tuberculosis showed improvement, with a cumulative decrease of -5.87%.

Poor waste management in Jayawijaya Regency due to the absence of a 3R system, processing infrastructure (TPST/Waste Bank), and overloaded landfills, significantly contributes to the surge in respiratory diseases (Pneumonia, TB, Asthma, ISPA), digestive (Typhoid, Gastroenteritis), and reproductive disorders (LBW, Fetal Abnormalities). Air pollution from plastic burning and water contamination due to waste are the main risk factors. Although conceptually supporting the hypothesis[19], these findings require further validation through water/air quality laboratory tests and epidemiological mapping involving cross-sectoral experts and the local Health Office. Jayawijaya.

The Potential and Advantages of Noken Bags as an Environmentally Friendly Alternative to Replace Plastic Bags

Based on the results of observations and interviews conducted with noken craftsmen to find out the potential of noken as a substitute for plastic bags, the following data was obtained. Table 4 below illustrates the natural

[19] Yura WItska Firmansyah, Mirza Fatan Fuadi, Muhammad Fadli Ramadhansyah, Farida Sugiester, "Keberadaan Plastik di Lingkungan, Bahaya terhadap Kesehatan Manusia, dan Upaya Mitigasi: Studi Literatur" Jurnal Serambi Engineering. 6(4), 2022, hlm. 2279–2285.

colors of noken that come from nature, emphasizing noken's environmental friendliness.

Table 4.
Natural Noken Dyes to Enhance the Environmentally Friendly Impression

Colour	**Natural Coloring Sources**	**Brief Description**
Black	***Waunggen tree extract*** (growing among forest grasses)	Provides an elegant feel while emphasizing the sustainability of the dyeing process.
Yellow	***Forest Orchid*** *(*planted between large trees*)*	Produces bright colors that resemble the morning sun.
Brown	***Roasted soil produces*** a dark brown pigment.	Adds a warm and natural feel to the noken fiber.
Red	***Jongkoluwuk tree*** ***(***usually grows around residential areas***)***	This red color reflects the close relationship between humans and nature.
Green	***Ten plants (***thrive among forest trees***)***	Give the noken a fresh and lively feel.
White	***Belitenangguk plant*** (only found in forests***)***	Symbol of the purity and uniqueness of the forest ecosystem.

Source: Interview with Noken Craftsmen of the Baliem Valley Community, 2025

The conclusions from this table can be explained as follows.

1. Sustainability Aspect: All of the colors above are produced naturally without synthetic chemicals, making Noken an environmentally friendly alternative that is strong, lightweight, and rich in cultural value.
2. Cultural Value Aspect: These colors are not merely aesthetic, but also hold traditional meanings that strengthen the identity of the Noken-making community.
3. Environmental Benefits Aspect: The simple extraction process (washing, boiling, and light firing) produces minimal waste and can be managed organically.

Table 5 explains the types of trees from which fiber is extracted and the distinctive characteristics of each tree.

No	Name of Tree	Advantages	Characteristics
1	Walmet/ Welat	Durable	The wood fibers are elastic, so washing is not recommended.
2	Mabro	Easily Broken	Fine textured bark fibers
3	Ganemo	Very Strong	Stiff textured bark fibers
4	Manduam	Durable and Strong	Strong and elastic bark fibers
5	Nawa	Durable	Smooth and strong bark fibers
6	Anggrek Hutan	Strong and Flexible	Flexible and strong bark fibers

Table 5: Types of Trees Used to Make Noken

Source: Results of Interviews with the Noken Knitting Community of Jayawijaya Regency, 2025

Each plant species used in the Noken crafting process plays a specific role, representing the cultural and ecological value systems of the Papuan people. Walmet/Welat symbolizes endurance for strenuous activities due to its elastic and sturdy fiber, while Ganemo is the strongest fiber used for agriculture and hunting. For daily use and comfort, Nawa and Orchid Forest are the primary choices due to their smooth texture yet flexibility and strength. Conversely, Mabro, with its soft texture, is more for decoration, while Manduam offers a balance between strength and flexibility. The choice of these materials demonstrates local wisdom in combining the physical

characteristics of plants with practical functions and the philosophy of harmony with nature.

The Noken bag is a symbol of identity and pride for the indigenous Papuan people and has been recognized by UNESCO as an intangible cultural heritage. More than just a bag, the Noken possesses profound philosophical, social, and economic value.[20]In their research, they stated that "the Noken is not just a bag, but also has philosophical, economic, political, and social significance." Over time, its function has evolved from an attribute of traditional ceremonies to supporting daily activities, even transforming into a funeral garment or Sali skirt for weddings. In the modern era, the Noken is also used to welcome honored guests and symbolizes the hard work and central role of women in maintaining family sustainability.[21]

Using Noken as a substitute for plastic is a holistic solution that supports environmental sustainability while strengthening local cultural identity amidst modernization. Economically, this initiative has the potential to advance the creative economy sector and improve community welfare, particularly for women as the primary artisans. With the right policy integration, the Noken will become more than just a bag, but a representation of sustainability that combines ecological, economic, and cultural values.

Plastic Bag Waste Reduction Strategy Through the Use of Noken Bags in Jayawijaya Regency

A strategy to reduce plastic bag waste in Jayawijaya Regency needs to be designed taking into account local conditions, including social, cultural, and infrastructure. One potential step is to utilize noken bags as an environmentally friendly alternative that aligns with local wisdom. Using noken not only reduces dependence on plastic but also strengthens Papuan cultural identity, which is being eroded by modernization. A crucial initial step is to encourage behavioral change. Plastic is often used because it is considered practical, inexpensive, and readily available. Therefore, increased awareness of the negative impacts of plastic on the environment and health is

[20] Ibid, Decky Wospakrik dan Elias Hence, Thesiar hlm. 1616–1631.

[21] Vauziah, S. (2025). Perempuan Papua sebagai Penjaga Warisan: Peran Perpustakaan dalam Memberdayakan Pengrajin Noken. DIWANGKARA: Jurnal Pendidikan, Bahasa, Sastra Dan Budaya Jawa, 4(2), 87–94.

necessary. This education should be accompanied by encouragement to use noken in daily activities, particularly in markets and shopping centers.

The following are the results of a survey of 30 respondents regarding perceptions and habits of plastic bag and noken bag use in Jayawijaya Regency. The data analysis yielded several key themes related to the potential of noken as an environmentally friendly alternative:

Table 6.
Public Perception of Noken Strategy to Replace Plastic Bags

Emerging Themes	Implications
High Environmental Awareness	The majority consider plastic reduction very important and believe Noken can help.
Economic Barriers	Prices exceeding Rp100,000 are considered too expensive; this is the main reason for not purchasing or using Noken.
Limited Accessibility	Many respondents stated that Noken are "hard to find," indicating a suboptimal distribution network.
Practicality	In quick shopping situations or at the market, plastic is preferred because it is more practical and easier to carry.
Support for Local Products	A strong preference for locally produced Noken opens up opportunities for the regional creative economy.

Source: Survey results of 30 respondents, Perception of Noken as an Alternative to Plastic Bags, (2025).

An analysis of public perception of Noken bags as an environmentally friendly alternative can be measured using the following aspects. First, Positive Potential: Noken bags are viewed as an environmentally friendly alternative with both aesthetic and functional value. Public awareness of the importance of reducing plastic bags is very high. Second, Adoption Gap: Despite the positive perception of benefits, actual adoption of Noken bags remains low. A survey of 30 respondents revealed that approximately 65% had heard of them, 20% had used them, and 15% were unaware. Third, Economic Barriers: The main barriers are high price, with the average respondent reporting a price exceeding Rp100,000 (one hundred thousand rupiah), limited availability, and the perception that plastic is more practical for immediate needs.

Based on the survey results of 30 respondents, the majority of whom highlighted the high price of Noken bags compared to plastic bags, the following table presents data from observations and interviews regarding Noken bag prices obtained from Noken craftsmen. Data such as type, size, capacity, and price are presented in the following table.

Table 7.
Types, Sizes, Capacity and Prices of Noken

Type	Size		Capacity	Price
	Noken Mouth Diameter	Noken Depth		
Small	15 Cm- 20 Cm	20 Cm - 25 Cm	1-2 Liter	Rp.100.000.,
Medium	25 Cm- 35Cm	30 Cm - 40 Cm	5-8 Liter	Rp.300.000.,
Large	35 Cm- 45 Cm	40 Cm – 60 Cm	10-20 Liter	Rp.500.000.,

Source: Interviews with the Noken Craftsmen Community at Sinakma Market, Potikelek Market and Pasar Baru 2025).

The analysis of the data in the table above indicates a strong positive correlation between Noken size and price. The larger the Noken (diameter and depth), the greater its capacity, and consequently, the higher the price. Price increases from one size to the next are significant, reflecting the increased materials and complexity of manufacturing.

The strategy for using Noken as a plastic substitute in Jayawijaya Regency must shift the focus from "price" to "long-term value" through appropriate product segmentation. This effort will be achieved by increasing accessibility, providing environmental education, and empowering female artisans through capital assistance, training, and marketing. Furthermore, research and innovation in alternative, environmentally friendly raw materials are needed to address the limitations of natural materials and production time, ensuring the economic and cultural sustainability of Noken.

Existing Legal Policies and Those That Need to be Formed to Support the Strategy of Reducing Plastic Bag Waste with Noken Bags in Jayawijaya Regency

To realize a significant plastic bag waste reduction strategy in Jayawijaya Regency, a comprehensive, multi-sectoral approach is required, relying not only on outreach but also supported by a strong regulatory framework. Legal policy plays a crucial role in supporting plastic waste reduction efforts in Jayawijaya Regency. Based on the results of a document study, the current legal policies in Jayawijaya Regency that focus on waste management, specifically those related to plastic bag reduction, are Jayawijaya Regency Regulation Number 4 of 2024 concerning Waste Management and Jayawijaya Regent Regulation Number 8 of 2023 concerning Jayawijaya Regency's policies and strategies for managing household waste and household-like waste.

Field research indicates that there are no specific legal policies that support the strategy of reducing plastic bag waste by utilizing Noken bags in Jayawijaya Regency. Regional Regulation (Perda) No. 4 of 2024 concerning Waste Management, Article 11, mentions recyclable materials but does not explicitly mention Noken as an environmentally friendly bag to replace plastic bags. The following is a detailed analysis of why the Regional Regulation is insufficient to provide a legal basis for the use of noken bags as an alternative to plastic bags.

Table 8 presents the results of an analysis of existing regulations and legal policies related to waste management in Jayawijaya Regency.

Table 8.
Brief Description of Articles in Regional Regulation No. 4 of 2024 Concerning Reducing Plastic Bag Waste with Noken Bags

Article	Main Content	Relevance to Noken Bags
Article 11 paragraph 2 point	Regulates waste reduction through the use of materials that can be reused, recycled, or easily decomposed naturally.	Recognizes the principle of "reuse, recycle, biodegradable," but does not specify specific types of materials or products (e.g., noken bags).
Article 12	a. The regional government will monitor and supervise plans for the use of environmentally	Establish control and education mechanisms, but will not mandate or mandate the use of noken bags.

	friendly materials by all business actors. b. The government will disseminate information on waste reduction policies.	
Article 13 paragraph 1	All businesses are required to reduce waste in their operations.	This mandate binds businesses to general waste reduction, without setting specific standards or products.
Article 13 paragraph 2	Waste reduction is defined as minimizing the use of materials, products, or containers that generate waste.	The principle is sound, but concrete actions (e.g., replacing plastic bags with noken bags) are not regulated.
Article 13 paragraph 1 point b	Requires the use of reusable, recyclable, or biodegradable materials in business activities.	Similar to Article 11, it emphasizes material properties, not product identity.
Article 13 paragraph 3	Businesses are required to report waste reduction activities in the form of a balance sheet.	Increases accountability, but does not direct reporting specifically to noken bags.
Article 13 paragraph 4-5	Administrative sanctions (warnings, suspension of activities, permit revocation) apply to businesses that fail to comply with these obligations.	Sanctions are generic; there are no specific weights or incentives for adopting noken bags.

Source: Legal Policy Documentation Study (Jayawijaya Regent's Office, Legal Section, 2025)

A policy gap analysis revealed that the effectiveness of Noken use is hampered by the absence of explicit clauses in regulations, preventing businesses from binding on technical standards. General requirements regarding environmentally friendly materials allow for the use of cheaper alternatives, while the absence of fiscal incentives and subsidies hinders the high-cost production of Noken. Furthermore, socialization efforts that underemphasize the value of local wisdom, monitoring mechanisms that fail to record quantitative product data, and sanctions that are solely administrative in nature without a specific reward system collectively undermine Noken adoption as a plastic waste reduction strategy in Jayawijaya Regency.

The analysis shows that the effectiveness of Noken use is hampered by overly general regulations without binding technical standards for businesses. Without fiscal incentives, artisan mentoring, and quantitative data monitoring, this strategy is purely voluntary, making it vulnerable to greenwashing and difficult to compete with cheaper alternatives. The solution requires

strengthening multi-sectoral regulations that include a total ban on single-use plastics in modern retail and traditional markets, as well as the implementation of a plastic bag surcharge. Building on the success of Jayapura City, the new policy in Jayawijaya should explicitly mandate Noken use across all trade sectors to ensure the sustainability of locally-based waste reduction.

This regulatory model has been successfully implemented in various major cities in Indonesia, which can serve as a benchmark for Jayawijaya Regency. Based on the results of a documentation study in Jayapura, Jayapura Mayor Regulation Number 1 of 2019 concerning the Use of Alternative Shopping Bags to Replace Plastic Bags in Shops and Shopping Centers. This regulation requires all retail stores, malls, and shopping centers to use environmentally friendly bags made of cloth, cardboard, nets, paper, or other environmentally friendly materials to reduce the rate of plastic bag use. Expanding the scope of inclusion regulations across all retail stores, both traditional and modern. Based on the results of the documentation study that has been conducted, it was found that one of the weaknesses of Jayapura Mayor Regulation Number 1 of 2019 concerning the Use of Alternative Shopping Bags to Replace Plastic Bags in Shops and Shopping Centers is that it does not include the word "Market" in its formulation. This results in the regulation not being effectively binding on all traditional and modern markets spread and operating in Jayapura City. For example, observations conducted at the Yotefa Abepura Main Market, Hamadi Jayapura Market, Jayapura Fish Market, and Jayapura Regional Main Market showed that the use of single-use plastic bags was still widespread in shopping activities.

The Jayawijaya Regency Government needs to develop broader and more explicit regulations for plastic waste reduction, learning from the policies in Jayapura City. These regulations must target all commercial entities, from modern stores and traditional markets to street vendors and MSMEs, to ensure the transition to Noken bags or eco-friendly containers occurs effectively and comprehensively at all points of transaction.

Obstacles Faced in Implementing the Policy to Reduce Plastic Bag Waste Using Noken Bags and Solutions to Overcome Them

Obstacles to the Implementation of the Plastic Bag Waste Reduction Policy with Noken in Jayawijaya Regency, The implementation of the plastic bag waste reduction policy, especially by promoting the use of noken bags in

Jayawijaya Regency, faces various complex challenges that require a multi-sectoral approach. Based on the results of interviews with the Jayawijaya Regency Government and the Head of the Jayawijaya Regency Environmental Service, the main obstacles can be grouped into several important aspects. Based on the results of the interviews, several themes emerged, which can be presented in the following table:

Table 9.
Data from interviews with the Head of the Jayawijaya Regency Environmental Agency

No	Main Theme	Key Points / Related Obstacles
1	Social and Behavioral Factors	a. Low public awareness. b. Socialization efforts, such as creating banners prohibiting littering during certain hours, have not been effective in changing behavior.
2	Economic and Financial Factors	a. Limited local government budgets b. High costs for alternative raw materials for Noken and their distribution
3	Infrastructure and Logistics Factors	a. Very limited facilities and infrastructure (15 garbage trucks, no TPST (trash collection point), overloaded landfills, no waste banks, no weighbridges). b. Challenges in the availability and distribution of Noken for the mass market.
4	Policy and Implementation Factors	a. Existing regulations are difficult to implement in the field. b. Gap between policy objectives and socio-economic realities.

Source: Head of Jayawijaya Regency Environmental Agency (2025)

Interviews revealed four main obstacles to waste management in Jayawijaya Regency. First, low public awareness and ineffective outreach programs hinder behavioral change in waste reduction. Second, limited facilities and infrastructure are crucial, evidenced by a shortage of trucks, the absence of waste banks, and the overloaded landfills (TPA). Third, budget constraints hinder the addition of collection units, despite requests. Finally, weak implementation of regulations on the ground has rendered the regulation on the use of environmentally friendly containers ineffective due to a lack of public understanding of the dangers of single-use plastics.

Interviews with the Jayawijaya Regency Government revealed that:

> "*The local government has initiated a policy to designate Noken as an eco-friendly shopping bag to support the local economy and cultural preservation. However, its implementation is hampered by the limited availability of native raw materials (tree bark) due to the threat of deforestation, necessitating alternative materials such as wool yarn. The main problem is the high cost of distributing these raw materials, which must be by air, given the limited transportation access to Jayawijaya. This makes this plan difficult to implement.*"[22]

The Regional Government, through its Legal Department, has highlighted significant challenges in mass-producing Noken due to limited artisan production capacity and the scarcity of authentic tree bark raw materials. Although alternative raw materials such as manila thread or wool are available, prices remain high due to distribution constraints, which rely entirely on air transportation. These production scale issues and high logistics costs pose a major dilemma in meeting market demand as a substitute for plastic bags.

In line with the challenges faced by the Environmental Agency in implementing Jayawijaya Regency Regional Regulation No. 4 of 2024 concerning Waste Management, the three largest retail stores in Wamena City, Jayawijaya Regency: Ropan, Holandia, and Yudha, also face these challenges.

> "*I have used environmentally friendly containers, just like the ones I use in my shop in Sentani Jayapura, but it had a big impact on sales, which dropped drastically within a week because people were reluctant to buy the environmentally friendly bags we provide for ten thousand rupiah and twenty thousand rupiah.*"[23]

Interviews with three of Wamena's largest retail stores revealed that implementation of Regional Regulation No. 4 of 2024 is difficult due to low public awareness. A trial of replacing plastic bags with eco-friendly spunbond bags for a fee (Rp 10,000–Rp 20,000) negatively impacted sales volume, forcing businesses to revert to plastic to avoid losses. Low social awareness and a lack

[22] Interview with the Legal Department of the Regional Government, (2025)

[23] Interview with one of the leaders of the largest retail store in Jayawijaya Regency). 2025

of policy education from stakeholders are key inhibiting factors that risk harming the local economy and hindering the policy's success.

CONCLUSION

Jayawijaya Regency faces an urgent plastic waste crisis, marked by a 26.28% surge in waste volume (2022–2024), exacerbated by systemic infrastructure failures such as the absence of TPST (recycling facilities), the 3R program, and overloaded landfills. This situation has a fatal impact on public health, with pollution from plastic waste contributing significantly to a drastic increase in respiratory diseases (ARI, asthma), digestive diseases (gastroenteritis, typhus), and reproductive disorders (LBW). As a solution, Noken bags have great potential as an environmentally friendly alternative that is ecologically, culturally, and functionally superior. However, mass adoption of Noken is hampered by high prices, limited raw materials due to the threat of deforestation, and high air logistics costs. Regulatory-wise, Regional Regulation No. 4 of 2024 is considered too general and does not explicitly support Noken, while trials in the retail sector have shown consumer resistance, resulting in declining sales. Therefore, a multi-sectoral strategy is needed, including the innovation of affordable "Shopping Noken," strengthening regulations requiring the use of environmentally friendly containers at all points of sale, and central budget support to address infrastructure and distribution challenges in Highland Papua.

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