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PERSPECTIVE

Brazil's new national policy on solid waste: challenges and opportunities

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Abstract Brazil, one of the world's largest developing countries, has recently introduced a new solid waste management regulatory policy. This new regulatory policy will have implications for a wide variety of stakeholders and sets the stage for opportunities and lessons to be learned. These issues are discussed in this article.

Keywords Brazil · National policy on solid waste · Sustainability

Introduction

Brazil is the fifth largest country in the world based on geography. It also represents the world's sixth largest economy. The "B" of the BRIC countries, it is often overlooked on economic and environmental issues relative to current and potential economic giants such as India and China.

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An unheralded environmental issue in Brazil revolves around industrial, consumer, and public waste. Solid waste generation and management remains an urgent global problem (Mallawarachchi and Karunasena 2012). Brazil as a developing economy is not immune from this issue. In 2011, Brazil's population generated 61.9 million tons of solid waste. The growth in solid waste is not the only issue, disposition of this waste is also a concern. 42 % of the total solid waste collected in 2011 was inappropriately disposed (Albuquerque 2012). Some of this waste disposal occurs in the most ecologically sensitive regions in the world.

Given this increasingly visible environmental predicament, Brazilian regulators enacted the national policy for solid waste (NPSW) in 2010 (Law 12.305/2010). The expressed purpose of this sweeping regulatory policy is to internalize costs and liabilities to manufacturers and consumers while establishing and promoting reverse logistics and product or material stewardship.

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The NPSW establishes guidelines for National, State, Regional and Municipal Solid Waste Plans. The specific objectives of the Law include (PNRS 2010):

- Encourage and promote a waste management hierarchy of reduce, reuse, recycle, and treat solid waste, while solid waste disposal must be completed in ecologically and environmentally responsible ways;
- Adopt, develop, and improve clean technologies as a way of minimizing environmental impact;
- Provide incentives to the recycling industry to help foster the use of recycled raw material;

- Prioritizing green government procurement, including the purchase of recycled and recyclable products and goods, services and construction work that consider criteria compatible with socially and environmentally sustainable consumption;
- Integrating reusable and recyclable material collectors in actions that involve joint liability for product life cycles.

To successfully achieve these objectives, manufacturers, distributors, and traders—organized across industry sectors—are required to develop recycling functions for the collection and processing of plastic, paper, cardboard, glass, and metal packaging. The closed-loop supply chain requirements for material and product take back include developing processing systems for a broad variety of consumer materials. These additional consumer based materials include pesticide packaging, batteries, tires, lubricants and their respective packaging, light bulbs, and electrical–electronic equipment discarded by consumers. This effort requires developing reverse logistics systems which must include capacities for return of these solid wastes back into the original production supply chain.

The federal regulations not only influence private industrial practices, but also public practices, especially at the municipal level. Municipalities are required to manage household wastes and wastes generated from public departmental efforts. Municipalities are now required to develop a Solid Waste Integrated Management Plan based on solid waste flow evaluations. Municipalities need to identify the final and appropriate disposal of refuse and the creation of operational and environmental performance indicators for their solid wastes (PNRS 2010).

Beginning in August 2014, unregulated dumping sites and landfills must be deactivated. For waste management practices that violate the enacted regulations, the persons or entities responsible for the damage are required to compensate the government for the expenses arising from remediation actions (PNRS 2010).

These types of new regulations and policies are becoming more evident as emerging economies, such as the BRIC countries, try to decouple economic growth from environmental degradation. Brazil is not alone in this effort and it has kept an eye on developed and developing country environmental regulatory policies that support green growth. These policy instruments contain both voluntary and mandatory dimensions. Brazil's regulatory efforts fall in line with efforts in China (Geng and Sarkis 2012) and India (Joseph et al. 2012).

These Brazilian all-encompassing solid waste regulations can result in business and social opportunities and demands. As with any new regulatory policy, social and economic innovation opportunities do exist and developmental requirements can be identified. These opportunities and requirements include:

- Invest and develop R&D into cleaner technologies;
- Redirect the strategic focus of companies to meet the needs of public purchases through ecodesign, life cycle analyses, green labeling, reverse logistics, and green supply chain management practices;
- The need for knowledge acquisition and transfer for municipal and state solid waste management plans;
- Complying with some of the UN's eight *Millennium* Development Goals beginning with the integration of the recyclable refuse/material collectors in the recycling chain;
- Educationally, improve and redesign curriculum in Engineering, Business Management, and Chemistry to prepare professionals who are qualified with regard to solid waste management and reverse logistics.

On the other hand, public and private management face a few barriers to effectively take advantage of these opportunities. Brazilian States and Municipalities as of August 2012 should have delivered their compliance plans. Weeks after the deadline, 95 % of the municipalities have not delivered plans. A number of reasons can be posited for this poor response, for instance:

- NPSW is focused on solid waste management, rather than on gas emissions or effluents, so developments in solid waste management could have taken a back seat to other efforts, e.g., goals of carbon neutrality;
- Specific goals to be achieved are vague;
- Long-term strategies and operations in which public institutions will control or periodically monitor the performance have not been determined;
- There is a lack of coordination among manufacturers, distributors, and traders for an effective storage, collection, and recycling process. Cost and benefit sharing across the supply chain and partners will need to be determined;
- Lack of qualified expert knowledge in Brazil that is dedicated to issues concerning solid waste management and reverse logistics.

Final remarks

Developed countries have had a long history of solid waste regulatory policies. Some of these policies and practices are appropriate for emerging economy situations, but not all are completely portable. BRIC countries can learn from each other. Brazil, with its policies, can learn from its BRIC partners. It can also provide lessons in solid waste management based on its opportunities and barriers to other developing and developed countries. These issues may include support of private and public investment initiatives to obtain integrated actions for more sustainable development. The world's most vulnerable ecosystems are in these large and

developing nations, thus internal regulatory policy, with teeth, is the most effective way to manage these concerns. Careful evaluation of emergent regulatory policies and enforcement is needed.

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