ENVIRONMENTAL RESEARCH
INFRASTRUCTURE AND SUSTAINABILITY

TOPICAL REVIEW

Pay as you throw; an exploratory study on a market-based approach to the environmental problems caused by public littering in Nigeria

Cletus Alexander Umerie1,∗ and Joy Nzube Nnamoko2
1 Greenville LNG, FCT, Nigeria
2 Federal University of Technology Minna, Suleja, Nigeria
∗ Address for correspondence: No. 45b TY Danjuma Street, Asokoro.
E-mail: alexumerie@yahoo.com

Keywords: environmental policy, command-and-control, market instrument, deposit refund system, litter management

Abstract
This paper provides an overview of environmental policy research focusing on market-based instruments, and their applicability to developing countries, in particular Nigeria. It also addresses more general developments in the field of deposit-refund systems (DRSs) and explores the practicality of a DRS to litter management in Nigeria. A prominent theme of our discussion is economic instruments, where different approaches will be explored to understand the link between compliance and neglect inherent in environmental issues of a developing country such as Nigeria. Where the objective is to reduce littering, a DRS was considered the choice for the framework of this study, after researches detailed its benefits and relevance to the research problem. DRS is subsequently discussed as a policy intervention, and the feasibility of introducing the system in Nigeria is evaluated. By understanding the implementation mechanisms, the economic viability and environmental effectiveness of a DRS, it is concluded that a DRS can support a country’s drive to solve some of its pressing issues of environmental concerns even with the bare minimum of government administration. The consolidation of information from this research can kick-start the conversation on ways to incorporate this system as part of Nigeria’s solid waste management policy.

1. Introduction

Environmental problems have become the bane of many developing countries due to increased urbanization and industrial activity. As countries develop from low-income to middle and high-income levels, their waste management situations also evolve (World Bank 2018). The intersection between economic development and improved standard of living has consequences beyond the purchase of goods and services, as Everett et al (2010) posits that while economic expansion has raised living standards and improved quality of life globally, it has also resulted in resource depletion and ecological damage.

Economic benefits in exchange for environmental compliance could be considered one of the ways to induce environmental mindfulness, facilitate communal cooperation in environmental protection, and mitigate the constraints on economic activities that sometimes exist due to protecting the environment in developing countries. Since environmental policy cannot necessarily be separated from developmental policies and economics, market-based instruments—which involve payment systems in their elementary form, provide an incentive to the polluter in exchange for compliance—may harness economic facilities, such as incentives to reduce environmental pollution.

1.1. Objectives of the study
(a) To understand alternative ways of improving environmental quality, where the main issue is more economic than regulatory.
(b) To demonstrate the challenges in achieving environmental policy compliance in developing countries.
To analyze the effectiveness of market-based instruments as a partial solution to litter.

To explore and evaluate the potential success of a deposit-refund system (DRS) in Nigeria.

1.2. Structure of this study

This study begins by discussing the inherent challenges of achieving sustainable environmental management systems in a developing country. Subsequently, it explores the existing approach, i.e. the command-and-control (CAC) method, which is prevalent, but inadequate in its effectiveness in curbing some environmental problems. Furthermore, there is extensive discourse on the validity of market-based approaches in the formulation of environmental policies, thereby leading to the introduction of a DRS, which has been strongly recommended through the review of various authors’ scholarly work. Finally, DRS is extensively discussed, highlighting studies that herald its impact, drawbacks and limitations, as well as the conditions necessary for it to thrive in any country, more so, developing ones. The study concludes by outlining some recommendations on the impact of such a system if introduced in Nigeria, and the changes it could induce among polluters in achieving environmental compliance and improvements.

2. Methodology

This article reviews the management or lack thereof of the environment in developing countries, particularly in Nigeria, as well as how incentivising environmental issues could affect Nigeria’s socio-economic status as a developing country. Furthermore, DRS is introduced as one of the market-based instruments that may improve litter practices in Nigeria. Therefore, regarding environmental problems and environmental regulatory approach, the narrative review presented in this article explores environmental impact due to government lapses, such as the non-enforcement of environmental laws, bureaucratic bottlenecks and deficiencies in environmental policies.

The scientific literature considered was collected from different databases, which includes but is not limited to Google Scholar, Web of Science and Science Direct. The keywords used for reviewing the literature are the ones that refer to issues concerning environmental management and environmental economics in developing countries. Therefore, we combine the keywords ‘environmental problems’ and ‘developing countries’ with poverty, economic incentive (EI), recycling, environmental policy, CAC approach, litter problems, DRS, consumer behaviour, growing economy and urbanization. Only papers written in English were considered. The scientific articles were reviewed during the months of April and September 2021, analyzing literature from 1980–2021. Case studies and reviews were also considered for the research, with a particular focus on developing cities in Africa. Developed countries were considered only for specific case studies, such as the success and applicability of the DRS.

3. Environmental management and economic goals

3.1. Environmental management in developing economies

In developing countries with unacceptably low living standards, environmental degradation problems might be hidden behind poverty and should not be overlooked (Masron and Subramaniam 2018). Several scholarly works have pointed out the link between poverty and lack of environmental concern. Hence, developmental agencies and environmental policy researchers have constantly sought to find synergies between environment and development, to address poverty, consumption, patterns, demographic pressures, land, freshwater and forest (World Bank 1997). The World Bank (1997) further contends that for environmental policy to be more practical—one that recognises the constraints that governments and societies face—and effective, it is imperative that more emphasis is placed on reconciling the environment and development. Approaches that should improve environmental performance may be found in the intersections and trade-offs between economic, social and environmental goals (Lehtonen 2004). Nevertheless, Gray and Moseley (2005) argue that poverty as the cause and effect of environmental degradation seems intuitively sensible. However, poverty defined as a lack of income or savings is problematic in many settings. They opine that while poverty may be an important driving force of environmental degradation, several studies show that wealth and economic development are more likely culprits in environmental degradation. Hence, discourses that link the economics of poverty and environmental degradation may be feeding into a mainstream environmental feedback perception that is not present in many cases.

Accordingly, the threats the environment faces in Africa can be more economic than informative, in addition to complete neglect of the harm which they pose on their quality of life due to the actions or inactions of the public. Meanwhile, Ojedokun (2015) and Ojedokun and Balogun (2011) attributed the failure of various institutions’ approaches in dealing with littering problems to be less of a regulatory problem, and more
of an attitudinal, behavioural or social problem that requires a psychological solution. Viscusi et al.'s (2011) argument bolsters the fact that individual behavior that benefits the environment is potentially influenced by values of environmental quality, social norms that encourage pro-environmental actions. Reflecting on these assertions, one can opine that people’s attitude towards environmental concerns may be waning, where there is less incentive to be environmentally sensitive. A weak and relatively underdeveloped compliance system only exacerbates the problem. The consequences are dire, but for a country such as Nigeria, which has weakened constitutional protection for the environment, roles and conflicts in environmental management, excessive adherence to legalism by courts, and a lack of required disclosure of information, compliance will continue to be a major issue (Ijaiya and Joseph 2014). The same applies to the enforcement of laws, which is a common challenge in low-income countries (World Bank 2018).

3.1.1. Environmental management in Nigeria

Environment and growth are intertwined in many ways, thus indicating a trade-off between both. It has been observed that less-developed countries appear to allow more environmental degradation due to their level of economic growth. They believe that economic growth should come first, followed by environmental protection (Oriavwote and Oyovwi 2019). Over the decades, Nigeria’s economic dependence on extractive industries and agriculture production has highlighted the critical link between economy and environment (Falola and Paddock 2011). While successive Nigerian administrations from the colonial era paid little attention to environmental issues (Ogboru and Anga 2015), the dominant issue in post-independence Nigeria has been how to maintain political stability and manage economic development (Falola and Paddock 2011). However, beyond political considerations, the objective realities of climate change and environmental degradation have already become genuine challenges in Nigeria. Water scarcity, floods, droughts and desertification, which endanger food security and human life, have become emblematic of the impact of the environment’s deterioration on Nigerian society (Leke and Leke 2019).

By and large, the incapacity of Nigerian towns to appropriately handle environmental degradation issues manifests itself in low economic growth and development. With the predicted population rise in metropolitan areas, unless dramatic measures are implemented, environmental deterioration is expected to worsen, posing a danger to sustainable development (Ogboru and Anga 2015). While socioeconomic development is an ongoing priority in Nigeria and most African nations, the Nigerian experience clearly shows that environmental sustainability as a component of sustainable development has yet to receive the attention it deserves (Leke and Leke 2019).

3.2. Beyond a CAC approach

Early studies focused on CAC regulations as one of the ways to reshape incentives (Keohane et al. 1998). As the word infers, a CAC approach refers to a prescriptive regulatory scheme focused on statute and police authority, to induce enforcement using penalties if necessary (Karp and Gaulding 1995). It engenders fear in people, inducing them to change their behavior. CAC approaches were the norm in environmental policies until about 15 years ago (Harrington and Morgenstern 2007). While it dominated environmental policy, alternatives are being sought, as both the real and relative success of traditional policies diminishes in the face of growing environmental concern (Karp and Gaulding 1995). It struggled in the face of scarce enforcement resources and proved more costly and complex (World Bank 1997).

Many considerations influence the decision to favour either a policy that leans more towards EIs or direct regulation, also known as CAC administration. The essence of the environmental issue itself, as well as the country’s political and regulatory infrastructure, are underlying determinants (Harrington and Morgenstern 2007). Policymakers face a complex decision when deciding on a strategy they can apply to environmental administration. When it comes to the CAC approach, one of the important considerations for policymakers is the degree to which its regulatory ability favors efficiency and administrative feasibility, without the recourse to financial resources that could impact the country’s macroeconomic performance.

Meanwhile, environmental management in Nigeria is characterized by a CAC approach (Adelegen 2007). This strategy has many drawbacks, including a severe lack of government finances, management experience and institutional compliance capabilities. Efforts to use CAC approaches in a transition economy such as Nigeria’s will be met with multi-faceted problems in its implementation. Furthermore, as the authorities strive to inculcate environmental discipline in the populace when socio-economic goals are the most pressing needs, any other action undertaken for the ‘common good’ of society will be placed on the back burner. When the populace is aware of the country’s weak environmental institutions and scarce enforcement resources, they will have less reason to comply with environmental policies fail to contribute to the collective protection of the environment and proactively respond to pressing environmental issues.

Human interest drives environmental issues. Currently, the increased enthusiasm for pro-environmental policies may not necessarily be mirrored in government and citizen actions, because while people believe in
the values of ecology, they do not believe conventional economic structures that could jeopardize existing economic progress should be disrupted to help save the environment (Hodgkinson and Innes 2000). Importantly, as Cooter (2000) asserts, obeying a norm often imposes a direct cost in money, inconvenience, effort, risk or lost opportunity. Thus, when environmental issues are posed to the poor in a developing economy such as Nigeria, their judgment will largely have economic undertones (Chokor 2004). Hence, negative and unsustainable exploitative practices would be elevated in the absence of profound economic wellbeing.

That said, CAC will continue to be an important instrument in achieving minimum levels of environmental improvement. In recent years, classic CAC systems have largely been replaced by more efficient and effective market-based approaches or EIs as the preferred option for reducing ecologically damaging commercial activities (Asian Development Bank 2008). If it is a strategy that advances the cause of a good environmental policy—through the implementation of a market-based instrument using incentives—then, when employed, could induce proper environmental management practices in the mind of the individual.

3.3. Towards a market-based approach

The concept of incentives has long been used by both the public and private sectors to encourage behavioral change among targeted audiences (Hutton and Markley 1991). By realigning EIs with individual choice and behavior, rather than relying on mandatory behavior backed by enforcement (Niles and Lubell 2012), they empower drivers and reduce barriers (Ecorys 2012), increase net benefits by reducing compliance costs and increasing flexibility in achieving environmental goals (Olmstead 2010). This encourages targeted changes in corporate processes and customer behavior to solve environmental challenges (Watkins et al 2019). Incentive-based approaches can also address small sources of pollution, such as households that are not easily controlled with traditional forms of regulation, and provide a reason for polluters to improve performance vis-a-vis existing regulatory requirements (Anderson 2002). As developing countries begin to deal with large-scale environmental problems, their resources are severely limited. Thus, they have been repeatedly advised to consider and implement incentive-based regulations for managing the environment (Anderson 2002).

Since the reaction to environmental concern in Nigeria could be an attitudinal problem (Akpoghiran 2020), and the approach to be followed favors punishment, fines and sanctions, this may not lead to improved compliance, as economic factors predominate the impact that social norms have on an individual in a transition country. In addition to the discussion above, it is worth considering a system of EIs to reduce the proliferation of solid waste problems and litter. As much as incentives are not intended to replace traditional CAC regulations, but rather drive environmental performance (Ecorys 2012), it has been pivotal in facilitating compliance where a culture of attention and responsibility for one’s environmental sensibility does not currently exist. Although both the CAC approach and market-based instruments may function as stand-alone, albeit to varying degrees of effectiveness, their combinations could help achieve the desired results.

4. Deposit-refund system

4.1. Introduction

There are no clear formulated policies in Nigeria aimed at coordinating and monitoring the relationship between environmental management and sustainable development. This is despite all the effort of the federal environmental protection agency (Adelegan 2007). Accordingly, the federal government has signed agreements with international bodies for several decades, signalling their pledge to accelerate the implementation of environmental policy blueprints that foster various approaches to integrating environmental management programs and economic growth. Furthermore, there have been concerted campaigns by the federal government to design policies that can educate the local population on the need for environmental consciousness, but few have recorded significant success of any measure. The same pattern has occurred in both military and civilian regimes in Nigeria. Despite modest progress in oil spillage control in the Niger Delta region (Kadafa 2012), many obstacles and challenges persist in inducing environmental sensibility among the populace. However, the public consensus on profound economic development has cast doubts on the success of any environmental measure.

The prevalence of environmental degradation is exacerbated by the non-existence of enforceable instruments to curtail the wanton reckless disposal of solid waste. Moreover, regulations governing the environment are only as effective as the scale of responsibility authorities confer on the public. Their prioritization of other areas of governance indicates that various administrations in Nigeria have placed very little importance on environmental issues, for good reasons, because governments have limited resources, so waste management often becomes a lower priority sector (World Bank 2018). While strong growth remains a necessity for developed countries facing recession or economic loss, protecting the environment is unlikely to be a high priority until it is seen as a relatively effective way of avoiding stagnation and reaching macroeconomic stability (Panayotou 1994).
4.2. Overview of a deposit-refund system
While the world faces scarcity in natural resources (Simpson et al. 2005), the extinction of species (Siipi and Finkelman 2016) and several other dilemmas predicated on scarcity, there is an inordinate proliferation of solid waste and litter in Nigeria. Nigeria has an acute municipal waste problem per capita, with its per capita waste on the increase. The World Bank (2018) predicts that daily waste will grow to 3.40 billion by 2050, while that of low-income countries will increase by more than threefold. It is particularly dire in a country where self-littering of the environment has become a waste disposal habit among many Nigerians (Akpoghiran 2020). Consumption patterns are changing and moving towards more packaged products and electronics. An increase in imports also leads to larger quantities of packaging (World Bank 2018). In Nigeria, litter appears to be a recurrent environmental pollution issue. It represents a significant contribution to environmental management problems in public spaces in urban high-density areas in Nigeria (Ojedokun 2015). This is an aspect of solid waste management that has become almost intractable to local authorities in Nigeria (Irene 2018).

The increasing rate of litter and waste management problems has become the public’s nightmare in developing countries. More particularly, in and around urban centers in the major cities, the eyesore created by various origins of litter has given members of the public cause for concern, where Akpoghiran (2020) has identified self-littering of the environment as a common environmental practice and habit in Nigeria.

On this basis, we need appropriate tools and instruments to tackle this problem. When studying the approaches other countries took to successfully tackle litter problems, one prominent system was part of a market-based instrument—and one which has recorded some success has come to be known as a DRS. It has been considered an efficient means of increasing recycling rates and reducing litter (Eunomia Research and Consulting 2010). This system was initially used to tackle litter problems, but the strategy is now used with much more than just soft drink cans and bottles (Walls 2011). A DRS will minimize waste disposal, maximize recycling and increase the volume of waste diverted from waste disposal and other waste management options. It provides an opportunity for people to return the empty containers while they are ‘on the move’ and then recover the deposit by allowing them to deal responsibly with their waste. The two goals of litter reduction and increased recycling will also be reached (Eunomia Research and Consulting 2010).

In its simplest form, a DRS combines a tax on product consumption with a rebate when the product or its packaging is returned for recycling or appropriate disposal (Walls 2011). This compels manufacturers to use environmentally friendly manufacturing processes and directs customers to recycle waste items at designated institutions, which is a necessity of the circular economy and the objective of the DRS (Zhou et al. 2019). Accordingly, a refundable deposit is added to the cost of an item considered a huge waste generator or pollutant. Once the item has been used, it is returned to the assigned place or location for disposal or recycling. Then, the consumer gets his deposit back, otherwise, it is forfeited. The refund value of the container provides a monetary incentive for customers to return the container for recycling (Ashenmiller 2011). This mechanism for waste, litter and pollution control has been implemented in several developed countries with success. Most notably, the USA, Canada, Australia, Finland, Sweden, Germany, South Korea, as well as developing countries such as India, China, Palau, Tunisia, Taiwan, etc (Eunomia Research and Consulting 2010).

This system was first applied in the Oregon bottle bill of 1971 in the US, where a deposit was imposed on all beer and soft drink containers, which will be refunded upon the return of the container. Consequently, this idea has spread to other states in the US, with California having the largest, and among the most comprehensive in the nation (R3 Consulting Group 2009). DRSs appear to be most appropriate for discrete, solid commodities, such as beverage containers, batteries, and car bodies that would otherwise cause environmental harm through improper disposal (National Center for Environmental Economics 2001). At present, more than 40 countries in the world have implemented a DRS for end-of-use beverage packaging. Due to the significant variances in national situations, the operational procedures for executing the beverage packaging DRS vary per country (Zhou et al. 2019). Their implementation can be applied through two systems: either by manufacturers through a voluntary system, as can be seen on the deposit on most beer bottles in Canada, or by government-imposed deposits (R3 Consulting Group 2009).

Several studies have concluded that deposit systems are more cost-effective than other methods of reducing waste disposal, such as traditional forms of regulations, recycling subsidies or advance disposal fees alone (National Center for Environmental Economics 2001). However, high transaction costs (National Center for Environmental Economics 2001), and relatively high administrative costs of a deposit system could outweigh these cost savings (Ackerman et al. 1995).

4.3. Considerations for a deposit-refund system
If Nigeria is to set up an effective DRS, it should be based on principles similar to systems existing in Denmark, other Scandinavian countries, and in some provinces in Canada. Since this system primarily involves incentivising people to appropriately dispose of their waste and encouraging recycling in the process, one needs to
first decide on what product or consumable should the deposit system be applied to. Based on similar trends in other countries, this system is usually applied to beverage containers made of metals, as well as glass beverage containers such as beer bottles, wine bottles, soft drink bottles, etc. Most importantly, the modelled system should target non-refillable beverage containers to exploit the potential for increased recycling rates, increase the quality of material collected for recycling through the deposit mechanism, and reduce litter levels (Eunomia Research and Consulting 2010).

Consequently, key stakeholders involved, such as manufacturers, retailers, collection companies and consumers, need to be incentivised appropriately for the system to be effective. In addition, a collection point at major retail outlets that sell beverage containers could be encouraged, so that there are a sufficient number of places that can serve as return points for consumers, as well as remove the inconvenience of consumers having to travel to redemption centres to return containers.

According to Zhou et al (2019), the operating mechanism for setting up a DRS is the same. However, the following key parameters need to be considered and sufficiently determined before the initiative is introduced in Nigeria:

I. Management institutions. This is an important consideration, where any development towards a DRS must be through a government-backed initiative. The government serves as a link between beverage producers and official recycling operations. Beyond that, they provide scientific and reasonable standards, as well as EIIs and guidance to recycling businesses. Sometimes, their directives are backed by laws and legislation, which helps strengthen and bolster the compliance of both consumers and beverage bottling producers. Hence, Nigeria needs to prioritize the initiative to recycle to facilitate changes in business and consumer behavior towards littering and environmental responsibility in general.

II. Scope. This mainly refers to the application scope of the end-of-use beverage packaging. That is, a determination is made whether the DRS applies to plastic bottles or aluminum beer and beverage cans, which are common products produced on a large scale and have high recycling value. Once a beverage packaging recycling system has been established, the choice of which beverage packaging should come under the recycling system becomes secondary. With time, the DRS could apply to virtually any end-of-use beverage packaging—from mineral water packaging to Tetrapak packaging (Zhou et al 2019).

III. Deposits. Deposit amounts play a key role in influencing the return of end-of-use beverage containers. It is worth noting that the recovery rate will rise in tandem with the deposit amount, so it is necessary to ensure that the deposit amount is reasonably applied to this system. The practice proves that the EI created by the DRS has an important influence on individual behavior (Zhou et al 2019).

IV. Unredeemed deposits. One needs to account for situations where all end-of-use beverage packaging is not collected, or in some instances where the deposit levels become more than the refund levels, the difference is said to be unredeemed deposits. For a new DRS, the government should keep unredeemed deposits, else providers may not have the incentive to collect. When end-of-use beverage containers are not returned, the government should recover unredeemed deposits and pay the supplier a handling commission.

V. Funding mechanism. The operating cost of a DRS can be overwhelming. A funding mechanism needs to be adequately contextualised to bolster the sustainability of the system. Although different countries use different mechanisms to offset operating costs, the DRS’s financing mechanism should be based on the value of unredeemed deposits, as well as the value of scrap materials.

VI. Material owner. Zhou et al (2019) argues that there are three categories of material owners. The first is where the retailer owns it, which could encourage retailer participation. The second is when management institutions own it. In this situation, management institutions compensate merchants. The third is where the manufacturer owns it to promote recycling. The operating system and material value define material ownership.

VII. Technology. As technology has come to dominate most aspects of our lives in recent years, the DRS must not be left out in the fusion of technology to its system of operation. Countries involved in the DRS harness the potentialities of technology to improve collection, recycling and convenience for consumers. From the use of reverse vending machines to reduce transportation costs, the volume of the packaging, and data tracking, to using a barcode-based recording system capable of determining if a beverage packaging contains a deposit, and generating real-time data statistics.

4.4. Economic applicability of deposit-refund system to Nigeria

One of the crucial elements in the deposit model is the setting of the deposit itself (Eunomia Research and Consulting 2010). To make DRSSs effective, the amount of the required deposit is of primary importance, because it has a huge impact on the percentage of return. In addition, Hollins (2005) reported that there are two styles of DRS. Those aimed at encouraging bottle refilling may require a large deposit to encourage a high container return rate of 90% or above, because based on established studies, bottle refilling requires a return rate of approximately 90% to justify the cost of collection, sorting, washing and checking. Those aimed at increasing
recycling and reducing litter could require a smaller deposit and achieve a return rate of 65%–70%. Meanwhile, incentivising with an amount seen as too small could be counter-intuitive and lead to the ineffectiveness of the system. As Environmental Resources Management (2008) argues, if the deposit level is too low, and the consumer is not sufficiently incentivized to return the empty beverage container, the return rate will be low, and the deposit system will in effect fail. Thus, the number of deposits must be low enough to make refunds and reuse more economical to manufacturers than buying new containers.

The question which then presents itself is, how can one determine the optimum deposit amount to be levied on each beverage container in Nigeria to make it attractive enough to induce compliance, and achieve a high return rate? Although that may be difficult to determine due to a key issue of environmental compliance (Ijaiya and Joseph 2014), many countries have attempted to use various techniques to arrive at the appropriate amount to be deposited. A study by the University of California at Berkeley (2003) used regression analysis to choose the best value of the deposit. One of the main focuses of their study was on the most effective way to maximize the recycling of containers in California. While Eunomia Research and Consulting (2012), when estimating the value of the deposit for Spain based on deposits and return rates from other systems around the world, plotted the return rate as a function of deposits across existing schemes and established that return rates of 85%–95% are possible, assuming the principal motive driving returns is an economic one. For Spain, they surmised that the potential financial impact of applying different deposit values and the resultant return rates are valid, and concluded that a high return rate can be achieved by setting a deposit of €0.20 per container.

4.5. Criticism of the DRSs

One factor that could limit the widespread use of DRSs is their high implementation cost (Anderson 2002), administrative cost (National Center for Environmental Economics 2001), etc. In terms of administrative cost, Palmer et al (1997) cogently argued that there could be a significant administrative cost associated with refunding deposits, which could reduce the efficiency of the approach. To remedy this conundrum, they suggested the cost could be passed on to the producers/manufacturers, not to the final consumers. Subsequently, in one study that looked at the general application of economic instruments in the field of waste management by Great Britain (Department of Trade & Industry 1992), deposit refunds scored poorly in that they were not considered applicable to the bulk of waste being managed.

All in all, most studies have heralded the benefits of a deposit-refund mechanism. Although it may not be a panacea to all environmental concerns that have to do with solid waste management, the underlying advocacy surrounding it is the economic efficiency that comes with the increase in recycling rates. It has a generally supportive view, in that it reduces littering, incorporates recycling, poses an economic advantage for countries with limited enforcement capabilities, and fosters economic and environmental benefits to the participating individual, and the country at large. Deposit-refund policies have shown to be a particularly successful method of minimizing beverage packaging waste due to their flexibility and EIIs (Zhou et al 2019).

5. Conclusion

There is no denying that developing countries lack a mature institutional base for environmental management, making the adoption of the subject discussed above difficult to administer and implement. Furthermore, policy directions, such as the issues discussed above, may not necessarily be an economic priority due to more cogent problems in their societies. Therefore, environmental management problems with litter may continue to receive less attention relative to other development and economic issues. However, with limited resources, this study should provide the opportunity to find a synergy between the environment and developmental concerns, which can simultaneously address poverty and environmental deterioration.

While regulations through a CAC approach continue to be an important driver, incentives should not be seen as trying to replace traditional approaches to environmental management, but rather complement existing regulations to encourage the public to improve their awareness of environmental degradation through littering and bridge the constraints on administrative and political infrastructure in many developing countries like Nigeria. There is not a one-size-fits-all.

Herein lies an opportunity for developing countries to deal with their solid waste management problems by designing regulations that harness the market to change polluting behavior. This issue, as discussed above, is accomplished through market mechanisms such as DRS to create incentives to counter public actions that impose great harm on the environment. The trajectory of environmental regulations, while still slow and reactive, will continue to face many challenges. The lack of environmental responsibility will remain potent and lasting in the face of increased consumption. Environmental attitudes will continue to be abysmal at best, as the average Nigerian struggles for economic visibility. All these notwithstanding, there has never been a need for economic and environmental agendas to be harmonized; one that takes a practical and balanced approach, while recognizing the constraints that governments and societies face (World Bank 1997). Further debate and
analysis of the issue of solid waste are encouraged in order to acquire a rounded knowledge on the subject matter and provide solutions on the applicability of market-based instruments to environmental problems caused by solid waste litter in Nigeria.

Data availability statement

No new data were created or analyzed in this study.

ORCID iDs

Cletus Alexander Umerie  https://orcid.org/0000-0003-0082-1055
Joy Nzube Nnamoko  https://orcid.org/0000-0002-9381-9829

References

Ackerman F, Cavander D, Stutz J and Zukerman B 1995 Preliminary Analysis: The Costs and Benefits of Bottle Bills (Boston: U.S. EPA Office of Solid Waste and Emergency Response)
Adelekan J A 2007 The History of Environmental Policy and Pollution of Water Sources in Nigeria (1960–2004): The Way Forward (Oyo State: University of Ibadan)
Akphoghiran I P 2020 Engaging media advocacy on self-littering of the environment in Nigeria Global J. Soc. Sci. 19 53–62
Anderson R C 2002 Incentive-Based Policies for Environmental Management in Developing Countries Washington, DC: Resources for the Future
Ashenmiller B 2011 The effect of bottle laws on income: new empirical results Am. Econ. Rev. 101 60–4
Chokor B A 2004 Perception and response to the challenge of poverty and environmental resource degradation in rural Nigeria: case study from the Niger Delta J. Environ. Psychol. 24 305–18
Cooter R 2000 Good laws make good citizens? An economic analysis of internalized norms Va. Law Rev. 86 1577
Ecorys 2012 Study on Incentives Driving Improvement of Environmental Performance of Companies Rotterdam: European Commission-DG Environment
Environmental Resources Management 2008 Deposit Schemes & Reverse Vending Systems: A Review (UK Department for Environment, Food and Rural Affairs (DEFRA))
Eunomia Research and Consulting 2010 Have We Got the Bottle? Implementing a Deposit Refund Scheme in the UK A Report for the Campaign to Protect Rural England Bristol: Eunomia Research and Consulting Ltd
Everett T, Ishwaran M, Ansaloni G P and Rubin A 2010 Economic Growth and the Environment (Defra Evidence and Analysis Series) (Department for Environment Food and Rural Affairs) 1–52
Falola T and Paddock A 2011 Environmental and Economics in Nigeria (New York: Routledge)
Gray L C and Moseley W G 2005 A geographical perspective on poverty-environment interactions Geogr. J. 171 9–23
Gunatilake Herath and De Guzman Franklin (Asian Development Bank) 2008 Market-Based Approaches for Managing the Asian Environment: A Review (ADB Economics Working Paper Series vol 124) (Manilla, Philippines) pp 1–45
Harrington W and Morgenstern R 2007 Economic incentives versus command and control: what’s the best approach for solving environmental problems? Acid in the Environment: Lessons Learned and Future Prospects ed G Visiglio and D M Whitelaw (Berlin: Springer) pp 233–40
Hodgkinson S P and Innes J M 2000 The prediction of ecological and environmental belief systems: the differential contributions of social conservatism and beliefs about money J. Environ. Psychol. 20 285–94
Hollins O 2005 Deposit Return Systems for Packaging: Applying International Experience to the UK Department for Environment Food and Rural Affairs (DEFRA)
Hutton B R and Markley F 1991 The effects of incentives on environment-friendly behaviors: a case study Adv. Consum. Res. 18 697–702
Ijaiya H and Joseph O T 2014 Rethinking Environmental Law Enforcement in Nigeria Beijing Law Rev. 5 306–21
Irene I C 2018 Effect of litters on environmental quality in Nigeria: a case study of Iyana-Iba, Lagos state 7th World Convention on Waste Recycling and Reuse (Tokyo, Japan: Advances in RecyclingWaste Management)
Kadafa A A 2012 Oil exploration and spillage in the Niger Delta of Nigeria Civ. Environ. Res. 2 1–38
Karp D R and Gauding C L 1995 Motivational underpinnings of command-and-control, market-based, and voluntarist environmental policies Hum. Relat. 48 139–65
Keohane N, Revesz R and Stavins R 1998 The choice of regulatory instruments in environmental policy Harv. Environ. Law Rev. 22 313–67
Lehtonen M 2004 The environmental-social interface of sustainable development: capabilities, social capital, institutions Ecol. Econ. 49 199–214
Leke J O and Leke E N 2019 Environmental sustainability and development in Nigeria: beyond the rhetoric of governance Int. J. Dev. Manag. Rev. 14 25–35
Masron T A and Subramaniam Y 2018 Does poverty cause environmental degradation? Evidence from developing countries J. Poverty 23 1–19
National Center for Environmental Economics 2001 The United States Experience with Economic Incentives for Protecting the Environment (Washington, DC: National Center for Environmental Economics)
Niles M T and Labell M 2012 Integrative frontiers in environmental policy theory and research Pol. Stud. J. 40 41–64
Ogboru I and Anga R A 2015 Environmental degradation and sustainable economic development in Nigeria: a theoretical approach J. Econ. 3 1–13
Ojedokun O 2015 The littering attitude scale (LAS) development and structural validation using data from an indigenous (Nigerian) sample Manag. Environ. Qual. Int. J. 26 552–65
Ojedokun O and Balogun S 2011 Psycho-sociocultural analysis of attitude towards littering in a Nigerian urban city Ethiop. J. Environ. Stud. Manag. 4 68–70
Olmstead S M 2010 Applying market principles to environmental policy Environmental Policy: New Directions for the Twenty-First Century ed N J Vig and M E Kraft (Washington, DC: CQ Press)

Oriavwote V E and Oyovwi D O 2019 Economic implications of environmental degradation in Nigeria: is the environmental Kuznets curve relevant to Nigeria? Int. J. Dev. Econ. Sustain. 7 18–27

Palmer K, Sigman H and Walls M 1997 The cost of reducing municipal solid waste J. Environ. Econ. Manag. 33 128–50

Panayotou T 1994 Economic Instruments for Environmental Management and Sustainable Development (Nairobi: United Nations Environment Programme)

R3 Consulting Group 2009 Evaluating End-Of-Life Beverage Container Management Systems for California California California Department of Conservation

Siipi H and Finkelman L 2016 The extinction and de-extinction of species Phil. Technol. 30 427–41

Simpson D R, Toman M A and Ayres R U 2005 Scarcity and Growth: Natural Resources and the Environment (New York: Routledge)

Viscusi W K, Huber J and Bell J 2011 Promoting recycling: private values, social norms, and economic incentives Am. Econ. Rev. 101 65–70

Walls M 2011 Deposit-Refund Systems in Practice and Theory (Resources for the Future), pp 11–47

Watkins E, Schweitzer J-P, Leinala E and Börkey P 2019 Policy Approaches to Incentivize Sustainable Plastic Design (Paris: Organisation for Economic Co-operation and Development)

World Bank 1997 Five Years after Rio Innovations in Environmental Policy (Washington, DC: The International Bank for Reconstruction/The World Bank)

World Bank 2018 What a Waste 2.0 A Global Snapshot of Solid Waste Management to 2050 (Washington, DC: International Bank for Reconstruction and Development/The World Bank)

Zhou G, Gu Y, Wu Y, Gong Y, Mu X, Han H and Chang T 2019 A systematic review of the deposit-refund system for beverage packaging: operating mode, key parameter and development trend J. Clean. Prod. 251 119660