

Solving the Global Plastic Crisis: The Role of Policymakers and Collaborative Efforts towards Sustainability

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Abstract. The relentless increase in plastic production and its inadequate recycling highlights the emergence of a global plastic crisis. This essay explores the role of local, national, and international policymakers in addressing the crisis independently and collaboratively. Market failures and negative externalities associated with plastic production are major contributors to the crisis. Local policymakers have the potential to reduce plastic waste by promoting sustainable practices and collaborating with businesses to adopt recyclable materials. However, challenges such as limited budgets and enforcement difficulties hinder their efforts. National policymakers can implement effective regulations, taxes, and subsidies to internalise the cost of plastic pollution and hold companies accountable for waste. Nevertheless, conflicts between environmental concerns and alternative solutions must be addressed. International policymakers play a crucial role in developing global regulations and setting sustainable development goals. Collaborative efforts among policymakers at all levels enhance policy effectiveness, but they may also face conflicts due to divergent interests. To effectively address the plastic crisis, individuals must change consumption behavior, while policymakers need to promote sustainable practices, research, and inclusivity in policymaking. A comprehensive approach combining individual responsibility and collaborative efforts can lead to a sustainable future in combating the plastic crisis.

Keywords: Plastic crisis, Policymakers, Sustainability, Collaboration, Case Study.

1. Introduction

Based on historical growth patterns, projections indicate that global primary plastic production is expected to achieve 1.1 billion tonnes by 2050 [1]. The available data shows the alarming amount of plastic production, thus highlighting the emergence of a serious plastic crisis. A total of 7 billion tons of plastic waste is generated globally, but less than 10% is recycled [1]. It shows the inadequacy of current plastic recycling practices. Therefore, it is vital to implement effective environmental policies to address the plastics crisis, with key measures including regulating plastic production, strengthening plastic recycling procedures, and promoting the development of sustainable and alternative raw materials. Addressing the plastics crisis will require effective consultation among policymakers and a strong development framework.

There is a widely held statement suggesting that environmental policy can only achieve effectiveness when different level policymakers work together. However, I disagree with this view and argue that it is indeed feasible for various level policymakers to implement effective environmental policies independently, collaboration across all levels of governance has the potential to enhance the overall effectiveness. Policymakers at different levels provide different perspectives and resources to overcome issues. According to the Organisation for Economic Co-operation and Development (OECD), national policymakers possess a broader lens that allows them to consider the comprehensive needs of the country, and that local policymakers are often more closely attuned to the specific concerns of their respective communities [2]. When addressing global issues, international policymakers can offer recommendations within a broader context and propose more universal policies [2].

This essay analyses how externality and market failure contribute to the plastic crisis, while also considering the advantages of local, national, and international policymakers in individually addressing the crisis. Additionally, potential challenges associated with their roles will be discussed. Lastly, this article thoroughly explores the advantages and limitations of collaboration among

policymakers at various levels, focusing on both top-down and bottom-up approaches to effectively address the plastic crisis and enhance the efficacy of environmental policies. Thus, it is evident that various policymakers can operate independently, and their collaboration can facilitate a comprehensive and integrated approach to shaping and implementing environmental policies.

2. Background of the Causes of Plastic Crisis

Plastic pollution has become a pressing developmental problem, leading to market failures that fail to fully account for the costs associated with plastics [3]. These additional costs associated with the production and consumption of plastics have negative externalities that impact various groups beyond the producers. The plastic crisis represents a worldwide externality, inflicting harm on ecosystems, diminishing biodiversity, and posing potential repercussions for every individual on the planet [4]. Hence, the implementation of more effective environmental policies can reduce the negative externalities arising from plastics and alleviate the adverse impact of market failures.

According to Randall, market failure is characterised by inefficiencies in commodity markets and is indeed a concern in the production of plastics [5]. The allocative resource efficiency of plastic production is notably low as the timely reflection of additional costs stemming from the negative externalities of plastic production is lacking. Based on Figure 1, the negative externality (external marginal cost) is evident in the cost difference, which signifies the variance between the expenses paid by the plastic manufacturer and the actual production cost. Likewise, the market price of plastic consumption fails to reflect the negative externality of plastic, indicating that consumers are not fully aware of the complete cost associated with plastic consumption, including its adverse effects on human health, the environment, and society. For instance, Verma et al. [6] highlighted that the subsequent treatment of plastics results in the generation of numerous chemicals harmful to human health, leading to developmental delays in children, issues with the human reproductive system, and even the development of cancer cells.

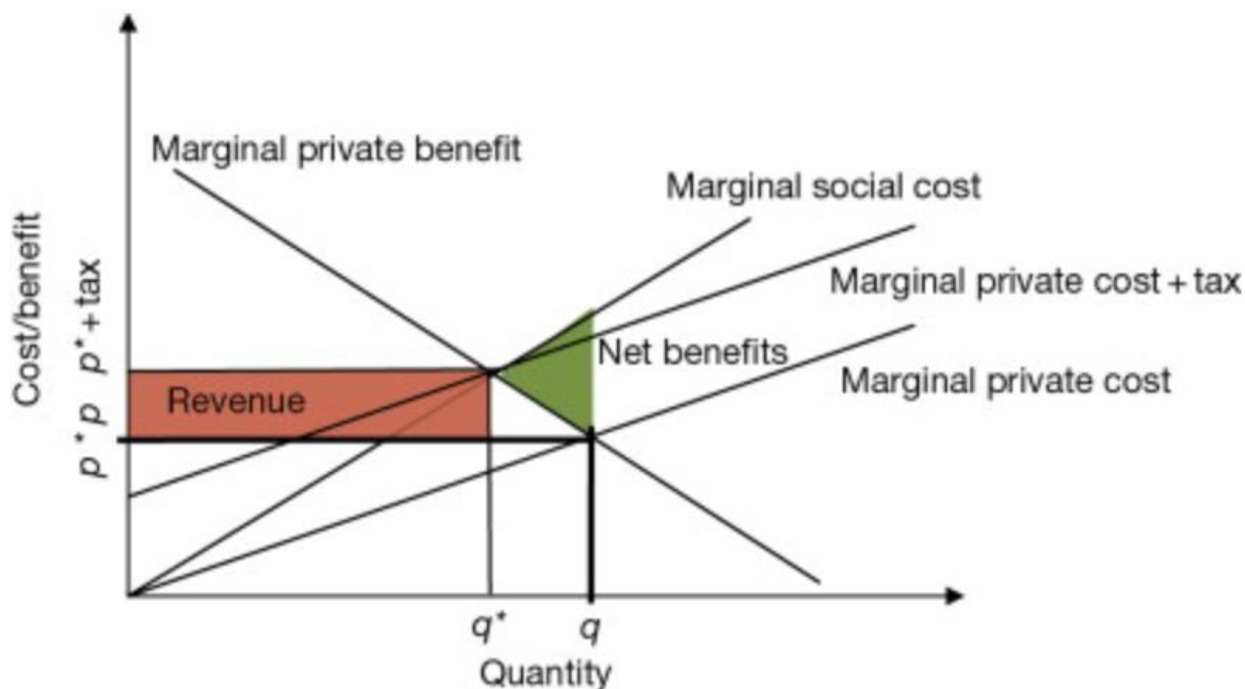


Fig. 1 Implementing Taxes as Market Corrective Measures [7]

Therefore, market failures arise due to producers or consumers not fully internalising the negative externalities associated with plastics. To address the negative effects of market failures, policymakers can effectively promote environmental policies internalise those additional costs, and strive for sustainable production and consumption. However, inefficient environmental policies may limit their effectiveness and enforcement in tackling the plastics crisis.

3. Exploring Local Policies Addressing the Plastic Crisis

Firstly, it is commendable to observe that local policymakers are taking proactive steps to address the plastic crisis within their communities. With a forward-looking approach, they are actively promoting sustainable practices and striving to curtail plastic consumption.

Local policymakers have a key role in reducing plastic waste by strategically implementing environmental policies, which aim to foster a culture of sustainability by encouraging individuals and businesses to adopt responsible and environmental-friendly practices. In September 2019, Zoopla set a remarkable example for office-based environments across the UK by illustrating how simple actions can yield significant outcomes [8]. Zoopla's initiatives resulted in 600 employees signing a Plastic Pledge, leading to a reduction of up to 65% in single-use plastic use, the elimination of a million single-use plastic items through reduction or substitution, and the removal of 43,200 plastic water bottles alone due to an office ban [8]. Local policymakers can also collaborate with manufacturers, encouraging the adoption of recyclable materials in product design and production, which can effectively diminish the negative externalities related to plastic manufacturing. According to Briain *et al.* [9], the state of California enacted a law mandating manufacturers to label products containing plastic microbeads as 'Do Not Flush' in 2014, aiming to address the concerns with these microbeads. Furthermore, local policymakers can provide incentives for businesses to decrease plastic packaging by levying taxes on single-use plastic bags, as exemplified in the city of Berkeley, California [10]. In conclusion, local policymakers can motivate individuals and businesses to act and foster collective efforts to effectively address the plastic crisis.

However, local policymakers encounter challenges in tackling the plastic crisis, primarily due to inadequate financial support and difficulties in effectively enforcing policies on businesses. Toloken [11] supposes that limited budgets act as a hindrance for local policymakers in their efforts to implement effective policies, while Coyne [12] proposes that businesses failing to satisfy plastic sustainability targets also present difficulties in enforcing controls. Although some companies promised to reduce plastic waste, they have increased their use of new plastics [12]. These actions present difficulties to local policymakers and hinder progress in reducing plastic waste. Thus, addressing the plastic crisis requires support from higher-level policymakers to develop more effective solutions that target the root causes.

4. Analysing National Policies to Tackle the Plastic Crisis

National policymakers have a range of tools at their disposal, including taxes, subsidies, and regulations, to effectively address the plastic crisis. Drawing on Laffont's research, tax policies are an effective mechanism for internalising the cost of plastic pollution, creating financial incentives for both producers and consumers to reduce their plastic usage [13].

National policymakers hold companies accountable for plastic waste and regulate the plastics industry through the enforcement of penalties to address the plastic crisis. By providing financial support and limitation, national policies can encourage the adoption of tax constraints and innovation subsidies, both effectively contributing to the resolution of the plastic crisis. The UK's Plastic Packaging Tax (PPT) applies a rate of £210.82 per tonne to plastic packaging with less than 30% recycled content that is manufactured or imported into the country [14], and Canada invests \$19 million to support Canadian innovators in developing solutions to address challenges related to plastics both signify significant steps taken by these countries to address the plastic crisis [15]. Based on Figure 2, trade-in per unit of product contributes more positively to the environment compared to consumption of new products. As a result, substitution subsidies, which encourage trade-ins and the use of recycled alternatives, are considered more environmentally friendly than consumption subsidies that incentivise the purchase of new products.

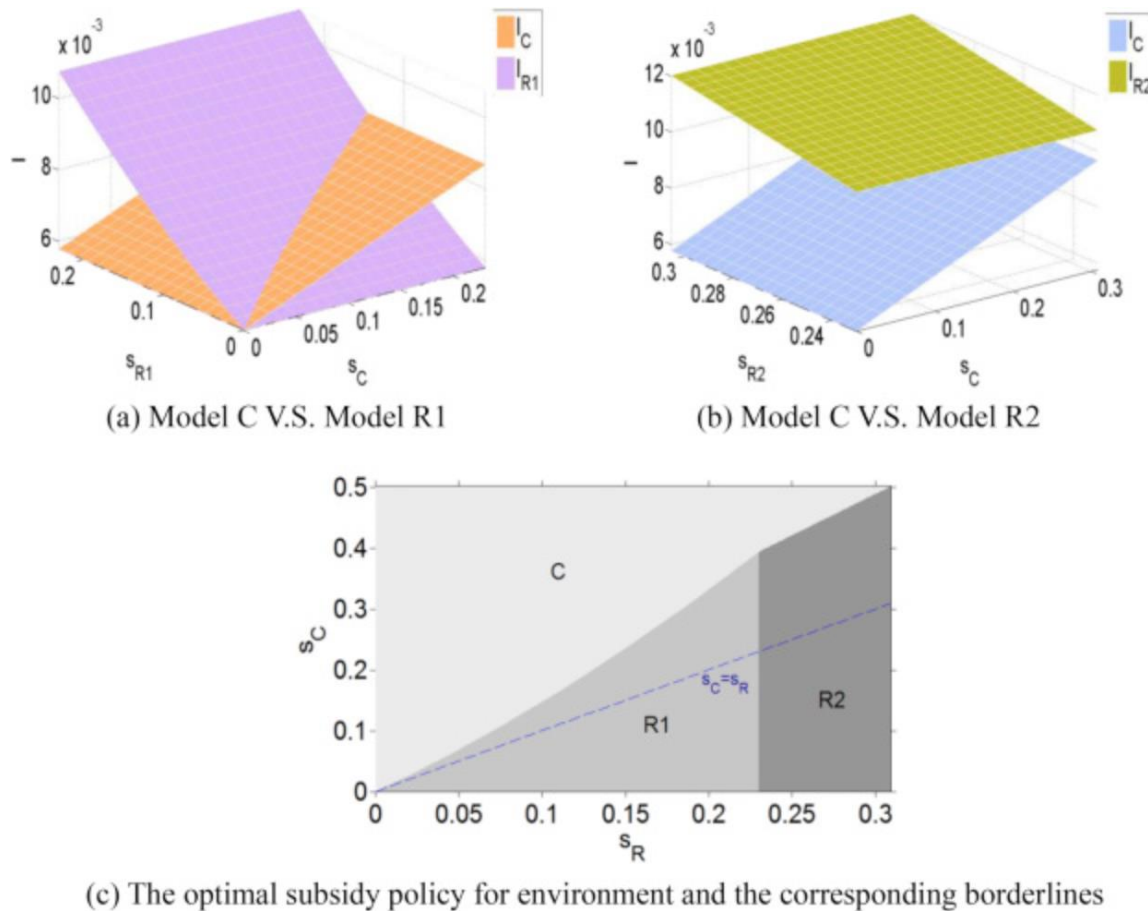


Fig. 2 Environmental Benefits and Limitations of Various Subsidy Policies [16]

National policymakers can further contribute to addressing the plastic crisis by implementing regulations on plastic production and disposal. The European Union has implemented the Single-use Plastics Directive, which outlines a target for Member States to achieve by 2025 [17]. The goal is to collect and recycle 77% of used single-use plastic beverage bottles, which aims to improve recycling rates and address the environmental challenges posed by single-use plastics in the region [17]. Besides, the Extended Producer Responsibility (EPR) environmental policy states that a producer's responsibility for its products extends to the consumption stage, and they are required to meet specific collection and recycling targets under the legislation [18]. However, the effectiveness of an Extended Producer Responsibility (EPR) system depends on the balance between the cost and return of plastic recycling. In monopoly systems where extended producer responsibility (EPR) costs surpass the average level, there is an increase of 10 to 15 percentage points in plastic recycling rates [19]. This discovery indicates that managing the cost of Extended Producer Responsibility (EPR) can positively influence plastic recycling rates. Through regulations, national policymakers effectively monitor whether plastic manufacturers comply with sustainable practices, such as plastic recycling and collection, aiming to promote environmental responsibility and reduce the plastic waste impact.

National policymakers face challenges in implementing policies and it is vital not to overlook the negative impact of plastic pollution on the environment and human health. Bourne [20] suggests that the alternative to plastic might have adverse environmental consequences and lead to increased landfill waste. Despite the potential negative environmental consequences of alternatives to plastic, it remains essential to continue exploring and developing sustainable options. Moreover, resorting to exporting plastic to other countries to accomplish government goals is not a sustainable solution for addressing the plastic crisis. Figure 3 illustrates that the volume of plastic exports is substantial, despite a slowdown in the trend of plastic exports in recent years. Therefore, national policymakers cannot always act alone to address the global plastics crisis and must collaborate with other countries to find effective solutions.

Annual exports of plastic waste from the United Kingdom from 2000 to 2021 (in million metric tons)

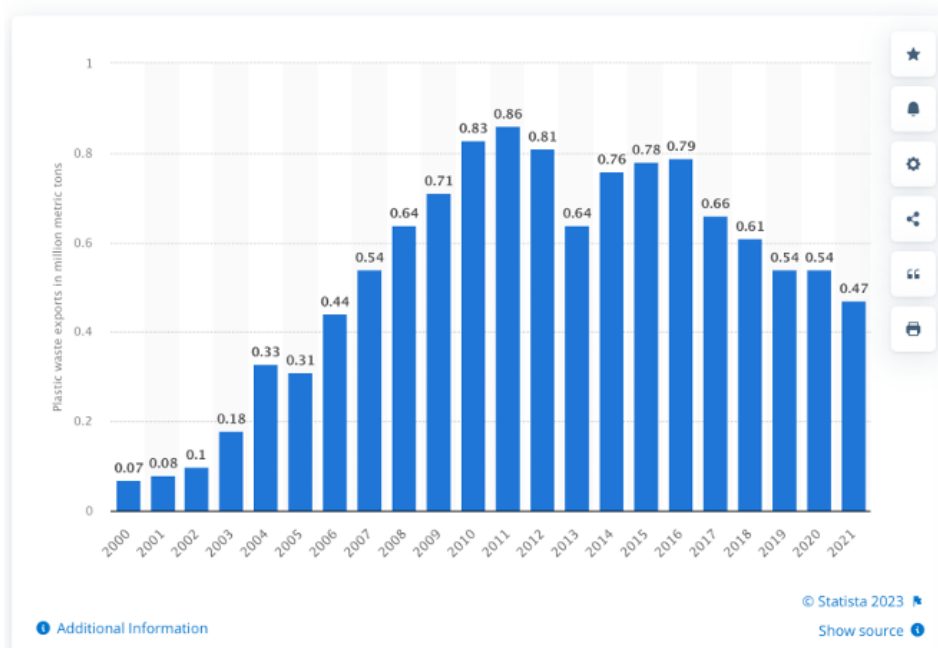


Fig. 3 Investigating the Challenges of High Plastic Exports [21]

5. Assessing Global Efforts in Addressing the Plastic Crisis

In addition, international policymakers have been instrumental in promoting sustainable development through two key approaches. Firstly, they have actively developed effective international regulations aimed at reducing plastic waste. Secondly, they have set ambitious sustainable development goals to tackle various environmental concerns.

International policymakers effectively implement environmental policies across a broader region to encourage the participation of multiple countries in the sustainable development movement. The Single-Use Plastics Directive adopted by the European Union is an important international environmental policy with implications beyond individual countries. The aim is to tackle the urgent issue of plastic pollution by banning certain single-use plastic products and setting precise recycling targets for plastic bottles in all member States [22]. By adopting such a comprehensive approach, the Directive showcases its potential to actively promote sustainable development on a global scale, thereby making a significant contribution to international sustainable development efforts. Another success in tackling the plastics crisis has been the setting of clear international development goals, such as the United Nations Sustainable Development Goals (SDGs), which have effectively reduced the presence of microplastics in the environment. Based on Walker [23], the Sustainable Development Goals (SDGs) encompass a specific target within Goal 14, focusing on life below water, with the objective of reducing marine plastic pollution by the year 2025. This target serves as a guiding principle for international policymakers, encouraging countries to implement transformative changes aimed at addressing the root causes of the plastic crisis. By advocating for these measures, the international community moves towards the widespread adoption of sustainable development principles around the world and accelerates the promotion of environmental well-being.

International policymakers could fail to fully understand the regional contexts and conditions of different areas, which might constrain the policies in particular places. Due to varying infrastructure, economic conditions, and customs of the culture, a policy that proves effective in one country might not be appropriate or beneficial in another. Single-use materials are the only feasible option for keeping hygienic food and beverages, thus even though the ban on their usage has been imposed in various countries across the world, it might not be practical in countries where there lacks a

availability of sanitary facilities or clean water. Silva *et al.* state plastic is a necessity in particular Covid-19 surroundings for people to prevent cross-infection, which substantially boosts the usage of plastic [24]. To deal with the plastic problem among multiple levels of policymakers, alternate approaches that are appropriate to the specific circumstances are essential.

6. Enhancing Collaboration Among Policymakers to Combat the Plastic Crisis

Collaboration among policymakers is necessary for enhancing the effectiveness of solving the plastic crisis because it's a global issue. When decision-makers interact across all levels, they share the duty of handling environmental difficulties. Collaboration at various levels may facilitate an exchange of creative thoughts and the latest methods for addressing the plastic crisis.

In general, it contains two approaches that various policymakers engage in cooperation: the top-down and bottom-up approaches. In the top-down approach, individual policymakers work to promote and implement progressive policies that prioritise environmental protection from the higher level. Several governments and organisations across various countries have embraced international policies, leading to the implementation of environmentally friendly measures within their own territories. Countries came together to adopt a resolution on marine trash and microplastics at the third meeting of the United Nations Environmental Assembly (UNEA) in December 2017 [25]. Policymakers at the lower level actively carry out their responsibility to preserve the environment while tackling the plastic crisis based on guidance from high-level global objectives. According to Da Costa *et al.* [26], over 150 member states have pledged to act towards safeguarding 30% of the global ocean by 2030, which aims to reduce plastic waste within their respective countries, inspired by the UN conference's efforts. On the other hand, the bottom-up approach involves collaboration with citizens, encouraging their active participation in generating innovative ideas and solutions to address environmental challenges, which fosters a more inclusive and participatory form of policy collaboration. The United Nations Ocean Conference, which was established in Portugal, intends to address the urgent ocean problem, and involve the public, governments, and stakeholders in the struggle against marine plastic pollution, attracting the attention of a wider range of policymakers [27]. The urgent problems from the plastic crisis have stimulated creativity for a worldwide response to environmental challenges, driving international governments to develop effective policies that prioritise public interests and prevent plastic pollution. This concerted effort has resulted in more innovative environmental policies that align with the principles of sustainable development. By collaborating on a global scale, policymakers at different levels can work towards a common purpose, making policies to address the plastic crisis more effective than if pursued individually by each country. The collective action of countries worldwide enhances the potential for successful and impactful solutions to combat plastic pollution and promote a more sustainable future.

While collaboration has its benefits in implementing environmental policies, it can also lead to conflicts when tackling environmental issues. Policymakers at different levels often have divergent interests and objectives that are challenging to reconcile, resulting in conflicts that hinder the achievement of a unified goal. For instance, in 2015, the Paris Agreement on climate change aims to limit global warming to below 2 degrees Celsius above pre-industrial levels faced challenges due to differing interests and priorities among participating countries [28]. Developing countries advocated for developed nations to assume a larger responsibility for emission reductions, citing historical contributions to the issue. Conversely, developed countries argued for a shared responsibility across all nations. Another instance involves the development of renewable energy projects, exemplified by Australia's case. Local governments may endorse renewable energy projects within their regions to stimulate economic growth and job opportunities, while national governments may prefer projects aligned with national energy security objectives [29]. Such divergent priorities can lead to conflicts among policymakers at different levels, with local governments feeling that their interests are not adequately considered in the decision-making process. Thus, it is vital for policymakers to be flexible

enough to address diverse demands at different levels of governance, finding a balance among the interests of policymakers while actively minimising potential conflicts between them.

7. Suggestion

Overall, several environmental policies effectively address the plastics crisis, however, it brings potential problems in the aspect of excessive using plastics by individuals, immature policies and lack of support, and conflicts among corporations. Based United Nations about the Sustainable Development Goals (SDGs) 12: Responsible Consumption and Production, aims to guarantee the use of resources efficiently and responsibly and minimise the environmental impact of economic activities [30]. Hence, individuals, national institutions, and international organisations are suggested to make differences in response to the appeal of the United Nations, which implement improved measures to overcome these potential issues through environmental policy on the plastic crisis.

Firstly, individuals can contribute to solving the plastic crisis by changing their consumption behavior. By being aware of the dangers the plastic crisis poses to people's health and the negative environmental impact, including pollution and carbon emissions, individuals can make informed choices to reduce their purchases of plastic products and use alternatives with degradable materials. Furthermore, it is advised to change people's living habits to reduce their dependence on consumer plastics. It includes re-evaluating daily practices and choosing more sustainable alternatives. For example, individuals can bring reusable shopping bags, bottles, and coffee cups to minimise consuming single-use plastic. Also, it recommends people choose products with minimal or no plastic packaging can significantly reduce plastic waste. These above suggestions practice the concept of a circular economy [31], which contributes to the reduction of plastic waste and conservation of resources, aiming to achieve sustainable development.

Secondly, governments and organisations from the national and international levels have various actions to address the plastic crisis and promote environmentally friendly practices. Governments can increase investments in aspects of management, finance, and talent to support and encourage more financial incentives and regulations for using paper straws instead of plastic straws for businesses that adopt green technologies. Additionally, governments are suggested to establish a professional team that specialises in environmental management, using carbon accounting to effectively monitor and control the emissions generated from plastic production [32]. where the demand for plastics cannot be eliminated, organisations can encourage the use of degradable materials as alternatives to conventional plastics. By promoting research and development in the field of biodegradable materials, governments can support to reduce environmental impact and lower persistence in the ecosystem. Furthermore, increasing awareness through environmental protection publicity is crucial by organising environmental protection workshops and public welfare activities to engage the public in sustainable practices. These actions help raise awareness about the harmful effects of plastic pollution and encourage individuals and businesses to adopt responsible behaviors.

Finally, it is vital to promote equitable policymaking, especially in terms of cooperation between different levels of organisations. To ensure equity and inclusion, inter-organizational cooperation should be based on shared goals and interests, allowing all partners to participate and share in the benefits of cooperation. It is recommended that transparent channels of communication be established to facilitate a smooth and timely exchange of information between the parties concerned. When conflict arises, third-party agencies or experts are needed to resolve the issue, which can help facilitate meaningful consultation and maintain the integrity of the collaborative process. Furthermore, promoting inclusivity and diversity within inter-organisational cooperation is essential. Encouraging the active participation of stakeholders from different backgrounds, including civil society organisations, local communities, and marginalised groups, helps to ensure that a wide range of views is represented in the policy development process. This inclusive approach enhances the legitimacy and effectiveness of the policies developed through inter-organisational cooperation.

8. Conclusion

In conclusion, policymakers at various levels are critical in mitigating the negative externalities of plastic production and consumption, which are central to resolving the market failure associated with the plastic crisis. While local policymakers prioritise the interests of the public, they often face challenges in enforcing policy implementation due to limited authority and resources. The national policymaker has the capacity to implement government interventions to control plastic pollution, but the outcomes may not always be ideal for the environment. On the other hand, international policymakers can facilitate cooperation among multiple countries to address the plastic crisis, although they may face limitations in certain areas. Collaborative efforts among policymakers can enhance the efficiency of policy implementation, but this cooperation may also lead to conflicts. By embracing recommendations and implementing strategies at individual, national, and international levels, policymakers can foster a more effective and comprehensive approach to combat the plastic crisis. Given the urgent nature of the plastic crisis and its potential threats to the natural environment and society, a successful environmental policy requires individual accountability combined with collaborative endeavours to effectively tackle the issue from various angles and work towards a sustainable future.

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