

## A view of circular economy in the world

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**Summary.** The circular economy is an industrial model focused on the design and development of products, processes and services, aimed at obtaining a reusable final result in other processes or industries, obtaining economic and environmental improvements. Traditional economic models implemented in industries, with large production volumes are not friendly to the environment and incur uncontrollable costs. Models that implement Lean philosophies where the pace of production, balancing, flow of parts, are a cycle of continuous improvement, eliminating downtime and losses, which allows optimizing costs. The circular economy, along with other technologies and methods appears as an alternative for companies that seek to be more competitive, have greater corporate social responsibility and a greater commitment to the planet. Therefore, several countries in various parts of the world have been working and making efforts to implement in their economies flexible models that allow the use of existing tools and techniques, but little used. This document takes a look at the work that several countries of the world have developed on circular economy, the approach and non-formal commitments they have acquired.

**Keywords** - Circular Economy; Sustainable Development, normativity.

**Abstract.** Circular economy is an industrial model focused on the design and development of products, processes and services directed to obtaining a residue that can be reusable in other processes or industries, achieving economic and environmental improvements. Traditional economic models implemented in industries are not environment friendly and uncontrollable costs are incurred.

Models that implement Lean's philosophy where production rhythm, balancing, flow of parts, are a cycle of continuous improvement, various times and waste, which allows optimizing costs. to the non-

Circular economy, along other technology and methods come up as a new alternative for businesses that are looking to be more competitive, have a greater social responsibility and greater compromise with the planet. Therefore, several countries in different parts of the world have been working and making efforts to implement in their existing economies more flexible models that allow the use of tools and techniques currently in use but less frequently. This document provides a look to the developed work about circular economy in various countries of the world, it's approach and the non-formal compromises that have been acquired.

**Key Words:** Circular economy, sustainable development, normativity

### I. INTRODUCTION

Seeing the economy as the science that carries out actions aimed at the proper administration of the increasingly scarce resources that a society has to meet its growing needs, it is observed that these actions involve both the people as industries; to people relating them to the consumption of goods and services, and to industries by focusing on the processes of transformation and distribution.

It is important to emphasize that within these actions processes of choice are generated, be it choice of consumption, but also of production; in the last decade the aspects related to consumption and production have focused on sustainability and environmental responsibility, this brings with it and forces the productive sectors to be more strategic when planning their processes and positioning their products and services.

In the economic field it is common to divide goods into categories, for example, you can find the bienes de suppressing down consumption and within them are the durable and non-durable,

Durable goods are also called perishable or single-use such as food; durable use goods are used several times in their useful life, single-use goods are acquired in short intervals of time (day by day or week by week), while durable goods (such as televisions) are not necessary to purchase. rlos constantly but only when the

necessity given by obsolescence, time of use or damage to the product; these goods are characterized by having utility for a long time after their purchase, this difference between goods arises since they are important for the mode and form of production in a country or region, if all the goods that were needed in an economy were of single use it would be much easier to organize and control. In an economic system, the production of durable goods is more complex since production is more difficult to stabilize due to irregularity in consumption.

In the same way it happens with the factors of production, there can be those of single use (raw materials) and those of durable use or capital goods (machinery and equipment). As stated [1] *"the production of capital goods is perhaps even more difficult to stabilize than the production of single-use consumer goods given also the instability of productive consumption"*.

Whether it is the production of consumer goods or capital goods, each of them generates significant impacts on the use of resources, many of them underutilized and eliminating them before the fulfillment of their productive useful life, therefore, and in order to safeguard the proper use of these resources, it is necessary to establish sustainable methods and standards of production and consumption. The manufacturing sector is quite diversified, and after wholesale and retail establishments, it is the most representative activity in terms of number of companies, within the activities found in the industry are some such as; the manufacture of food and beverages, manufacture of transport equipment, manufacture of machinery and equipment, wood and paper, textiles and clothing, metalworking, plastic among many other activities, this dynamization of industrial activities and processes has been important to improve the indices of competitiveness, productivity and generation however, it is important to highlight that these activities result in terms of final products and waste that threaten the safety not only of the various actors. industrial as they are, suppliers, direct personnel of the industry (employees) and customers, but of the population in general.

The circular economy model seeks to change the way of designing, producing and using the different products, the objective is not only to mass produce, but to produce better, thinking from the very design of the product in its recycling, [2]

The circular economy emerged in the 70s where thanks to the publication of [3] where it is established that a consequence of industrial development and population growth is the increasingly rapid decrease in resources, in their studies determines that, *"if current trends of world population growth, industrialization, environmental pollution, food production and resource depletion are maintained, this planet will reach the limits of its growth over the course of the next hundred years. The most likely result would be a sudden and uncontrollable decline in both population and industrial capacity."*

From the business point of view, the circular economy makes it possible to concentrate efforts on the use and management of resources, where it is sought that both products and their components remain as long as possible in their life cycle.

This has led to a dilemma in companies about the best how to produce, without affecting the shareholders' agreements, which is the main variable on which the economy is based currently where his principal strategy is Based in the increase of the consumption by part of the people Offering products to one minor

cost due to the new materials used, improvements in production processes, lower cost in labor and a greater purchasing power of buyers.

Making durable products, with interchangeable components that can be repaired (as they were formerly done), is not currently business for companies, since revenues are generated by the number of units sold in a given period of time, and in which, the number of competitors is increasing, at the same time the number of buyers is increasingly scarce.

In addition to the above, the need to use a greater amount of resources has led to an overexploitation of them, which does not allow nature to have enough time to recover, according to the new commercial conditions imposed by man, additionally generating a large amount of waste, waste and garbage, which end up degrading what little remains.

All of the above has allowed us to see other options in which the profitability of companies continues to be sought, but with a more socially and environmentally responsible thinking, which allows producers and buyers to change the way of doing the economy, where a reduction of unsizable waste is sought, a decrease in exploitation against resources and greater efficiency than those already existing in the economy.

The circular economy model is presented as one of the best options to be adopted by entrepreneurs, including in this process their supply chain, which manages to integrate from suppliers to customers, seeking to satisfy the needs and tastes of the latter, but generating a profitability of the former.

As mentioned above, the circular economy seeks to reincorporate those resources that have been used foreseeably and that, by the linear economy model, (produce, consume, discard) their last destination would be a waste dump, so still can provide a service for a long time to humanity, through processes such as ecodesign, the economy of functionality, industrial symbiosis and the 9Rs (rethink, reuse, repair, restore, remanufacturing, reduce, re-propose, recycle and recover), in such a way that the circular economy seeks to reduce environmental imbalances from the economic point of view, giving value to what is discarded, and preserving the value of what is used

## II. METHODOLOGY

This article aims to show some of the strategies and policies established on the subject of circular economy in some countries in Europe, Asia and Latin America, this is derived from the project of research entitled *"Analysis of the approach of economics circular through the industrial symbiosis in SMEs of the manufacturing industry of the city of Bogotá"*.

The information is taken by reviewing various databases such as EBSCOhost, Elsevier and JSTOR, in the same way some texts, laws, regulations and economic policy documents are taken as a reference, which provide a panorama on the position and importance given to the increasingly growing concept of circular economy.

From this review, it can be seen that the continent that has worked the most on the issue of circular economy is Europe, where some countries in the region have been implementing recycling and reuse policies from the sources, looking with innovative ideas (various coercives)

positively impact the systems of commercialization and end use of goods, even if the speed of implementation is not the best.

It is important to start by citing the 2030 agenda for sustainable development of the United Nations, which establishes 17 objectives, which seek to concentrate efforts to guarantee the well-being of people and the planet, in such a way that each country must establish strategies aimed at fulfilling each objective and is precisely with the development of this 2030 agenda and its strategies where the first circular economy scenarios are announced, in the next part of the document some regulatory experiences on circular economy of some countries will be shown from Europe, Asia, Africa and Colombia.

### III. RESULTS

#### International experience

##### EUROPE

In the case of the old continent and continuing with the purpose of collaboration to achieve the sustainable development goals, the European Union (EU) seeks to maintain its vision of leadership both in policies and in the development of innovative circular economy projects according to [4] one of the biggest bets of the EU is the relata In such a way that the European Commission in September 2014 [5] officially communicates the heading "Making a circular economy: a zero waste programme for Europe". increased recycling of 65% of municipal waste and 75% of packaging by 2030, in addition to the limitation of 10% of packagingis so that it does not end up in landfills in European countries.

In France in 2015 the "*law for the energy transition and green growth*" was approved, establishing within its measures the promotion of the circular economy promoted or recycling, penalizing planned obsolescence and controlling the generation of waste, some of which the measures taken are: the prohibition of the distribution of single-use bags, in the same way they prohibit disposable kitchen utensils, these measures are taken in order to achieve the objectives described in Table 1.

TABLE 1  
OBJECTIVES OF PROMOTION CIRCULAR  
ECONOMY

Objetivo	Años	
	2020	2025
reducción de residuos en los hogares del 10%	X	
Reciclaje del 55% de los residuos no peligrosos	X	
Reciclaje del 65% de los residuos no peligrosos		X
La reducción del 50% de las cantidades de residuos producidos.		X

Source: Law for energy transition and green growth "France"

Another important aspect within this law for the energy transition and green growth is the one that refers to the use of spare parts for cars, where it obliges companies that provide maintenance services to vehicles to make recycled parts available to customers instead of new spare parts in order to increase the cons umo of reused parts.

One of the countries in Europe where important advances are also evident in circular economy issues is Spain, there are several legislations on this aspect, one of them is Law 22 of 2011, modified in 2013 that deals with the management of waste stream and contaminated soils, within this law the characterization of waste is specified, going through the definition of waste, types, waste hierarchy, obligations of producers, holders and managers of waste, and establishing for these actors the incentives and sanctioning measures to show the various actions for the final disposal of waste.

In Sweden, they bet on the circular economy by deducting income taxes from repair businesses, second-hand businesses or other types of companies that apply this model.

In Norway there are quite high fines seeking the total elimination of deposits in the seas, in the same way and following the policies of the EU the elimination of single-use plastics is sought, there are also tax benefits for companies that promote the management of electrical waste and the electronic.

Denmark leads aspects of environmental education by integrating circular economy chairs in primary and baccalaureate programs which are mandatory.

Another important aspect to take into account is food waste in Europe and the United States, which reaches between 95 and 115 Kg/year, more than ten times the levels of sub-Saharan Africa and South/Southeast Asia, [6] in southern and southeastern Africa these losses range from 6-11 Kg/year [7]

Of the management realized by Europe, the European Commission has published a report where it states that due to the new opportunities and business models have been generated four millions of repair, reuse and recycling jobs [6].

The Netherlands is another of the references worldwide in terms of the establishment of policies focused on the application of the circular economy model, in 2016 the circular economy program for the year 2050 is disclosed [8] concentrating on 6 strategic sectors, manufacturing, plastics, construction, consumer goods and biomass; promoting and concentrating efforts on the use of sustainable raw materials.

##### ASIA

Of the continents that in recent years has had greater economic growth and social development is the Asian, but this development has passed its collection account, since much of it has been at the top. The need for environmental degradation in all respects

It is estimated that only five countries are responsible for more than half of all plastic ending up in the oceans China, Vietnam, the Philippines, Indonesia and Thailand [6]

Asia has not been left behind, and with initiatives such as Circular Economy Asia Incorporated (CEA), it integrates twenty-four countries, offering resources to make the transition from the linear economy to the circular economy, promoting projects which has to do with the recovery of recyclable waste, training and education, promoting the voluntary agreement of plastics and packaging.

The Association of Southeast Asian Nations (ASEAN) has been working with other nations (the European Union) on circular economy issues.

**China** that not only leads economic and growth issues, but also pollution issues, having in the first decade of the twenty-first century, 16 of the 20 most polluted cities in the world, 70% of its hydrological system polluted and being the first country in carbon dioxide emissions, given these conditions the country has been forced to formulate new laws. If they mitigate the degradation of ecosystems and promote circularity, at the end of 2008 and with entry into force at the beginning of 2009 the law called "Promotion of the Circular Economy" is promulgated, this consists of seven chapters, where it is specified that it has to be propelled by the government, carried out by the market and companies and must have the participation of the government, the new circular economy law in China, has three levels, the first level is that of companies, which must seek efficiency in the reduction in the consumption of resources, reduction in waste and polluting emissions, making a reuse of resources and a recycling process of by-products, the second level occurs within the eco-industrial parks and group industries, with the recycling and reuse of resources among local industries, and the third level that seeks to circulate resources between industries and urban systems, through production and consumption in different regions.

Within the same regulations, the responsibility of the State is established in order to implement a list of products and containers that must be compulsorily recycled, as long as it is economically feasible, or at least convert them into environmentally friendly matter. Parallel to the previous list, there is also a list where equipment, materials and products are encouraged, subtracted or eliminated, seeking, in the case of those eliminated, that they are not produced, sold, or used.

What China has developed in recent years is summarized in that it has been the country that invested the most in renewable energies in 2015 and is the first global investor of renewable energies abroad [9].

**Singapore is driven by the "Zero Waste Nation" project**, where a large and sustainable offshore landfill (CO2 factor) stands out, but also the incineration of waste, producing ash, which is used to manufacture construction material for non-habitable constructions (Smart.city.lab).

In **Taiwan**, 80 percent of waste has been recycled and the project for the promotion of the circular economy in the industrial innovation initiative 5+2, which includes Areas of R&D of technology and materials. Innovative circulars [10].

The excess of heat generated in the plant more great of the park Linhai Industrial and operated by China Steel Corp., is used for produce steam for other plants, where it is an essential element [11]. In addition to the above, Taiwan, will incorporate a wide range of innovations in circular economy to the new oil refinery in the region of Nanzih, What herself Hold on Is for the year 2027 [10].

**South Korea** has not been oblivious to the environmental and social problems generated by technological and industrial development, with high levels of air and water pollution, so they have been implementing the initiative called Resource Circulation Economy and Society, managing to be one of the countries with the highest recycling rate (second after Germany) [12], and waste use, reaching up to 75% in various services and with only a percentage of 16% that reaches landfills [13], one of the few that recycles food with a tasa 95%, its efforts are to find substitute materials of plastics, development of new water resources and air control and treatment [12].

All companies must prepare plans to manage waste according to the new measures established by the Government.

In North Vietnam (communist), at the beginning of 2020 the work developed in circular economy is null both in policies and in companies that have the technological capacity for the recycling and reuse of products [14], but the Party Communist and the State, aware of the problem, promulgated numerous policies in the following lines: construction of a model of sustainable growth, strengthening of the management of natural resources, protection of the environment and the intensification of recycling and reuse [14], which allowed the first public-private cooperation agreement for the management of plastic waste to be carried out in February 2020 [15].

In the month of July 2020, the Institute for the Development of Circular Economy (ICED) is opened, which has the objective on the basis of the Business – Government – University ecosystem, to take to mind the scientific study, innovation and scientific and technological solution in the development of the circular economy [16].

## AFRICA

The countries of the African continent, like China, have started by ceasing to be the great dumping grounds of clothes of developed countries such as the United States or the European Union, but they are very incipient in the subject.

To talk about the work developed and the plans that the African continent has in environmental issues, we must talk about NEF (Next Einstein Forum), which is a platform that seeks to connect Africa with the world of science, society and politics. For this continent, to talk about circular economy is simply to mention the practices they have developed every day, by extending the useful life of the elements, a practice developed over generations.

The Africa Circular Economy Alliance, promoted by Rwanda, South Africa and Nigeria and which seeks to integrate several African countries, the World Economic Forum and the Environment Facility, seeking to establish the circular economy model as part of sustainable development, where they work with various governments, private companies and Organizations, to make this goal a reality [17].

On the African continent, in 2012 only 4% of waste is recycled and 90% goes to landfills, many of which are uncontrolled, but the effort of several institutions have already managed to work on issues of biogas technology, electronic waste management, the promotion of organic agriculture, eco-friendly manufacturing and the eco-industrial park and standards and labelling in the hotel industry [18].

Another African alternative is the African Circular Economy Network (ACEN), which seeks the cooperation of many specialists.

on the subject and who are in Africa, to share experiences and organize events [19]

Efforts and initiatives do not only involve countries or continents, but you go further, trying to unite regions like Asia – Pacific in the Econ Circularomy Asia Incorporated (CEA), que integra a 24 countries on issues such as recyclable waste, education, training and promotion of the volunteering Agreement envelope plastics y Packaging (Asia Plastics & Packaging Agreement) [19]

In South Africa, the REDISA initiative (Recycling and Economic Development Initiative of South Africa), seeks through a tax for each kilogram of rubber in new tires, to collect the used and thus prevent them from ending up in landfills [20].

In matters of economycirculate, with strong policies and actions of high impact the countries of the African continent, like China, have begun to stop being the great dumping grounds of clothes of developed countries such as the United States or the European Union, but they are very incipient in the subject. For Latin America, you see some initiatives by a few countries, such as Chile, Uruguay, Ecuador and Colombia, but it is more at the level of work of entrepreneurship, that you begin to see some projects that seek to start the work of circular economy, but there is a great ignorance on the part of many on the subject.

### Experience in Colombia

One of the questions that arises within the previous analysis is to see What is the state of public policies focused on the circular economy in Colombia? Finding that, the country has established different policies aimed at strengthening the productive sector preserving natural resources, in the decade of the 90s the national policy of Biodiversity is created, the comprehensive solid waste management policy and the national policy for productivity and competitiveness, between 2000 and 2010 there are several economic policy documents developed, some of them these are: national policies of environmental research and education, policies for the development of ecotourism and in 2010 the policy of sustainable production and consumption is consolidated.

In the year 2018 is promoted by document conpes 3934 the green growth policy, whose general objective to 2030 is to promote the increase in productivity and economic competitiveness of the country, ensuring the sustainable use of natural capital, this policy is concentrates on 5 specific objectives which can be seen in Figure 1.



Fig. 1. Strategic axes green growth policy

One of the strategies established in order to strengthen and optimize the use of natural and energy resources, is the "definition of clear guidelines that allow the transition to the circular economy", to carry out this strategy four lines of action are planned that are in Figure 2.



Fig. 2. Lines of action towards a circular economy

From the policy of sustainable production and consumption and the policy of green growth is born the National Circular Economy Strategy developed for the period 2018–2022, this strategy seeks to promote the efficient and sustainable use of resources mainly energy, water and materials, in the same way it seeks promote the generation and management of knowledge, research and innovation; one of the main objectives of this strategy is the creation of new business models, contributing to the development of value chains and symbiosis industrial promoting eco-efficient industrial parks, promoting sustainable agricultural chains, promoting sustainable consumption through new patterns of consumption of products and services; In addition, the strategy also seeks the promotion, development and use of information technologies and big-data for the generation of new opportunities [21]

Colombia is the first country to implement the circular economy, seeking to be one of the three most effective economies Competitive America Latina, where initiatives on the subject have been seen, but they are very few the Sectors What he initiate Processes of economy circular, Entities how CEMPRE Colombia (Commitment Business for the recycling), he accomplished integrate a several companies in the philosophy of recycling, but the vast majority of companies work on issues in water and energy saving, more like part of programs environmental and compliance with standards such as Sat ISO 14000.

### IV. CONCLUSION

This regulatory review related to circular economy strategies shows the leadership of European countries in aspects related to resource management that are beginning to generate positive impacts, both internally and as a reference for other countries. There are policies aimed at different actors, including the direct responsibility that industries have in optimizing both their resources and their processes focused on the creation of a

circular organizational culture. The responsibility that governments have to create conditions and incentives that allow both consumers and companies to generate conditions of sustainable consumption. At the educational level, it is important that the programs consolidate spaces for debate related to circular economy.

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