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RESEARCH ARTICLE

Design of strategies for an efficient and applicative transition from the linear economy to the circular economy, Colombia case

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Abstract
The process of transition from linear economy to the circular economy has shown progress in other countries thanks to the strategies implemented, by analyzing these from the perspective of some authors, it was possible to identify which ones can be replicated in the country. The approach of this article is qualitative of a proactive documentary type with an inductive method, the sources were secondary, from databases such as Dialnet, Scielo, Academic Google, repository of universities, books, foundation reports and DANE reports, also information was obtained from a primary source through a dialogue whit recyclers and owners of warehouses in the village of La Playa and Barranquilla. Through the sources, essential strategies for sustainable development in Colombia were analyzed, such as: pedagogical strategies focused on changing the behavior of the various sectors of the community through educational campaigns, technological innovation strategies that allow the development of consumer goods that generate the least environmental impact, and social strategies. It was concluded that eco-design, the implementation of innovative technology and access to loans for circular activities are essential for the development of the model, in addition, successful experiences of developed countries in term of C.E can be replicated since they offer the opportunity to improved through pedagogical technological and social strategies.

Keywords: Circular economy; recycling; eco-design; sustainable development; waste

Introduction

The interest in adopting the circular economy has increased in recent years taking into account that in addition to being considered as an alternative to change the linear economy model, "many companies have also begun to realize that the linear system increases their exposure to risks, especially the increase in the price of resources and interruptions in their supply. " (Ellen MacArthur Foundation, 2014, p.02). As not all resources in nature are renewable, companies are forced to pay more for their raw material to avoid stopping their production. (Sandoval et al., (2017) affirm that what is involved is to close the cycles of energy, of materials it is not about going against economic growth, but that the resources we have have an intensive use instead of increasing their exploitation ". A circular economy contributes to at least 12 of the 17 goals outlined in the UN's 2030 Agenda for Sustainable Development." (Ellen MacArthur Foundation, 2019, p 19). Chaves, R. & Monzón, J.L. (2018) conceive that the circular paradigm is in the current production system an innovative change, since the idea of regeneration is present in each phase of the production process. (p. 34). "In EC, one of the goals is to increase product life, produce goods with long life cycles, and focus on services rather than products." (EU-LAC Foundation, 2018, p 8). Brook. (2018). Expresses that, in Europe and Asia, the incorporation of this economic paradigm is promoted through the implementation of pedagogical, technological and social strategies. Sweden, in 1997 outlined its current energy policy, whose motto was the transition to an ecologically sustainable society, this is evidenced in research such as (Moreno et al., 2022; Moreno Rocha et al., 2022). Fulfilling this goal, the European country opted for recycling, its population is characterized by recycling 99% of its organic waste and 88% of inorganic waste and this is how it now produces energy through the "From waste to energy" program. The initiative has proved so effective that Sweden now imports tons of waste from other countries such as Italy and the United Kingdom to supply the 32 energy centers it now owns.
In the study Advances and challenges for inclusive recycling: Evaluation of 12 cities in Latin America and the Caribbean developed by The Economist Intelligence Unit. (2017) Brazil is recognized as one of the pioneers of inclusive recycling in Latin America and the Caribbean, also highlighting that in BuenosAires recycling becomes

an activity co-managed by the State and cooperatives, with a joint social responsibility, in the Colombian case in Bogotá the recyclers become visible and are recognized as providers of the public cleaning service, and are therefore entitled to remuneration. (p. 22)

In Colombia, Resolution No. 1407 of July 26, 2018 aims to regulate the environmental management of packaging waste and packaging of paper, cardboard, plastic, glass and metal."

Although materials are used through recycling, the disproportionate increase in plastic during the COVID-19 pandemic since 2020 is worrying since not being able to recycle all single-use plastic would increase environmental pollution (UN News, 2021).

The chemist-ecologist Michael Braungart and the American landscape architect William McDonough, consider that currently there is no recycling but an undercycling because the raw material is losing value until the usefulness of the material reaches its lowest level, just as in recycling, reduction and reuse do not meet 100% with the objective set by the circular economy (McDonough and Braungart, 2005).

Therefore, the objective is to analyze pedagogical, technological and social strategies of circular economy as a factor of sustainable development from the perspective of studies of authors that can be replicated in Colombia.

Methodology

The focus of this article is qualitative of a propositive documentary type with an inductive method, an analysis of scientific literature was carried out, databases such as Dialnet, SciELO, Google Scholar, repository of universities, books, reports of foundations and reports of DANE, information was also obtained from primary source through a dialogue with recyclers and owners of deposits of the corregimiento la playa and Barranquilla.

Development

For the Hellen Mac Arthur Foundation, (2014). The Circular Economy differs from the mere management of waste and recycling in that theproducts designed and optimized can be reused their components, in this way large amounts of energy and labor are not lost as it happens in recycling, this is what defines the Circular Economy. (p. 4). The reason why it is considered that recycling does not fully meet the requirements of the circular economy according to McDonough and Braungart (2005) is because raw materials are not designed for this purpose, for this reason, although once their useful life cycle is finished they are transformed into new materials, the result is a low quality product. When plastics other than those used in soft drink or water bottles are recycled, they are mixed with different plastics to produce a lower quality hybrid, which ismolded amorphously and cheaply.

In Colombia, DANE in its First Circular Economy Report of 2020 defines the

circular economy such as:

> "a system of production and consumption that promotes efficiency in the use of materials, water and energy; taking into account the resilience of ecosystems and the circular use of material flows through the implementation of technological innovations, alliances and collaborations between actors, and the promotion of business models that respond to the fundamentals of sustainable development". Pag (7)

Although the circular economy is frequently associated with recycling and perhaps the power of this in being transformed into energy as evidenced in research such as (Manuel et al., 2022), this is not the only way to contribute to the Sustainable Development Goals (SDGs), other ways to contribute to these objectives is the creation of companies whose purpose is the EC, To achieve this end they focus on the design of innovative products that can be reused, repaired, remanufactured or recycled, this strategy allows them to be more competitive by reducing investment in virgin raw materials.

The DANE in its first circular economy report published on August 5, 2020, marks the starting point of the SIEC Circular Economy Information System that will integrate technical and statistical information to generate new knowledge and guide the execution of the Pact for Sustainability, and the public policies that are formulated in this regard.

This report presents indicators of statistical information that are classified into four components that allow analyzing some topics of interest to the Colombian case such as: extraction of environmental assets, production of goods and services, consumption and use, closure and optimization in the life cycles of materials and products. In the Second Report published on December 11, 2020, it presents 23 indicators of available statistical information and the classification of the components remain the same as the first report.

In the third circular economy report published on July 28, 2021 , there are four new components, these are: demand for environmental assets and ecosystem services, conservation or loss of value of materials in the productive system, pressure on ecosystems due to the disposal of waste and the fourth is factors that facilitate the Circular Economy. Without departing from the purpose of the first two reports, this is the result of the statistical articulation undertaken by DANE within its technical directions, but also in the context of the National Statistical System SEN.

In the Fourth Report published on December 2, 2021, the Circular Economy indicators were categorized into the following four components: Demand for environmental assets and ecosystem services, conservation or loss of value of materials in the productive system, pressure on ecosystems due to the disposal of waste and Factors that

facilitate the Circular Economy. This report includes for the first time information about the indicators of area modified by type of forest cover, sustainable extraction, extraction and use of timber resources, in natural forest, Pressure for fishing and Average size of catch and distribution by size.

The fifth circular economy report published on June 23, 2022 maintains the following components: Demand for environmental assets and ecosystem services, conservation or loss of value of materials in the productive system, pressure on ecosystems for the disposal of waste.

In the first report, the indicator Percentage of households that make separation in the source of waste expresses that in 2018 39.9% of households (6.2 million) of a total of 15.5 million, made separation at the source of some type of waste and households by departments that classified waste in a higher percentage were: Bogotá D.C, Antioquia, Caldas, Santander, Cundinamarca, Boyacá, Casanare, Valle del Cauca, Putumayo, Huila and Nariño, while in the fourth report it appears that between 2018 and 2020 the highest levels of waste classification according to the departments is headed by Bogotá D.C. and in the departments of Santander, Cundinamarca, Boyacá, Putumayo, Antioquia and Cauca.

Table 1. Components that group the Circular Economy indicators

First report August 5, 2020	**Second report December 11, 2020**	**Third report July 28, 2021**	**Fourth report December 2, 2021**	**Fifth report June 23, 2022**
1.Extraction of environmental assets. **2. Production of goods and services.** **3. Consumption and use.** **4. Closure and optimization in the life cycles of materials and products.**	1. Extraction of environmental assets. 2. Production of goods and services. 3. Consumption and use. 4. Closure and optimization in the life cycles of materials and products.	1.Demand for environmental assets and ecosystem services. 2. Conservation or loss of value of materials in the production system. 3.Pressure on ecosystems for waste disposal. 4. Factors that facilitate the Circular Economy.	1. Demand for environmental assets and ecosystem services. 2. Conservation or loss of value of materials in the production system. 3. Pressure on ecosystems for waste disposal. 4. Factors that facilitate the Circular Economy.	1.Demand for environmental assets and ecosystem services. 2.Conservation or loss of value of materials in the production system. 3.Pressure on ecosystems for waste disposal.

The second report of the DANE of 2020 maintains the logic of output or product, in this one addresses among other issues the form of disposal of waste from households in the country, it is mentioned that in the urban area the type of fuel that is used in greater proportion is natural gas, while in rural areas it is propane gas and firewood or wood.

With regard to the collection or disposal of garbage, the second report reports that in 2019 81.2% of a total of 15,999 households had a garbage collection service through the cleaning company, while 12.6% of households burned garbage and 6.2% disposed of garbage by another means. In 2018, the number of households that had the garbage collection service was 0.51% lower than in 2019 and the percentage of households that burn garbage remained the same. Page 7

In the fourth report regarding the way households dispose of their waste, a difference in the data can be observed when compared with those of the second report. In 2018 80.7% of households had a toilet service, in 2019 81.2% of households had a garbage collection service through the cleaning company and between 2019 and 2020 the fourth report reports an increase of 0.6% in households with toilet service, burning as a way to eliminate waste in 2018 and 2019 was 12.6 and between 2019 and 2020 it was 11.8% presenting a decrease in burning by 0.8%.

Table 2. Percentage of households by form of waste disposal National total 2018 - 2019

Year	It is collected by the toilet services	They burn it	Another way
2018	80,7%	12,6%	6,7%
2019	81,2%	12,6%	6,2%
2019-2020	81,8%	11,8%	

In the fifth circular economy report, the indicator percentage share of the consumption of energy products of households that is part of the component Demand for environmental assets and ecosystem services, presents the participation of the consumption of each energy product within the total consumption of energy by households, in this you can see how the demand for each type of product increases or decreases. Page 11.

Table 3. Percentage share of energy product consumption in total household energy consumption. Total, national 2016-2020

	Liquefied petroleum gas (GUP)	Natural gas (distributed)	Firewood	Motor Gasoline	Electricity
2016	5,5´0%	11,3%	21,3%	28,5%	33,3%
2017	6,3%	11,5%	18,7%	30,9%	32,6%
2018	5,0%	13,4%	20,5%	24,4%	36,7%
2019	5,7%	13,0%	18,3%	26,0%	37,0%
2020	7,4%	14,4%	18,8%	20,3%	39,1%

Results

Strategies

Working ondesign has become a strategy of some Asian and European countries such as Japan, South Korea, Germany, Norway, Spain, Italy and Switzerland among others, in order to close the cycles of resources and be reused all its components.

With respect to private companies, they must establish as strategies the accompaniment of campaigns that promote the importance of the adoption of EC in economic, social and environmental development. To achieve this end, the training of committed leaders convinced of the benefits of the circular model is essential. Kowszyk and Maher in their case study for the EU-LAC Foundation (2018) highlights the importance of dreamy, idealistic and courageous leadership at the head of companies, an example of the importance of assuming this attitude is presented by this study in the company Neptuno Pumps of Chile where its Executive Director Petar Ostojic decided to act as a promoter of EC in the media of Chile and Latin America to raise awareness about the Importance of this business model, also as a strategy went to the use of social networks, the organization of talks and presentations in companies, universities and other institutions, this work that was of personal initiative led him to receive awards and recognition for his achievements in the field of EC by Latin American governments and the World Economic Forum and UN agencies. In Colombia, Resolution No. 1407 of July 26, 2018 aims to regulate the environmental management of packaging waste and packaging of paper, cardboard, plastic, glass and metal.

In chapter 3 article 11 of said resolution, are among other obligations: Promote the incorporation of circular economy guidelines, in the prioritization of alternatives for the use of packaging waste, and support the manufacturer in innovation and ecodesign for the manufacture of containers and packaging with sustainability characteristics.

Chapter 2 Article 9 establishes quantitative targets for producers where "Producers shall meet the target of using packaging waste with respect to the total weight of packaging placed by them on the market in the base year," below are the percentages set out in Table I of this Resolution."

Table 4. Quantitative targets for producers

Evaluation period Year	Annual increase (% meta)	Goal of use of packaging waste (%)
2021	10%	10
2022	2%	12
2023	2%	14
2024	2%	16
2025	2%	18
2026	2%	20
2027	2%	22
2028	2%	24
2029	3%	27
2030	3%	30

On December 24, 2020, the Ministry of Environment and Sustainable Development issued Resolution 1342 of 2020, modifying Resolution 1407 of 2018. Among the modifications are that of Paragraph 1 of Article 2 of Resolution 1407 to indicate that, within the exclusions of this regulation, the packaging and containers of drugs and medicines in general are included, eliminating the reference to primary packaging and containers.

Article 8 of Resolution 1407 is modified by establishing that existing producers as of December 31, 2018, must

submit the Environmental Waste Management Plan no later than January 31, 2021, thus extending the period that was indicated above and that expired on December 31, 2020 for existing producers as of December 31, 2018, Article 16 of Resolution 1407 was modified, in this it is established that natural or legal persons who consume or use goods or services, as the last link in the marketing chain must: - Carry out a correct separation at the source of packaging waste and deliver the separated waste at collection points, requirements are established for producers with returnable packaging systems, with the aim of establishing the returnability efficiency indicator and alternatives to obtain a returnability efficiency certification are included.

In order for the process of change not to stagnate, pedagogical, technological and social strategies that can be replicated and that are aimed at empowering CD must always be present.

Pedagogical Strategies

Having clarity about what the circular economy is allows company directors to transmit the concept of EC to their employees and other actors related to the company, to identify which issues they can lead with their experience and knowledge and in which they can benefit from learning from others, all the challenges they face on the road to greater circularity can be solved (EU-LAC Foundation 2018).

Sáez and Urdaneta, (2014) suggest in their conclusion that to achieve improvements in solid waste management in Latin America and the Caribbean requires will on the part of governments, strong investments and continuous education of citizens on the issue of waste use.

The organization of conferences and activities in companies, microenterprises and educational institutions accompanied by information on the proper management of solid waste and the contribution that these can generate if they are commercialized, will allow to demonstrate the changes in society. The relevance and applicability of modules to develop recycling projects in Educational Institutions allows young people to multiply knowledge in their community. From the perspective of Romero, (2017), schools are the ones that allow pilot tests, because there is a certain level of plurality depending on their type and location, in addition, the actors involved are repeaters of knowledge within their environment regarding Solid Waste Management.

To reduce the strong negative impact generated by the textile industry on the environment, it becomes pertinent that the consumer is aware of the final destination of their garments, Peña A (2019) recommends that the will of the consumer is important and that through educational campaigns about raising awareness about the large number of impacts generated by the textile industry, by the abandonment of a garment, its decomposition time, the amount of dyes and microplastics generated as a result of its decomposition.

During the I International Congress of Sustainability organized by Knauf in October 2018 in Madrid, the ABC live interviewed the architect Walter Stahel he commented that "we always forget that there is a renewable resource: work, human labor. We must produce a better human resource, because if we do not use this resource, we will not move forward. You have to focus on people, on training"

The COTEC Foundation for Innovation, in its 2017 report "Situation and evolution of the circular economy in Spain", is aware of the lack of information and data that allow actions to be taken in search of the adoption of the circular economy effectively.

In Colombia as in any part of the world, the process of transition from linear to circular is only possible with the presence of leaders who know and recognize that its implementation generates great benefits and that, to achieve results, the first thing to do is to change the mentality of those who run the companies and that of the citizens of all social strata. For Soria, (2016) educational strategies are those that allow generating environmental awareness and managing the characterization of waste, in this way the generation of economic income for people dedicated to recycling can be improved by applying a more comprehensive recycling.

On June 14, 2019 at the Chamber of Commerce of Medellín, President Duque officially launched the national economy strategy, through which it is intended that the country become one of the three most competitive economies in Latin America by 2030. To achieve this goal, he emphasized the need to reach the awareness of Colombians about the good management of garbage, efficient handling of materials, water and energy, and also encouraged producers, suppliers, consumers and other actors in the productive chain to develop business models that incorporate waste management, efficient management of materials and change in the lifestyles of citizens.

Technological Innovation Strategy

To achieve the transition process towards the circular economy, it is necessary to innovate in new technologies, processes, services and business models, and to make consumers aware of the importance of changing their behaviors COTEC, (2017).

Currently, the vast majority of companies only have machines that fit the linear economic model and designers focused on products that have as characteristics to become garbage in the literal sense of the word or in the best case be suitable to be recycled losing their quality in each process until losing their value completely.

To be able to adopt the EC it is essential to have eco designers who elaborate products that from the moment

they begin to create take into account that these should not lose value, but at the same time it is necessary to have machines capable of disassembling the product to consider which parts can be remanufactured. If it is a recycling company, you must have machines capable of identifying and separating each of the materials that compose them.

It is important that once the useful life of a product is over, they can decompose in the soil and provide their nutrients to the soil or are food for plants and animals, otherwise they are useful to be reincorporated back into industrial cycles to provide quality raw materials, (McDonough and Braungart 2005)

The ABC of the orange economy defines it as a tool for cultural, social and economic development that differs from other economies by the fact that it is based on the creation, production and distribution of goods and services whose cultural and creative content can be protected by intellectual property rights, therefore if the orange economy is considered as a tool of economic development, this can support technological creativity so that companies are competitive and can consolidate with innovative technology, therefore it is pertinent that projects supported through the orange economy focus on innovative technology at the service of the circular economy.

The Development Bank of Latin America CAF (2018), Development of a study that allows to know the contribution of innovative technology in the field of solid waste in countries of Europe, Asia and other countries. The result of this studyor shows the panorama of the state of consciousness of other countries with respect to the circular economy and what is proposed is that a deep evaluation of the possibility of replicability be made taking into account that it adapts to the Colombian context. What the report shows is that there are systems that recognize the people who recycle, the type of waste, systems that warn when the containers are filled and these automatically compact the garbage, specialized systems for people with disabilities, machines that give money in exchange for materials that are recycled and luminous screens that inform the user about the classification of waste.

Proposed social strategy

The offer of products that have a programmed useful life is what is known as planned obsolescence, this generates in many Colombian households negative impacts on their economy making evident the economic interest on the social interest, the absence of social contribution by these manufacturers is in Europe and the same should be in Colombia a subject of interest of different social groups.

In Europe, the Spanish Technical Institute of Cleaning (2017), states that the denunciation of different social groups has caused the fight against obsolescence to be incorporated into its agenda, issues such as increasing the coverage of guarantees, the establishment of minimum useful lives, or information to the consumer about the useful life of each product are supported by the new legislation as lines of fight against obsolescence.

For most households electronic devices and appliances more than a luxury has become a necessity, therefore, the absence of any of these devices affects the quality of life of many families, being so, the repair positively impacts the economy due to the decrease in costs, therefore, being able to access these is facilitated and has an impact on the social aspect. The contribution of the repair and reconditioning cannot be ignored, however, it must be required that the repaired items have a certification and a logo that identifies them, and that for this reason their cost is lower without this indicating lower quality.

With regard to recycling, it must be taken into account that the organization of this sector of society dedicated to collection is in process, employers can adopt some workers of this trade who work in their environment and provide them with endowment every six months and make them aware of how important their work is for society, the environment and the economy of the country, when their work is dignified, will not feel like a relegated social class of little value, they can even become multipliers in their area of work of the benefits of a correct classification of solid waste.

For the COTEC Foundation (2017), the transition from the linear to the circular economic model can create numerous jobs and promote socio-economic growth at the local level and strengthen social cohesion and integration. By investing less in raw materials, workers' working conditions can be improved.

Discussion

The circular economy as an economic model must be recognized for its social, economic and environmental contribution, therefore companies must adopt as a strategy a leadership focused on the sustainability of the EC, although it is true that the government must do its part, that is, create policies that support the development of the circular economy, companies must concentrate on strategies that allow the transition from the linear model to the circular from their economic activity, the results of these efforts will only be fruitful if there is a reciprocal relationship that feeds both sectors; therefore, the strategies implemented in the public sector should not only have regulations as a preference, but these should be aimed at facilitating access to financial support and financing of projects focused on the creation of innovative technology useful for companies in all sectors including those responsible for solid waste collection. (discussion)

Taking into account that the deterioration of the planet is not diminisheddue to the fact that there are still inappropriate practices in human beings and an economic model that prevails despite the efforts, it becomes mandatory that at the local and global level the strategies aimed at making the circular economy model mandatory and not remain only in the discourse

Table 5. Types of Strategies to Empower E.C.

Pedagogic	Technological	Social
• **The clarity of the circular economy allows company directors to transmit the concept of EC to their employees and other actors related to the company, (EU-LAC Foundation 2018).** • **Strong investments and continuous education of citizens on the issue of the use of waste. Sáez and Urdaneta, (2014)** • **The schools allow pilot tests, in addition, the actors involved are repeaters of the knowledge within their environment regarding Solid Waste Management. Romero, (2017).** • **raise consumer awareness about the large number of impacts generated by the textile industry, by the abandonment of a garment, its decomposition time, the amount of dyes and microplastics generated as a result of its Decomposition. Peña A (2019)**	• Iinnovate in new technologies, processes, services and business models COTEC, (2017).. • Designmachines to make it easier to disassemble and separate each of the parts and materials that make up a product to be reused, remanufactured or recycled • Support of the orange economy to the circular economy through projects that focus on innovative technology. • There are systems that recognize the people who recycle, the type of waste, systems that warn when the containers are filled and these automatically compact the garbage, specialized systems for people with disabilities, machines that give money in exchange for materials that are recycled and luminous screens that inform the user about the classification of waste. CAF (2018)	• The fight against obsolescence, issues such as increasing the coverage of guarantees, the establishment of minimum useful lives, or informing the consumer about the shelf life of each product are supported by the new legislation as lines of fight against obsolescence. express Spanish Technical Institute of Cleaning (2017), • Require repaired and refurbished items, a certification and a logo that identifies them, and that for this reason their cost is lower without this indicating lower quality. • Educational strategies and waste characterization improve the generation of economic income for people dedicated to recycling by applying a more comprehensive recycling. Soria, (2016) • We must produce a better human resource, because if we do not use this resource, we will not move forward. You have to focus on people, on training" Walter Stahel. • Investing less in raw materials improves workers' working conditions.

Colombia is one of the leading countries in the region that is concerned with showing and promoting an interest for the transition to the circular economy, however, there are different limitations, currently both consumers and companies maintain a relationship of consumption and production focused on the Linear Economy model (produce, consume and discard), privileging factors such as price over quality and useful life of products, (Castle 2018).

It must be recognized that in Colombia people are not yet prepared for certain behaviors driven by CD and their absence can be considered as an obstacle that slows down the transition from the linear to the circular. In Europe there are businesses dedicated to the purchase and sale of second-hand clothes, however, the pride of the vast majority of Colombians is to buy an item made supposedly with virgin raw material since they consider it important to be the first owner and that will guarantee the durability of the article unlike a remanufactured or second-hand product.

Although the circular economy is often associated with recycling, this is not the only way to contribute to the Sustainable Development Goals (SDGs), other ways to contribute to these objectives is the creation of companies whose purpose is the EC, to achieve this end companies must focus on the design of innovative products that can be reused, Repaired, remanufactured or recycled, these strategies allow them to be more competitive by reducing investment in virgin raw materials.

Although the design strategy contributes indisputably from the economic and environmental, Ramos (2019) highlights that by proposing the elaboration of tableware from banana leaves as an alternative to plastic sheets, it is much easier to adopt the circular model when new products are produced because existing ones such as plastic tableware make it difficult to change. "Consumer demand is a crucial component to the success of product design strategies and at any given time can become a barrier to design strategies for EC." (Re yes Forero, I. A. 2021, p 68).

Although the circular economy model has been globally accepted as the appropriate economic model to achieve the fulfillment of the 2030 agenda for sustainable development adopted by the UN General Assembly, this implies that in the transition process the way of producing and a global

awareness of environmental damage must be changed, social and economic generated by the old model of linear economy, it is precisely in these aspects where the different sectors of society must have a clear knowledge, it is well known that many entrepreneurs do not dare to make the leap to have their companies organized with the old form of linear production, change implies investment, time and pedagogy to raise awareness among its managers and staff in general.

If it is a question of achieving the goal that by 2030 Colombia will be among the top three most competitive economies in Latin America, we must not lose sight of the situation that collectors or recyclers are going through.

It is said that cardboard among solid waste is one of the most important for its contribution to the environment, however, this is only the opinion of those who do not exercise this activity and are unaware of the social problems that recyclers or recuperators go through, they ensure that there is no collaboration of society in general with respect to the final disposal of cardboard and other waste, from the economic some say that the collection of cardboard is not profitable due to its volume and its low price, to this is added that there are seasons that greatly lower the value and the response with which they find is that they are not buying.

With regard to deposits, little infrastructure and little technology can be appreciated, however, recycling is still the solution of many desperate unemployed who seek sustenance in this way. Although recycling and reuse are activities that man has practiced since he lives in community, its objective was not to reduce the deterioration of the environment, the reason was and is to survive, to be able to satisfybasic needs.

Taking into account the above, Colombia like other countries is aware that the reduction of pollution generated by solid waste, especially single-use plastics, is one of the great environmental challenges that is intended to be solved with the implementation of the circular economy model, however, with the appearance of COVID-19 these have become a safe protection option worldwide for the security they provide and their low cost. Personal protective equipment such as masks, plastic packaging and other sanitary waste generated for protection reasons, require measures to be taken with respect to collection management practices in order to positively impact health and the environment.

According to Plastics Technology Mexico (2020) in its article Reflections on COVID-19 and residual plastics written by chemical engineer Adrián Méndez Prieto, it is recognized that, although before the pandemic single-use plastics were strongly pointed out, the health sector and governments found the solution to reduce infections and deaths in single-use plastics used in personal protective equipment (PPE) for being reliable and accessible.

UN Environment Executive Director Erik Solheim in the foreword to the UN report SINGLE-USE PLASTICS: A Roadmap for Sustainability (2018), states that plastic is not the problem, the responsibility for what is done with it is ours in terms of how to use it, plastic has facilitated the expansion of solar panels, clean energy from turbines, food storage and in the health sector the use of plastic has saved many lives.

The United Nations reports in UN news Global Look Human Stories of March 30, 2021 that the use of plastic during the COVID-19 pandemic affects the most vulnerable because the disproportionate increase in plastic from 2020 to date is worrying since not being able to be recycled all single-use plastic would increase environmental pollution. According to the United Nations, more than 70% of this plastic will end up in the ocean and landfills, and up to 12% will be burned.

It should not be overlooked that companies dedicated to the manufacture of plastics prioritize the cost of the raw material, therefore, if oil prices are low, virgin resins end up being preferred because they are of lower value with respect to recycled ones. Thus, plastic pollution increases due to the new incursion of new packaging and articles made with virgin resins, in this situation it seems that efforts aimed at protecting the environment and empowering the circular economic model were at a slower pace than environmental deterioration.

With the presence of the pandemic, the little preparation in which the waste recovery system is found in health services, restaurants and other places that depend on single-use plastics to carry out their activities safely is demonstrated, as well as the scarce protection and preparation of recyclers to carry out their work without exposing their health.

From Sánchez's perspective in his article "The post-pandemic challenges in solid waste management" he expresses:

While the rapid disposal of single-use products is often seen as beneficial to the health of staff and consumers, the imminent increase in the volume of this waste resulting from the COVID-19 pandemic challenges to overwhelm existing waste management systems that have not been able to cope with existing plastic waste satisfactorily. Pag (6)

Conclusions

The promotion of the circular economy must occur in all social spheres and in all business activities to change the linear paradigm that prevails in the country, in this process the private sector, the public and citizens in general must participate, being thus, the change of mentality is fundamental for the success of the transition process from the linear to the circular economy.

It must be recognized that ecodesign, the implementation of innovative technology and access to loans for circular

activities are fundamental for the development of the model, in addition the successful experiences of developed countries in the field of CD can be replicated since they offer the opportunity to improve through pedagogical, technological and social strategies.

The implementation of innovative technology is essential to achieve sustainability, therefore, the government must support the creation of companies that intend to operate with this economic model, resources must also be provided to those companies dedicated to the collection of solid waste to invest in equipment that allows them to be more efficient, in this way they ensure their economic sustainability, contribute to environmental and social sustainability, likewise citizens must be trained, aware of the importance of proper management of solid waste and companies must take responsibility for their waste, extended producer responsibility is fundamental to the success of THE EC.

Although one of the objectives at a global level is to reduce the use of single-use plastic, it is pertinent to recognize that with the presence of the pandemic its effectiveness in minimizing the proliferation of this is indisputable, the contribution of these plastics forces to recognize the importance of their permanence in sectors such as health and food, therefore, plastic is not the problem as erik Solheim puts it, the problem remains the same since before the pandemic.

Colombia, like other countries concerned about the consequences generated by the linear economic model, has become aware that it must generate strategies aimed at transition.

Resolution 1407 and the DANE reports allow the country to have clarity on the shortcomings and strengthens in the field of CD, however, the problem generated by the pandemic at a global level also tested the management of solid waste by becoming evident weaknesses in the collection systems, increasing the impact on ecosystems, affecting the fulfillment of the goals in terms of packaging.

However, it is pertinent to bear in mind that the responsibility for keeping Circular Economy strategies on the right track should not only fall on the State, the planet belongs to everyone and everyone is responsible.

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