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EXTENDED PRODUCER RESPONSIBILITY (EPR) IN NEPAL: A TRANSFORMATIVE POLICY STRATEGY FOR SUSTAINABLE WASTE MANAGEMENT

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ABSTRACT

In response to Nepal's escalating waste management crisis due to rapid urbanization and evolving consumption patterns, this article examines Extended Producer Responsibility (EPR) as a transformative policy approach to enhance environmental sustainability. EPR, which extends a producer's accountability to the product's post-consumer phase, is particularly relevant for addressing Nepal's unique waste challenges. This study aims to provide a detailed analysis of Nepal's current waste management obstacles, the principles of EPR, and the potential pathways and benefits of EPR implementation. The research employs a doctrinal approach, including case studies from other nations to assess feasibility and derive applicable best practices. Findings reveal that EPR implementation could significantly reduce waste generation, promote a circular economy, and alleviate financial strain on municipalities, though challenges such as regulatory gaps and infrastructure limitations persist. The article underscores EPR's potential in transforming Nepal's waste management landscape and offers strategic insights for policymakers aiming to align with Nepal's broader environmental sustainability goals.

Keywords: Extended Producer Responsibility, EPR, Nepal, waste management, environmental policy, sustainability, circular economy

INTRODUCTION

Nepal, a nation of diverse landscapes and rich cultural heritage, finds itself at a critical juncture in its development trajectory. As the country

strives to balance economic growth with environmental sustainability, it faces a mounting waste management crisis that threatens to undermine its progress and jeopardize the well-being of its citizens. This crisis is particularly acute in Nepal's rapidly expanding urban centers, with the Kathmandu Valley serving as a stark example of the challenges at hand. The roots of Nepal's waste management predicament are multifaceted and deeply intertwined with the country's ongoing socio-economic transformation. Rapid urbanization, fueled by rural-to-urban migration and natural population growth, has led to a significant increase in urban populations. This demographic shift has been accompanied by changing consumption patterns, as rising incomes and increased access to consumer goods have resulted in a surge in waste generation. The proliferation of single-use plastics, electronic waste, and other non-biodegradable materials has further compounded the problem, creating a waste stream that is increasingly complex and challenging to manage. Nepal's waste management infrastructure, already strained and inadequate, has struggled to keep pace with these developments. Many municipalities lack proper waste collection systems, recycling facilities, and sanitary landfills. As a result, open dumping and burning of waste have become commonplace, leading to severe environmental degradation. Existing research highlights the effectiveness of Extended Producer Responsibility (EPR) in advancing sustainable waste management and supporting circular economy principles across developed nations, particularly in countries such as Germany, Japan, and South Korea (Akenji, 2012; Kunz *et al.*, 2018). However, there is limited empirical research on the implementation of EPR frameworks in low-resource and developing contexts, especially in South Asia, where factors such as informal waste sectors, fragmented regulations, and insufficient waste processing infrastructure create unique challenges. It is in this context that EPR emerges as a promising approach with the potential to transform Nepal's waste management landscape. EPR, originally implemented in OECD countries, represents a paradigm shift in how societies view and manage waste by extending a producer's responsibility for a product beyond the point of sale to encompass the entire lifecycle of the product, including its disposal and recycling. Internalizing the environmental costs associated with products throughout their lifecycle, EPR fosters a more sustainable and circular approach to production and consumption. The potential benefits of EPR are manifold: it incentivizes producers to design environmentally friendly products, stimulates innovations in recyclability, and establishes efficient waste collection systems through take-back programs and recycling infrastructure. For Nepal, the adoption

of EPR could represent a transformative step toward sustainable waste management, shifting responsibility from cash-strapped municipalities to producers and fostering investment in recycling infrastructure. However, challenges such as the large informal waste sector, limited institutional capacity, and the predominance of small and medium-sized enterprises in Nepal present significant obstacles that must be addressed to ensure successful implementation. This study aims to fill the research gap by assessing the feasibility, benefits, and challenges of implementing EPR in Nepal's waste management sector, drawing on international case studies and policy analysis to provide actionable insights for policymakers, stakeholders, and environmental advocates in Nepal. Investigating EPR's role in addressing Nepal's waste crisis, this study contributes to the broader discourse on sustainable waste management strategies in developing countries. While Extended Producer Responsibility (EPR) has been successfully implemented in developed nations like Germany, Japan, and South Korea, its application in low-resource contexts, particularly in South Asia, remains understudied (Faibil *et al.*, 2023). Limited research addresses how informal waste sectors and fragmented regulatory frameworks can adapt to EPR policies, creating a critical gap in understanding EPR's applicability in countries like Nepal. This study aims to bridge this gap by providing insights into feasible strategies for EPR implementation tailored to Nepal's unique socio-economic and infrastructural challenges.

METHODS AND MATERIALS

This study employs doctrinal research complemented by comparative case studies from developed and developing nations, including Australia (Shooshtarian *et al.*, 2021) and India (Faibil *et al.*, 2023). The methodological approach integrates recent advances in EPR frameworks to contextualize lessons for Nepal. The approach involves a systematic analysis of legal rules, principles, and policies related to EPR and waste management. A comprehensive literature review was conducted, encompassing academic journals, books, policy documents, and reports from national and international organizations. Relevant Nepalese environmental laws and regulations were examined, along with international legal frameworks and EPR policies from countries with successful implementations. Three international case studies (Germany, India, and Japan) were analyzed to derive best practices and lessons applicable to the Nepalese context. Data sources included academic databases such as JSTOR and Google Scholar, government publications, reports from international organizations, and legal databases. The collected information was analyzed using a framework

that included contextual analysis of Nepal's current waste management challenges, comparative analysis of EPR implementations in other countries, policy analysis of potential benefits and challenges, and legal analysis of regulatory implications. This doctrinal approach allowed for a comprehensive examination of EPR as a policy strategy, considering both theoretical foundations and practical implications within Nepal's specific context. The method's limitations, such as the potential gap between law in books and law in action, were acknowledged and addressed through the incorporation of case studies and contextual analysis.

Rapid Urbanization and Changing Consumption Patterns:

Nepal has experienced significant urban growth in recent decades, with the urban population increasing from 14% in 2001 to 19.7% in 2011. The urban population in Nepal has increased significantly over the decades. In 1952/54, only 2.9% of the population lived in urban areas, and this figure rose to 13.9% by 2001 and 17.1% by 2011[1]. As of the 2011 census, the average urban population density in Nepal was 1,381 people per square kilometer, compared to a total population density of 180 people per square kilometer[2]. This rapid urbanization, coupled with changing consumption patterns and lifestyles, has led to a substantial increase in waste generation, particularly in urban areas. The world generates approximately 2.01 billion tonnes of municipal solid waste annually, with projections indicating this could rise to 3.40 billion tonnes by 2050. This growth is attributed to urbanization and population increases, particularly in low- and middle-income countries[3]. On average, waste generated per person per day is 0.74 kilograms, but this varies widely, ranging from 0.11 to 4.54 kilograms depending on the region and income level. High-income countries generate about 34% of global waste despite comprising only 16% of the world's population[4]. According to a study by the Asian Development Bank (2013),

1 Joshi, D. R. (2023). *Contemporary Research: An Interdisciplinary Academic Journal*, vol. 6 (1); https://doi.org/10.3126/craiaj.v6i1.55367 Accessed: 2024, August 28.

2 Bakrania, S. (2015) Urbanisation and urban growth in Nepal (GSDRC Helpdesk Research Report 1294) Birmingham, UK: GSDRC, University of Birmingham. Accessed: 2024, August 28.

3 World Bank. (2024). Trends in Solid Waste Management. What a Waste: A Global Snapshot of Solid Waste Management to 2050. https://datatopics.worldbank.org/what-a-waste/trends_in_solid_waste_management.html. Accessed: 2024, August 28.

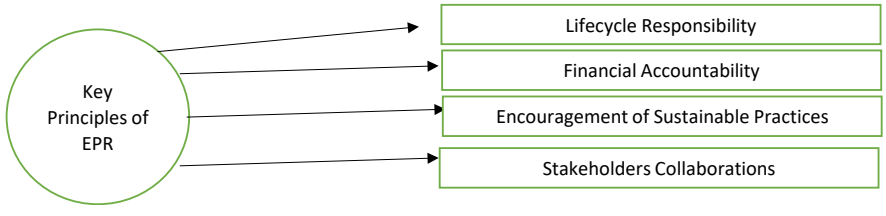
4 Ibid

the average municipal solid waste generation rate in Nepal is 0.317 kg/capita/day, with urban areas generating significantly more waste than rural areas. The composition of waste has also shifted, with an increasing proportion of non-biodegradable materials such as plastics, electronic waste, and packaging materials[5]. Nepal's waste management infrastructure is inadequate to handle the growing volume of waste. Most municipalities lack proper waste collection systems, recycling facilities, and sanitary landfills. Open dumping and burning of waste are common practices, leading to environmental pollution and health hazards[6]. A significant portion of waste management and recycling activities in Nepal is carried out by the informal sector, including waste pickers and small-scale recyclers.

Principles and Potential Benefits of EPR in Nepal

Figure 1

Key Principles of EPR



Extended Producer Responsibility (EPR) in Nepal presents a transformative approach to waste management, built upon core principles that redefine the relationship between producers, consumers, and the environment. At its heart, EPR embodies the concept of producer responsibility, extending manufacturers' obligations beyond the point of sale to encompass the entire lifecycle of their products, including disposal and recycling. This principle is complemented by the polluter pays concept, which internalizes waste management costs into product prices, effectively shifting the financial burden from municipalities to producers and consumers. EPR also incentivizes design for environment, encouraging the creation of more durable, recyclable, and less toxic products, while promoting the waste management hierarchy of reduce, reuse, and recycle. The potential benefits of implementing EPR in Nepal are far-reaching and multifaceted.

5 Asian Development Bank (n.d.).. *Solid Waste Management in Nepal: Current Status and Policy Recommendations*. http://hdl.handle.net/11540/817 . Accessed: 2024, August 28. Available at: https://www.adb.org/sites/default/files/publication/30366/solid-waste-management-nepal.pdf

6 Ibid

Making producers responsible for end-of-life product management, EPR can catalyze the establishment of more efficient waste collection and recycling systems, leading to significantly improved recycling rates and reduced landfill waste. This shift towards more environmentally friendly production practices can result in a substantial reduction in toxic materials, enhanced resource efficiency, and decreased environmental pollution from improper waste disposal. Moreover, EPR implementation has the potential to stimulate economic growth and job creation within the recycling industry, fostering innovation in product design and recycling technologies. Alleviating the financial and logistical burden on municipalities, EPR allows for the reallocation of resources to other critical urban issues. Over one-third of all plastic produced globally is used for packaging, yet only 14% of plastic packaging is recycled. Of this, a mere 2% is reused as packaging, while 86% ends up in landfills, with 40% directly sent to landfills[7]. Large producers in the UK are required to report their packaging data starting from 2023, with specific deadlines for submissions. The first two reporting deadlines for large producers are set for October 1, 2023, and April 1, 2024[8]. Perhaps most importantly, EPR plays a crucial role in promoting the transition towards a circular economy in Nepal, encouraging the reuse and recycling of materials, reducing reliance on virgin resources, and minimizing waste generation. Additionally, the implementation of EPR schemes can significantly raise public awareness about waste management issues, fostering more sustainable consumption patterns among consumers. As Nepal grapples with the challenges of rapid urbanization and changing consumption patterns, the adoption of EPR principles offers a promising pathway towards sustainable waste management and environmental stewardship, with potential benefits resonating across environmental, economic, and social spheres.

Ramasubramanian *et al.,* (2023) illustrate how advanced recycling technologies and clear regulatory frameworks have significantly improved plastic waste management in Germany and the UK. Nepal can draw on these experiences to establish similar frameworks, prioritizing investments in

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7 World Wildlife Fund. *Extended Producer Responsibility (EPR)* (n.d.).*Fact Sheet*. https://wwfint.awsassets.panda.org/downloads/epr_fact_sheet.pdf . Accessed: 2024, August 28.

8 UK Government (n.d.).. *Extended Producer Responsibility for Packaging: Who Is Affected and What to Do*. https://www.gov.uk/guidance/extended-producer-responsibility-for-packaging-who-is-affected-and-what-to-do . Accessed: 2024, August 28.

recycling infrastructure and technological innovations. Furthermore, aligning these practices with EPR principles could enhance resource efficiency and reduce reliance on virgin materials, fostering a circular economy.

Table 1:

Key Components, Benefits, and Challenges of Extended Producer Responsibility (EPR):

Component	Description	Benefits	Challenges
Definition of EPR	A policy approach where producers are given significant responsibility—financial and/or physical—for the treatment or disposal of post-consumer products.	Encourages eco-friendly design, waste reduction, and recycling.	Implementation across different industries and regions can be complex and costly.
Product Design	Producers design products that are easier to recycle or dispose of at the end of their life cycle.	Reduces environmental impact and promotes sustainable design.	Requires innovation and may increase production costs.
Collection and Recycling	Systems are established for the collection, recycling, or safe disposal of products.	Increases recycling rates and reduces landfill usage.	Ensuring participation and compliance can be difficult.
Consumer Participation	Consumers are encouraged to return used products to designated collection points.	Increases awareness and involvement in waste reduction efforts.	Public awareness and convenience of disposal options vary.
Cost Allocation	Costs associated with waste management are shifted from taxpayers to producers.	Provides economic incentives for producers to minimize waste.	Determining fair cost distribution can be challenging.
Sustainability Impact	EPR contributes to the circular economy by promoting the reuse, recycling, and reduction of waste.	Supports long-term environmental sustainability.	Measuring the actual impact and success of EPR initiatives can be complex.
Industry Resistance	Some industries may resist EPR due to increased costs and operational changes.	Pushes industries towards more sustainable practices.	Lobbying against EPR regulations can slow down progress.

Suo moto by Indian court in the context of EPR System :

The judgment in "*News Item Titled "Package Where Has The ... vs . Ankita Sinha & Ors*[9]" revolves around the significant issue of non-compliance with the Extended Producer Responsibility (EPR) system for plastic waste management in Tamil Nadu, a matter brought to light through a suo motu case initiated by the National Green Tribunal (NGT). The case was triggered by a news report highlighting that over 30% of plastic waste-generating firms in Tamil Nadu had evaded mandatory registration with the EPR portal, as required by the Union Government since February 2022. This evasion has raised concerns about the unregulated disposal of plastic waste, with risks of illegal dumping in landfills, water bodies, or informal recycling channels that do not adhere to legal or environmental standards. The core issue before the court was the large-scale evasion of EPR regulations by plastic producers and brand owners, and the apparent failure of the Tamil Nadu Pollution Control Board to enforce these regulations. The news report cited in the judgment pointed out that despite instructions from the Tamil Nadu Pollution Control Board requiring registration on the EPR portal by May 31, 2024, a significant number of companies had not complied, and no penalties had been imposed for this failure. In response, the NGT recognized the issue as a pan-India problem, noting that similar non-compliance existed across various states. Consequently, the court expanded the scope of the case, impleading a wide range of states and union territories to address the EPR compliance issue on a national level. The court directed these respondents to file their responses and ordered that the case be heard alongside a similar matter concerning fake pollution trading certificates in Gujarat, Maharashtra, and Karnataka. The judgment emphasizes the need for stricter enforcement of environmental regulations and the implementation of the EPR system to ensure that plastic waste is properly recycled or disposed of, thereby protecting the environment from the harmful effects of plastic pollution.

International Case Studies and Best Practices in EPR Implementation

Extended Producer Responsibility (EPR) involves a range of policy measures aimed at minimizing waste generation. It encourages increased

9 Original application is registered suo motu on the basis of the news item titled "PACKAGE Where has the plastic waste disappeared appearing in 'The Times of India' dated 30.07.2024. https://indiankanoon.org/doc/39784036/

recycling and resource recovery while fostering more sustainable product design[10].

EPR for Packaging Waste in Germany:

Germany has been at the forefront of Extended Producer Responsibility (EPR) implementation since 1991 when it introduced its groundbreaking packaging ordinance. This pioneering system, known as the **"Green Dot" (Der Grüne Punkt)**[11]**,** revolutionized waste management by making producers financially responsible for the packaging they introduce to the market. Under this scheme, producers pay fees based on the type and quantity of packaging they use, creating a direct incentive to reduce packaging waste and improve recyclability. The results have been remarkable, with Germany witnessing significant improvements in packaging recycling rates and a substantial reduction in overall packaging waste. This success story offers valuable lessons for countries like Nepal considering EPR implementation. Firstly, it underscores the importance of establishing a clear legal framework with robust enforcement mechanisms to ensure compliance. Secondly, the German experience highlights the benefits of involving producers in the design and implementation of the system, which can lead to improved compliance and more effective solutions. Lastly, the ongoing success of the Green Dot system demonstrates the necessity of regular monitoring and adjustment to maintain its effectiveness in the face of changing market conditions and technological advancements.

E-waste Management in India:

India's approach to EPR for e-waste management, introduced through the E-waste (Management) Rules of 2016[12], offers another

10 Wang, Ying. "*Research on Reverse Logistics Mode and Implementation of EPR*." Applied Mechanics and Materials 253-255 (December 2012): 1032–35. http://dx.doi.org/10.4028/www.scientific.net/amm.253-255.1032. Accessed: 2024, August 28.

11 The "Green Dot" system, known as "Der Grüne Punkt," was first implemented in Germany in the early 1990s and has since revolutionized waste management by making producers financially responsible for the packaging they introduce to the market. This pioneering system signifies that manufacturers have fulfilled their obligations regarding the recovery and recycling of packaging waste.

12 It replaced the earlier E-waste (Management and Handling) Rules of 2011. These rules were notified by the Ministry of Environment, Forest and Climate Change (MoEF&CC) and came into effect on October 1, 2016.

instructive case study. This policy mandates that electronics producers establish collection centers and ensure proper recycling of their products, addressing the growing challenge of e-waste in one of the world's largest consumer markets. While the implementation of this policy has faced numerous challenges, it has nonetheless yielded positive outcomes, including increased awareness of e-waste issues and the development of a formal e-waste recycling infrastructure. The Indian experience provides several key lessons for Nepal as it considers its own EPR strategies. First, it demonstrates the value of a phased implementation approach, which allows for gradual capacity building and infrastructure development. This can be particularly important in countries with limited existing waste management capabilities. Second, India's experience underscores the critical importance of collaborating with the informal sector, which often plays a significant role in waste collection and recycling in developing countries. Engaging with these stakeholders can enhance the effectiveness of e-waste management efforts. Finally, the Indian case highlights the crucial role of public awareness campaigns in ensuring the success of e-waste EPR schemes, emphasizing the need for comprehensive education and outreach efforts to accompany policy implementation.

EPR for Plastic Packaging in Japan:

Japan's comprehensive EPR system for packaging waste, with a particular focus on plastics, presents yet another model for countries like Nepal to consider. The EPR system in Japan was formalized through the Act on the Promotion of Sorted Collection and Recycling of Containers and Packaging (Packaging Recycling Act), enacted in 1995. This law mandates that producers of packaging materials are responsible for the recycling of their products, thereby creating a financial obligation to manage waste effectively[13]. The Japanese approach is characterized by its emphasis on shared responsibility among producers, consumers, and local governments. This multi-stakeholder model has proven highly effective, resulting in impressively high recycling rates for plastic packaging and spurring the development of advanced recycling technologies. Japan's success offers several valuable insights for Nepal's potential EPR implementation. Firstly, it demonstrates the effectiveness of a multi-stakeholder approach

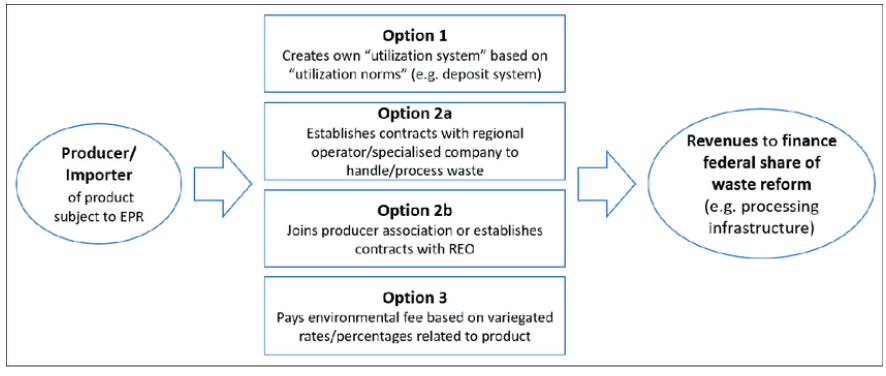
13 Chemlinked (n.d.).. Navigating Asian EPR Policies: South Korea, Japan, and Southeast Asia. https://sustainability.chemlinked.com/news/navigating-asian-epr-policies-south-korea-japan-and-southeast-asia. Accessed: 2024, August 28.

in enhancing EPR implementation, suggesting that involving all relevant parties can lead to more comprehensive and successful waste management strategies. Secondly, the Japanese case underscores the importance of significant investment in recycling technologies and infrastructure as a key factor in achieving high recycling rates and promoting innovation in waste management. Lastly, Japan's experience highlights the value of clear labeling and sorting guidelines in improving consumer participation, indicating that effective communication and easy-to-follow systems can significantly boost the success of recycling programs.

Russian Extended Producer Responsibility (EPR) scheme:

Figure 2

Diagram-1[14]



The diagram illustrates the options available to producers or importers of products subject to Extended Producer Responsibility (EPR) in Russia. EPR is a policy approach where producers are given a significant responsibility—financial and/or physical—for the treatment or disposal of post-consumer products.

Option 1: Creates Own "Utilization System"

The producer or importer develops their own system for managing waste based on established "utilization norms," such as a deposit system. This approach allows companies to control the process directly, ensuring that the waste from their products is appropriately handled.

14 ResearchGate (n.d.).. . *Overview of Russian Extended Producer Responsibility (EPR) Scheme*. https://www.researchgate.net/figure/Overview-of-Russian-Extended-Producer-Responsibility-EPR-scheme_fig2_346779731 . Accessed: 2024, August 28.

Option 2a: Contracts with Regional Operators or Specialized Companies

Producers or importers can establish contracts with regional operators or specialized companies responsible for handling and processing waste. This option involves outsourcing the waste management process to entities with the expertise and infrastructure to do so.

Option 2b: Joins Producer Association or Contracts with REO

The producer or importer can join a producer association or establish contracts with a Regional Environmental Operator (REO). This collective approach allows companies to share responsibilities and resources, making waste management more efficient and cost-effective.

Option 3: Pays Environmental Fee:

Instead of managing the waste directly, the producer or importer can choose to pay an environmental fee. The fee is based on varying rates or percentages related to the product, effectively transferring the responsibility to the government or a designated authority to manage waste disposal or recycling.

Revenues to Finance Federal Waste Reform:

The options are structured to generate revenues that will finance the federal share of waste reform initiatives. These initiatives could include developing or upgrading waste processing infrastructure, which is essential for effective waste management.

Overview of this scheme impact:

1. The EPR scheme ensures that producers or importers are accountable for the entire lifecycle of their products, from production to disposal. This encourages them to design more sustainable products.
2. The revenues generated through these options can be used to build and maintain necessary waste processing infrastructure, which is crucial for managing waste sustainably.
3. Enforcing waste management obligations on producers, the scheme helps reduce the environmental impact of products, leading to a cleaner and healthier environment.

This system ensures a balance between economic activity and environmental protection, aligning with broader sustainability goals.

RESULT AND DISCUSSION

The analysis reveals that Nepal's waste management challenges are deeply rooted in its inadequate infrastructure and regulatory framework. Municipalities lack sufficient resources for waste collection and recycling, resulting in widespread open dumping and burning of waste. The informal sector plays a significant role in recycling activities, but its operations remain unregulated and unsupported. Furthermore, the absence of clear enforcement mechanisms exacerbates inefficiencies in managing waste streams.

Implementing Extended Producer Responsibility (EPR) offers transformative potential to address these challenges. Findings from international case studies highlight several benefits of EPR:

- Enhanced Recycling Rates: EPR frameworks in Germany and Japan demonstrate significantly improved recycling rates, particularly for plastics and electronic waste, by holding producers accountable for the end-of-life management of their products.
- Financial Relief for Municipalities: Shifting the financial burden of waste management to producers reduces the strain on local governments and allows resources to be reallocated to other urban challenges.

However, the study also identifies critical barriers to successful EPR implementation in Nepal:

- Informal Sector Integration: The informal waste sector, which contributes significantly to recycling, must be formally recognized and included in EPR schemes.
- Institutional Capacity: Nepal requires enhanced regulatory frameworks and institutional capacity to monitor and enforce compliance.

Drawing from these findings, it is evident that EPR can significantly improve Nepal's waste management system. However, its success hinges on a phased implementation strategy, collaboration with the informal sector, and substantial investment in recycling infrastructure. These measures will enable Nepal to transition toward sustainable waste management and achieve broader environmental goals.

CONCLUSION

Extended Producer Responsibility (EPR) represents a promising policy strategy for addressing Nepal's growing waste management challenges. By shifting the responsibility for waste management to producers, EPR has the potential to improve waste collection and recycling rates, reduce environmental pollution, create economic opportunities, and promote sustainable consumption and production patterns. However, the successful implementation of EPR in Nepal will require overcoming significant obstacles, including limited institutional capacity, inadequate infrastructure, and the prevalence of the informal economy. A carefully designed and phased approach to EPR implementation, coupled with stakeholder engagement, public awareness campaigns, and investment in necessary infrastructure, can help Nepal harness the benefits of this policy strategy. As Nepal strives to achieve its sustainable development goals and improve the quality of life for its citizens, EPR can play a crucial role in transforming the country's approach to waste management. By learning from international best practices and adapting EPR to the local context, Nepal has the opportunity to create a more sustainable and circular economy, setting an example for other developing countries facing similar waste management challenges. The journey towards effective EPR implementation in Nepal will undoubtedly be complex and challenging. However, with strong political will, stakeholder cooperation, and a commitment to long-term sustainability, EPR can serve as a catalyst for positive environmental, economic, and social change in the country.

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