EXECUTIVE SUMMARY

CLOSING THE LOOP

The benefits of the circular economy for developing countries and emerging economies

EPEA Brasil

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Introduction

This report presents evidence to the effect that emerging economies can leapfrog development stages and implement an economic model that is better both for society and for the environment. The circular Cradle to Cradle® paradigm[1] is a production model aimed at leveraging steady economic development for the future, without causing environmental damage. If implemented correctly, it is capable of promoting the maintenance of natural ecosystems while at the same time offering benefits to the poorest groups in society.

The report illustrates the tremendous window of opportunity provided for Brazil by the new Solid Waste National Policy. Policies such as this can help low- and middle-income countries to build on and formalise existing informal circular economic activities, thereby taking a development path that avoids many unsustainable elements of the linear production model.

The various case studies included in this report demonstrate the potential of the circular economic model to bring numerous social benefits, such as strengthening local economies, empowering the poorest families and building resilience, through stimulating the entrepreneurial spirit of businesses based on the solidarity economy.

Although the circular economy concept is not yet very well known in Brazil, this system has already taken root in various countries, in innovative businesses and major global production chains.

Why circular?

Emerging economies like Brazil frequently encounter the false dilemma of having to choose between social development or environmental protection, as the two appear somewhat incompatible. The dilemma becomes even thornier when a degree of environmental destruction seems unavoidable if social development is to be achieved.

At global level, the economy is currently following a linear model based on 'extracting, producing and throwing away' and, as a result, the planet's ability to sustain life is shrinking fast. This represents the greatest threat to recent advances in social development and has many negative environmental impacts, primarily affecting the people and economies of developing countries. The two inevitable consequences arising from the failure of the current linear production model are becoming increasingly obvious: non-renewable resources for the production of goods are quickly becoming scarce, while the damage to the environment is compromising ecosystem services such as pure water, clean air, fertile soil and biodiversity – very often irreversibly.

On the other hand, the Cradle to Cradle® concept on which the circular production system is based can offer a genuinely viable alternative to the dilemma of 'developing or preserving', because it is able to promote improvements in the natural ecosystem and, at the same time, foster human social justice. That is because this economic model is based on the same rules followed by nature's production system, which sustains life. Nothing in nature is thrown away – everything that an organism discharges throughout its life cycle becomes raw material and nutrients for other beings. This is the foundation of the circular economy which, seeing the production system from a new 'positive impact' perspective, becomes a common working framework capable of guiding creativity and innovation – the most abundant resources humanity possesses.

Making the emerging economies of developing countries circular

The majority of academic and business case studies undertaken around the circular economy concept have so far produced analyses focusing on the reality in European countries. For example, studies have shown how Europe can benefit in environmental and social terms from the principles of the circular economy, generating economic gains of €1.8 trillion by 2030.[2]

But what advantages could this concept offer if it were adopted by the emerging economies of developing countries? This is an important question, because the bulk of the world's population is concentrated in those countries, and in the future global environmental and social outcomes will depend to a large extent on how countries like Brazil, China and India use their natural resources.

1 Cradle to Cradle® is a design concept that was developed in the 1990s by Prof Dr Michael Braungart, William McDonough and the scientists of EPEA Internationale Umweltforschung in Hamburg. It describes the safe and potentially infinite use of materials in cycles. Cradle to Cradle® is a registered trademark of MBDC. For more information see www.epea-hamburg.org

2 McKinsey & Company (2015) 'Europe's circular-economy opportunity.' Available at: www.mckinsey.com/business-functions/sustainability-and-resource-productivity/our-insights/europes-circular-economy-opportunity

This study therefore aims to investigate the relevance of the circular economic system for emerging economies – and the poorest people in those countries – on the basis of recent experience in Brazil. It is particularly pertinent now because Brazil is introducing a new Solid Waste National Policy, which is triggering a series of innovations in the social, technological, economic, political, legal and environmental fields.

The analyses carried out during this work sought to discover:

- what benefits the circular economy already offers in comparison with a linear economy in the Brazilian context, for instance in existing examples of informal circular supply chains
- what economic, social and environmental benefits are linked to developing more circular supply chains in Brazil
- what role the government can potentially play in helping existing production chains to adopt the circular production model.

RESULTS

Circular supply chains offer clear environmental benefits. Various features of circular economic activities help to minimise use of fossil fuel and reduce both the extraction of virgin raw material and sources of pollution. They can improve the carbon balance sheet and also foster responsible use of water and soil. For example, circular economic activities involving the repair, reuse/redistribution, refurbishing/remanufacturing and recycling of products help to reverse the impacts of goods production. In the same way, circular supply chains reduce the negative effects on environmental and human health (and their associated costs) – for instance, by eliminating the need for dumps and landfill. Apart from this, landfilling organic waste creates a large volume of greenhouse gas emissions and many health problems. Finally, to create genuinely beneficial circular supply chains, specific regulations need to be laid down, especially to control the toxic substances used in the components of products to be recovered or recycled. In brief, the circular economic paradigm has the potential to decouple economic growth from the intensive use of natural resources and provides evidence that circular chains can move the future in a positive direction.

CASE STUDY 1

Procomposto: The opportunity of organic waste

Procomposto is a 'start-up' offering reverse logistics services to major generators of urban organic waste. Unlike the situation in most European cities, more than half of all urban waste generated in Brazil is organic. Of the 94,000 tonne volume generated every day, less than 1 per cent is currently treated biologically or composted, the rest being disposed of in landfill or dumps. Procomposto's processing system prevents organic waste from going to landfill and emitting methane (CH_4), a very damaging greenhouse gas. Instead, the carbon can be put back into the soil through the application of organic fertiliser produced in sustainable agricultural processes. The company's business model is suitable for the great majority of small and medium-sized cities (fewer than 50,000 inhabitants) in Brazil. If the technology were scaled up to cover 25 per cent of the urban waste produced in Brazil, Procomposto's model could create more than 10,000 jobs and help to reduce CO_2 emissions by the equivalent of approximately 100,000 tonnes per day.[3]

3 Based on Brown S, Kruger C, Subler S (2008) 'Greenhouse gas balance for composting operations', *Journal of Environmental Quality*, v 37, pp 1396–1410

There are clear opportunities to involve groups at the bottom of the economic pyramid in circular supply chains, thereby improving these people's incomes and working conditions. This relates to the activities of not only waste pickers and recyclers, but also artisans, family farmers and vulnerable communities. These individuals can more easily benefit when they are organised into a legally recognised structure such as an association or cooperative, because this means they can sign contracts with private businesses and the public sector. In Brazil, support for the formalisation of these workers' activities has come from a series of initiatives.

CASE STUDY 2

AJRVI: The circular economy for the poorest

In Brazil, pickers of recyclable waste represent a significant proportion of the poorest population of urban areas. By organising themselves into recycling cooperatives, these individuals can leave the informal sector behind, enjoy better working conditions and increase their income, while working to increase recycling rates for waste that would otherwise be dumped in landfills or the environment. One example is the Associação Jaraguaense de Recicladores do Vale do Itapocú (AJRVI), an association founded in 2012 by a small group of waste pickers who wanted to improve their work opportunities. Three years later, AJRVI is providing work for around 100 people – 20 families – with the potential to generate average monthly income of R$ 5,000 per family. Apart from the material received from the local rubbish collection system, half of the takings come from marketing recyclable waste purchased from other waste picker groups in the region.

PeopleImages/iStock

Recycling cooperatives enable waste pickers to improve their working conditions and increase their income.

CASE STUDY 3

Nat.Genius: Industrial innovation

Nat.Genius is a business unit of Embraco – a multinational in the manufacturing sector. It focuses on the reverse logistics of electronic waste, engaging in research and development to find efficient solutions for the reuse and recycling of components and materials. The Nat.Genius programme has already remanufactured more than 3 million compressors and recycled 6,200 tonnes of materials. The company expects that reverse logistics for the industry will create many more better-quality jobs than the current system of disposal in landfill. In addition, it believes that there are mutual benefits to be gained from establishing links between industries and recycling cooperatives, especially for the implementation of door-to-door collection systems for discarded products.

Nat.Genius

The remanufacturing process at Nat.Genius – extracting value from electronic waste.

Circular supply chains help to boost productivity and job creation. There have already been various cases of private companies establishing their own reverse logistics systems not only to comply with the new Solid Waste National Policy law, but also because they see the potential efficiency and productivity gains (in comparison with the cost of virgin raw materials, for instance). Profit margins are often small, but there are reasons to believe that the economic benefits could increase as more experience is gained, infrastructure expands in the sector and economies of scale are achieved. Various new businesses are being set up in Brazil as part of circular production systems, with the potential to create a significant number of new jobs and even new economic sectors.

The government has an important role to play in creating a climate conducive to the establishment of socially effective circular supply chains. Firstly, it needs to provide the right level of economic incentives, ensuring that the environmental externalities of linear supply chains are factored into companies' costs (for example, by charging for the environmental costs of landfills or making manufacturers responsible for end-of-life products) and, in addition, ensuring that circular supply chains and the related products receive tax breaks or are at least taxed equally. Secondly, the government should facilitate cooperation between all stakeholders in each supply chain. Finally, it needs to ensure that circular supply chains are established in a way that includes or benefits the poorest groups in society. Nevertheless, the capacity to fulfil a large part of this role is very often limited. Responsibility for implementation tends to fall to municipalities and there is an urgent need to support these institutions at local level.

CASE STUDY 4

Diaconia: A circular economy in rural areas

Diaconia is a pioneer NGO in the field of agro-ecological technologies, and presently promotes circular production systems in rural areas for more than 4,000 people involved in family farming. The NGO has adapted and rolled out anaerobic digestion technology for the use of poor rural families in drought-stricken areas of the semi-arid Brazilian north-east. In place of wood, the families can use the biogas produced to cook for free. The process can also produce nutrient-rich fertilisers to increase agro-ecological production and, at the same time, potentially reduce the related greenhouse gas emissions.

Eleanor Bentall/Tearfund

Biodigestors turn waste into natural gas to use for cooking, benefiting Alvizio's family and many others in north-east Brazil.

There is a real possibility that countries like Brazil could overcome the problems of the current production system and move directly to a new economic model more beneficial for both people and the environment. While many developed countries have virtually eliminated the repair, reuse and recycle sectors of their economies, emerging economies and developing countries have economically vibrant activities in these and other circular sectors, although these activities largely reside in the informal economy. Consequently, countries with emerging economies could apply a different approach and move towards structuring circular chains on the basis of current economic initiatives. With the creation of a favourable climate, existing informal circular systems could be helped to achieve formalisation and expansion of their activities, as described in the report's case studies. In the treatment of organic waste, for example, significant environmental advantages and job creation potential can be seen when environmental and health factors are added together in a circular production approach built around composting or anaerobic digestion. Developing countries could therefore base their entire organic waste and effluent treatment infrastructure directly on these alternative circular approaches.

CASE STUDY 5

Vira-Lata: Partnerships between companies and waste picker cooperatives

The Vira-Lata cooperative was set up in 1998 with the aim of generating income for the community through the collection, recycling and marketing of waste. The cooperative plays a key role in reverse logistics for several large multinational industries operating in Brazil. For example, in the steel supply chain, the cooperative is responsible for collecting discarded vehicle components from the network of auto-repair shops of the Porto Seguro insurance company and selling the material to Gerdau, a leading steel company. Another example relates to the glass supply chain: the cooperative collects drinks bottles from distributors and establishments for the Diageo company and sells the material mainly to Owens-Illinois, a global producer of glass packaging. Both arrangements produce more efficient reverse logistics systems and, for both the steel and glass supply chains, the cooperative's participation makes reverse logistics economically viable, with better results than if the operation were carried out by the companies themselves. Furthermore, in enabling the circular flow of recyclable waste between generators and recyclers, the door-to-door collection and sorting services performed by the cooperative give the companies better control over the operational risks related to the illegal market – preventing the use of the glass bottles for counterfeit drinks or the improper reuse of defective car parts.[4]

Recommendations

The report puts forward a series of recommendations to help the Brazilian government promote the formation of circular supply chains. These recommendations are also relevant for other parties interested in the circular economy, and for emerging economies in other parts of the world. Detailed in the final section of the report, the recommendations may be summed up as:

1 **Create a national-level policy framework for the circular economy**

Building on the excellent start made by the Solid Waste National Policy, the new policy to promote the circular economy needs to refine some elements of current legislation. For example, there are many wasted opportunities in the fields of organic waste and agro-ecology. Unlike other countries, Brazil's urban waste comprises 51 per cent of organic matter on average, generating high levels of greenhouse gas emissions in landfills. Technologies for recovering organic waste through composting on a large scale are viable, however, and have already been tested. Similarly, agro-ecological production initiatives in rural areas offer huge potential for local production in

4 Based on Demajorovic J, Caires EF, Gonçalves LN da S, Silva MJ da C (2014) 'Integrando empresas e cooperativas de catadores em fluxos reversos de residuos solidos pos-consumo: O caso Vira-Lata', *Cad. EBAPE.BR*, v 12, Ed. Especial, pp 513–532

the circular model, using simple, decentralised, cheap technologies.

2 Establish a permanent Brazilian resource panel

Open for multi-stakeholder participation, the panel would be a vehicle for identifying and promoting best circular economy practice in emerging economies at all levels, bringing together policy-makers, industry bodies, universities, business leaders and civil society organisations.

3 Build capacity and raise awareness of the circular economy

Public management capacity at municipal level is a particular cause of concern. There is a risk that the potential social benefits arising from the proper application of the Solid Waste National Policy in Brazil will be lost unless an effort is made to increase understanding of the social role of circular chains. At the same time, if they are to play a part in the circular supply chains in accordance with the Solid Waste National Policy, waste picker groups need support to organise themselves into cooperatives and acquire skills in business and production management.

4 Form international partnerships for the circular economy

Product design standards in the European Union and other major markets have considerable influence on global manufacturing chains and impact various aspects of production in Brazil, including reuse, repair and recycle capability. Similarly, valuable waste considered as secondary raw material is often sent beyond national frontiers for processing and is therefore lost. Cooperation with international partners is key to breaking into global circular supply chains.

Final considerations

The study demonstrates the potential of supply chains in the circular economic model to increase job creation and improve the working conditions and pay of the poorest groups in society. The study also provides evidence that circular chains can promote activities capable of strengthening local economies, empowering and increasing the resilience of resource-poor families and promoting an entrepreneurial spirit for the solidarity economy. Furthermore, the circular economic model makes it possible for emerging economies to move directly to a more beneficial development model, with much more effective, balanced results for society and nature.

In conclusion, we can affirm that failing to support circular economic initiatives in emerging economies is a wasted opportunity to learn how the circular economy can offer a solution which, while promoting development and enhancing the natural ecosystem, can effectively reduce poverty on our planet.

Cover photos *(clockwise from left)*:

Biodigestors turn waste into natural gas to use for cooking, benefiting Alvizio's family and many others in north-east Brazil.
Eleanor Bentall/Tearfund

The remanufacturing process at Nat.Genius – extracting value from electronic waste.
Nat.Genius

Seleta women's group make crafts out of recycled materials, increasing their incomes while decreasing waste. Recife, Brazil.
Eleanor Bentall/Tearfund

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