

The Circular Economy as the axis of development of latin american countries

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ABSTRACT

The main objective of this article is to analyze whether the Circular Economy can currently become the axis on which the sustainable economic growth of the economies of a region such as Latin America and the Caribbean pivots. It starts with the definition of Circular Economy and, subsequently, analyzes whether its basic features are met in the Latin American economies, analyzing some specific cases. It also discusses the pending problems and challenges of the economies of Latin America and the Caribbean in relation to circularity and, finally, draws conclusions and outlines future lines of research that may be of interest at an academic and practical level.

Keywords: Circular economy, Sustainability, Sustainable growth, Latin America and the Caribbean.

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INTRODUCTION

The main objective of this article is to show the extent to which the Circular Economy is likely to become one of the essential axes on which the sustainable economic and social development of a region of the world such as Latin America and the Caribbean (LAC) is articulated. Likewise, the work formulates two specific objectives, subject to this main objective: to know the challenges and pending challenges of Latin American economies, in addition to linking the shortcomings of Latin America and the Caribbean at the economic level and the proposals proposed by the Circular Economy model or approach.

The structure of the article is as follows. First, the Circular Economy approach is contextualized within the principles of global sustainable development, exposing and describing the features that characterize the theoretical paradigm of the Circular Economy. The second point also examines the challenges that a growth pattern such as the one postulated by the Circular Economy implies at a global level. It is in the third point, the central one of the article, where the specific problems of circularity in Latin America and the Caribbean are addressed. The third section is divided into three axes of analysis: the current problems of the Latin American economy in relation to the circularity paradigm; the degree of assumption or compliance with the principles and guidelines of the Circular Economy by the economies of the Latin American region; finally, what are the prospects for sustainable development and the Circular Economy in Latin America and the Caribbean (prospective analysis, where we will venture a series of hypotheses that future research will have to corroborate or refute).

THE CIRCULAR ECONOMY AS A NEW GLOBAL SOCIO-ECONOMIC APPROACH AND SUSTAINABLE DEVELOPMENT PARADIGM

The concept of Circular Economy (hereinafter, CE) is one of the most discussed, explained and referred to notions in multiple fields, both academic, institutional and social, in recent times in the search for new solutions that go in the direction of generating a social, economic and environmental environment characterized by sustainability.

The first relevant studies on CE highlight authors such as Pearce and Turner (1995), who focus on the study of the optimal exploitation of natural resources, both renewable and non-renewable, as well as the problem of species extinction and, above all, the possibilities that open up at the end of the century to try to alleviate the pressing scarcity of material resources. and particularly fossil fuel resources.



Following the Ellen MacArthur Foundation (EMF, 2021), the notion of CE refers to a series of historical and philosophical ideas and currents³ that have to do with the concept of feedback and cycles in systems theory, resurfacing after World War II to refer to the computerization of nonlinear systems and efficient use of machines

To narrow down the term *EC*, the European Parliament (2021) defines it in the following terms:

The circular economy is a model of production and consumption that involves sharing, renting, reusing, repairing, refurbishing and recycling existing materials and products as many times as possible to create added value. In this way, the life cycle of products is extended (European Parliament, 2021).

Regarding the aforementioned life cycle of goods, Prieto's study *et al.* (2017) has shown the usefulness of CE in five specific fields of action that include this complete cycle from the moment materials are extracted from nature until they are recovered and become products or services, involving the interrelated processes of extracting, transforming, distributing, using and recovering. In addition, this research has highlighted the implication of CE for the set of goods and services developed by companies to be designed and marketed in an eco-innovative way.

CE is also closely linked to the Sustainable Development Goals (SDGs), formulated in the *2030 Agenda*, as reflected in Figure 1; specifically and above all, with Goals 12 and 13: responsible consumption and production, and climate action⁴ (United Nations [UN], 2021), but also with Goals No. 6, 7, 8 and 9. With regard to Goal 6 (Clean Water and Sanitation), the core principles of CE, which we will develop in the next section, provide an ideal framework for ensuring the satisfaction of a basic good for society. The same is true for SDG 7 (Affordable and Clean Energy), SDG 8 (Decent Work and Economic Growth) and 9 (Industry, Innovation and Infrastructure), which are shared by Dangond (2019). In fact, the planetary crisis, at the economic, social, health and ecological levels, has reached such a point that the Earth is immersed in a critical process as a result of the "excessive extraction of natural resources and the destruction of ecosystems, typical of the conventional linear economy dominated by an anthropocentric vision" (Norma and Porcelli, 2018, p. 328), so there is an urgent need to provide answers that go in the direction of what the SDGs and CE advocate at the global level.

In the sense of the above, CE plays, and can play even more, a prominent role in the scientific objective of carbon neutrality (Economic Commission for Latin America and the Caribbean [ECLAC], 2021). If switching to renewable energy could reduce polluting emissions by 55%, CE could do so by the remaining 45% (EMF, 2021).

³ Such as, for example, Stahel's performance economics, McDonough and Braungart's *Cradle to Cradle* design philosophy, Benyus's idea of biomimetics, Lifset and Graedel's industrial ecology, Amory, Lovins and Hawken's natural capitalism or Pauli's blue economy approach, among other approaches (EMF, 2021).

⁴ For a link between climate change and the impact on waste treatment, *vid.* Graziani (2018).

Figure 1: Sustainable Development Goals



Fuente: ONU (2021).

CE is part of a process that the European Parliament (2021) has also set out, as shown in Figure 1.

Figure 2: Illustration on the steps that shape a circular economy.



Source: European Parliament (2021).

In very similar terms, Arroyo (2018) defines CE:



Such as the business model that is based on recycling, reuse and the reduction of natural resources that, since the industrial revolution, companies have created a large number of products, which promote consumption and generate waste destined for environmental pollution without subsequent treatment (p. 78).

FEATURES OF THE CIRCULAR ECONOMY

CE is based on a number of principles. The first of these is the preservation and enhancement of natural capital by controlling finite *stocks* and balancing renewable resource flows. The second principle is the optimisation of resource performance, which makes it possible for products, components and materials to circulate at their highest level of utility at all times, both in the technical and biological cycles. Finally, CE is based on a third principle: the promotion of the effectiveness of the social system as a whole through the elimination of negative externalities, i.e. all those harmful effects on society of certain economic activities that are not included in the costs of a good, good or service (Cerdá and Khalilova, 1999). 2016). These three principles on which CE is based can also be formulated in a more concise way as follows: preserving and enhancing natural capital (principle one); optimize the use of resources (principle two); promoting the effectiveness of the system (principle three) (Dangond, 2019).

Likewise, every circular economy has a set of key features or characteristics that can be summarised as follows (European Environment Agency, ⁵2016):

- decrease in inputs and lower use of natural resources;
- increased levels of cooperation in the use of renewable and recyclable energy and resources.
- reduction of polluting gas emissions for the planet;
- Maintaining the value of products, components and materials in national economies.

CIRCULAR ECONOMY: CHALLENGES AND CHALLENGES

Any new commitment to transforming social or economic relations necessarily involves overcoming a series of obstacles or difficulties, since it involves radically altering established habits, patterns that were thought to be untouchable until then, and new public policies. This is the case of CE, which represents a radical paradigm shift from the traditional and hyper-polluting industrial societies of the late 20th and early 21st centuries.

One of the most pressing challenges or pending objectives facing the EC and, indeed, humanity as a whole with respect to sustainability is the one that has to do with food production and waste, given that food, especially at the industrial level and in businesses related to it, is wasted in huge quantities. mainly in rich countries. According to González's (2016) analysis, in order to face

⁵ EEA.



this challenge, it is essential to plan and implement policies to prevent and solve this problem. But for these policies to be effective, it is necessary to raise awareness of this problem among the population as a whole and, mainly, and in line with what was proposed by the European Parliament on 19 January 2012 on how to avoid food waste, to address the structural, objective causes of food waste and the corresponding overgeneration of waste: overproduction, poor product design, product spoilage, inadequate marketing standards and poor management of trade stocks. In our opinion, to all this must be added an essential requirement: that action against the problem of food waste is framed within the strategies of the CE and that both the starting point and the fact of sharing actions and results are something international. Any effort to implement circularity and solve the specific problem of food waste will be doomed to failure if it is not part of a joint, global strategy.

THE CIRCULAR ECONOMY IN LATIN AMERICA AND THE CARIBBEAN

The economies of LAC are not yet sufficiently prepared, as we will have occasion to show, to take the great leap of implementing a CE. However, it is also a fact that there are a number of Latin American initiatives that go in the direction of giving greater centrality to circularity in economic matters. Let's start by looking first at the main problems and challenges facing LAC economies, in order to carry out a prospective analysis of the chances of success of CE in the Latin American region as a whole.

CIRCULARITY, PROBLEMS AND PENDING CHALLENGES OF LATIN AMERICAN ECONOMIES. CURRENT SITUATION

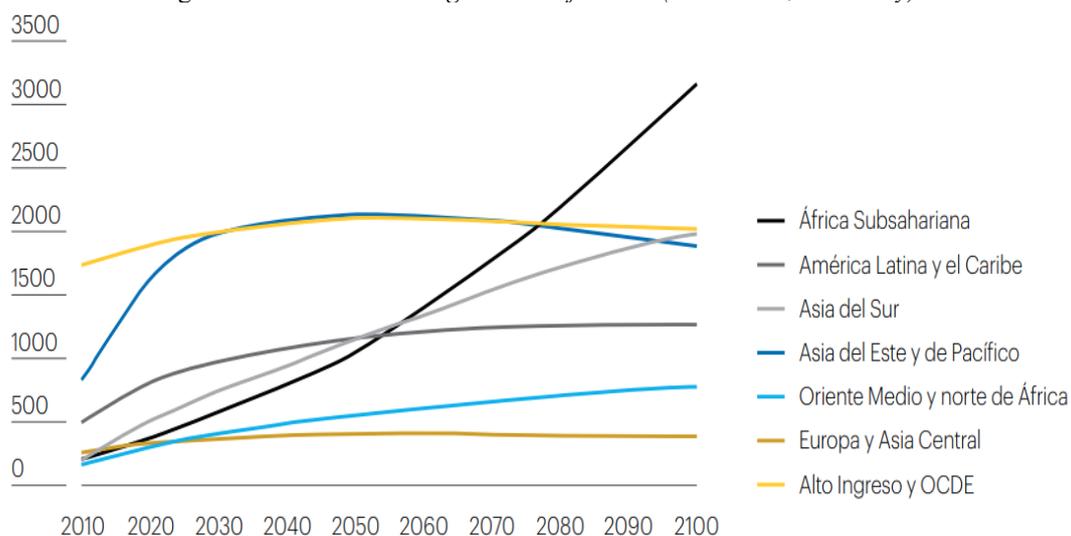
The concrete reality on the level of sustainable waste generation and collection in LAC yields the following results, according to ECLAC data (2021): throughout the region, an average of around 1 kg of waste per capita is generated per day; waste collection coverage is high globally; approximately 85% of waste is collected in urban environments, although the figures vary greatly from country to country (for example, in Uruguayan or Colombian cities the rate reaches 95%, while in the capital of Haiti it does not exceed 12%); less than 75% of municipal waste in LAC is deposited in landfills, and more than 20% ends up in open landfills; Finally, only 4% of municipal solid waste is recycled in the entire subcontinent, a figure very different from other regions of the world where it is as high as 20%. All this, as the ECLAC study (2021) points out, shows an unsustainable development style for LAC, which contrasts with the positive experiences of CE in different regions of EU countries, such as the CE plan in Aquitaine (France), the zero waste targets in Scotland (United Kingdom), the materials program in Flanders (Belgium), the integrated strategy for CE in Rhineland-Palatinate (Germany) or the case of CE in Lipor (Portugal) (Dangond, 2019).⁶ To compare

⁶ For more information on different case studies of CE within the EU, we refer the reader to the work of Leitão (2015).

a specific Latin American case, Colombia, with three EU states – Spain, the Netherlands and Germany – and the EU-27 average with respect to waste treatment, while in the Latin American nation the proportion is 17% for recycling and 83% for landfill, in Spain⁷ it is 17% for recycling, 10% for thermal, 10% for biological and 63% for landfill; in the Netherlands it is 24% for recycling, 49% for thermal, 26% for biological, and 1% for landfill; in Germany it is 47% for recycling, 35% for thermal, 17% for biological and 1% for landfill; finally, in the EU-27 it is 28% for recycling, 24% for thermal, 15% for biological and 33% for landfill. This confirms that the LAC country is well below the proportions in waste treatment of the most advanced area in the world in this regard.

In terms of solid waste generation forecasts by region of the world, Figure 3 illustrates well the middle position in which LAC is located, better placed than sub-Saharan Africa, the "High Income and OECD" group, South Asia and the Middle East and North Africa. Regarding the composition of waste in LAC, the distribution is as follows: organic (54%), paper (14%), plastic (11%), glass (5%), metal (3%) and others (13%) (World Bank, 2012, cited in Graziani, 2018, p. 79).

Figure 3: Total solid waste generation forecast (2010-2100; tonne/day)



Fuente: Graziani (2018).

That said, it should be noted that the concept of CE is relatively recent in LAC in terms of its knowledge and application. However, the fact that the EU leads the world in the implementation of a long-term CE and that the supranational EU institution has close relations with LAC can contribute to the Latin American region adopting a strong CE strategy more firmly. But to do so, it is essential to fundamentally change a series of variables, including public policies, business management

⁷With regard to the Spanish case, the study by Puentes (2018) has highlighted the inconsistencies in the draft of the *Spanish Strategy for the Circular Economy*, which would not reflect the true mutation of the paradigm announced by the EU documents in this regard, which is why Spain would be at the tail end of the circularity model at the EU level. In any case, we refer the reader to the author's critical research with a view to delving deeper into the matter.



systems, investments, regulation of polluting waste, public finances, financing systems and, in general, the adaptive capacities of Latin American economies (ECLAC, 2021).

Despite the incipient nature of CE in LAC, however, there are already several initiatives that have proliferated in the region in relation to CE, as explained by a source such as ECLAC (2021). For example, policies have been approved that move in the direction of integrating Latin American economies into the CE in terms of the use of inputs throughout the production cycle and the prohibition of toxic substances with little or no reuse, as well as sensitization and consumer awareness programs regarding the impact of the most unsustainable consumption patterns. Also noteworthy are the Latin American initiatives to update consumer laws on the promotion of the common use of products and devices, or those that have to do with incentives for investments in waste management systems and in relation to common standards and labelling for particularly polluting products.

In terms of strictly political initiatives, ECLAC (2021) highlights a series of interstate events within LAC that show that the path towards CE has already begun in the region. For example, in February 2021, on the occasion of the celebration of the LAC Environment Ministers' Forum, the so-called LAC Circular Economy Coalition was implemented.

While it is true that the guiding principles of CE are applicable on a global scale, each country and region has its own economic, social, cultural, political, environmental and technological specificities, so the way in which CE can be applied to society as a whole varies considerably. Likewise, even within the same region such as Latin America and the Caribbean (LAC), there are still notable differences between one economy and another, which is why we have considered it pertinent to also analyze the particularities of several case studies.

By country, starting with Ecuador (17.37 million inhabitants and 283,560 km²), Arroyo's study (2018) shows how, despite the growth in the country's level of resource exploitation, CE has not progressed at the same pace. A case that differs from the Colombian one (48,258,494 inhabitants and 1,142,748 km²), whose Ministry of Environment and Sustainable Development (MADS) launched in 2018 the National Circular Economy Strategy, in turn framed in the National Development Plan 2018-2022, which works on different lines of action: industrial materials and products, packaging materials, biomass optimization, water cycle, sources and use of energy, management of materials in urban spaces and communication and civic culture to raise awareness of the purpose of CE. One of the most important aspects of the circularity map in Ecuador is possibly the fact that a roadmap has been created for the different goals established, quantifying and specifying a series of resources, responsible entities and indicators that allow measuring the degree of compliance with the objectives of the CE (Dangond, 2019). Evidence that Ecuador still has considerable progress to make in this area is that, for example, it has only 12 solid waste composting



facilities, compared to 30 and 60 in Colombia and Mexico, respectively (Graziani, 2018). In connection with the above, Ecuador's basic industry still has to plan and implement strategies that allow the country to become a benchmark in the development of supply chains that are essential for sustainable supply, waste generated in the seas, food waste and an increasingly interconnected world market for secondary raw materials (Muyulema, 2017), something that particularly affects economies such as Ecuador, with a high degree of dependence on the production and export of raw materials.

The Colombian model is, in this sense, an example of the need for public authorities and society as a whole to be aware of the relevance of new policies with regard to CE and waste treatment. According to Guevara's (2020) analysis, pioneering executive documents in the country such as *Conpes Document 3874* (2016) have made it possible to articulate a true national policy for the Integrated Management of Solid Waste (GIRS), which in turn seeks to meet the following objectives:

- Promote CE through the design of tools within the framework of the GIRS.
- Raising awareness among citizens to build a true culture and education in GIRS that makes it possible to increase the levels of separation at the source and use of resources.
- Articulate a new political-institutional environment suitable for coordinating the various actors involved in promoting efficiency in the GIRS.
- Implement as many actions as are essential to improve the control, verification and dissemination of sectoral information in order to be able to follow the public policy of GIRS.

And, while it is true that there is still much to be done in Colombia, there are recent data that invite hope that CE can be a constituent part of the Colombian economy in the medium term, such as the creation of almost 800 green businesses in a few years and the approval of more legislative and executive measures such as Decree 1669. of 12 September 2019 (Rozo, 2019).

Analysing yet another model of CE in LAC, Uruguay, it should be said first of all that the Uruguayan case – a country with 3,529,014 inhabitants and an area of 176,215 km² – is certainly one of the countries with the greatest implementation and diffusion of CE. In 2018, it implemented the Circular Opportunities Program, reaping optimal results through the joint initiative of Biovalor, a government project, and the Uruguayan National Development Agency (ANDE), in order to deepen the transition of the national economy towards CE. The case of the Argentine neighbor (44,938,712 inhabitants, 2,780,400 km²), which, through the Secretariat of Environment and Sustainable Development, belonging to the Ministry of Environment and Sustainable Development of the Nation, has implemented the Provincial Strategic Plan for Solid Waste Management from the perspective of



the CE, planning to achieve the circularity objectives in a staggered manner, in 2025 and 2035 (Dangond, 2019).

As for Panama (4.24 million inhabitants and 75,517 km² of surface area), we are facing the second country in LAC with the highest rate of creation of urban solid waste (MSW) per capita, after Chile, which responds, fundamentally, to the high population density in large urban centers, the absence of state plans for a CE and the absence of policies to recover or transform MSW into material resources. Currently, the Republic of Panama has a pending issue in terms of CE, as corroborated by the fact that only 43.1% of Panamanian municipalities have plans for the comprehensive management of solid waste. However, according to data from the Inter-American Development Bank (IDB) cited in Espinoza (2021, p. 58), Panama is among the first Latin American nations (taking into account the Latin American average, which is 19.8%), as shown in Table 1:

Table 1: Ranking of Latin American municipalities with solid waste management plans.

Latin American country	Percentage of municipalities with an urban solid waste management plan (in %)
Nicaragua	1,2
Brazil	1,6
Dominican Republic	5,1
Bolivia	9,8
Paraguay	18,8
Belize	21,9
Honduras	26,7
Guatemala	28,5
Venezuela	33,4
Mexico	35
El Salvador	41,3
Chile	53,4
Costa Rica	57,1
Peru	57,2
Uruguay	73,9
Argentina	74

Source: Authors' own elaboration based on the IDB, as cited in Espinoza (2021).

PERSPECTIVES FOR SUSTAINABLE DEVELOPMENT AND CIRCULAR ECONOMY IN THE LATIN AMERICAN REGION. TO WHAT EXTENT HAVE THE ECONOMIES OF LATIN AMERICA AND THE CARIBBEAN EMBRACED THE PRINCIPLES OF THE CIRCULAR ECONOMY?

Given that the strategic management of solid waste has great potential in the sense that it can have very positive effects at the social and economic level, that is, in relation to the fact that the economies of LAC could be reactivated through a *green economy* similar to the German one, generating thousands and thousands of jobs (ECLAC, 2021), LAC has great potential to adapt its economic and social fabric to the guiding principles of CE. But to do so, at least, it will have to overcome what for us are its main pending challenges: generating a coherent political-legal framework that stimulates civil society to contribute to the creation of a CE; overcoming the inertia



that tends to consider that CE is only possible in more advanced countries; and, finally, that the public authorities provide incentives of different kinds so that social and economic actors better understand the need to move from a linear to a circular economy model.

In order to achieve greater circularity, LAC countries still need to overcome a number of limiting factors when it comes to the implementation of new composting and incineration technologies. In the case of composting, such factors have to do with an inappropriate definition of markets; high operating and transportation costs; poor quality of the finished product; low acceptance for source separation; lack of maintenance of industrial equipment; inappropriate technologies; lack of linkage with strategic soil reclamation projects; low participation of the formal sectors. As far as incineration is concerned, there are four main limiting factors: high moisture in the waste; low calorific value; lack of resources to initiate the investment; lack of skills in general (Graziani, 2018).

In any case, as shown by the Chilean and Mexican models, each with its own specificities, the so-called Extended Producer Responsibility (EPR), which emerged in Sweden and Germany in the early 1990s and is closely linked to CE, is a strategy that has made it possible to optimize the use of resources through their reincorporation into the production chain. progressively transforming the linear economy into a circular economy (Rondón & Turcott, 2017; Suazo, 2017). In this regard, we consider that the degree of acceptance of the principles of CE is satisfactory in countries such as those mentioned; However, in general, we still see problems, weaknesses, threats and obstacles that have not been fully resolved by all the countries of the LAC area. The Colombian case, which we have been able to analyse as carefully as possible using different sources, is perhaps one of the best examples in LAC of the potential of the new paradigm of circularity and, above all, the benefits it can bring at a social, economic and, of course, environmental level.

CONCLUSIONS

From what has been discussed in this article, we can draw the following conclusions. First, CE is an intrinsic element of sustainable development and is closely linked to the SDGs. In addition, CE is a development alternative for all countries, not just the most advanced and industrialized ones. For this reason, as we have seen, LAC economies can also jump on the bandwagon of the circular development paradigm, but to do so they still have challenges to overcome, among which we can highlight as a conclusion the lack of a true *green* culture. As for future lines of research, we consider, first of all, that it would be pertinent to analyse the degree of compliance with the 3Rs methodology (reduce, reuse, recycle) by countries and regions, examining comparatively how each area evolves so that the laggards emulate the most advanced from the point of view of sustainable development and CE. Likewise, another future line of research that may be of interest is the study of the advances that



will be implemented in composting and incineration over the next few decades, mainly taking into account the need to overcome the limiting factors mentioned in this article.



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