

**Export opportunity for compostable packaging for the food sector  
in the European Union<sup>1</sup>**

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European Union*

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## **Abstract**

The main objective of this research was to investigate the possible Colombian exportable supply of compostable packaging in the food sector for the European Union (EU). After the research, it was possible to deduce that it is possible to have opportunities to export compostable packaging to the EU market, taking into account the requirements or regulations and probabilities of competition; in addition to an analysis of the situation in terms of weaknesses, strengths, opportunities and threats that may arise at the time of production and export. Possible strategies are established to face internal and external factors found in the SWOT analysis. The results of this research were achieved through an analysis of the information, content classification and applying research methods such as inductive, since it started from the analysis of the facts and factors that have led society to begin with the implementation of ecofriendly packaging in the daily life of consumers.

**Key words:** compostable packaging, ecofriendly, European Union, Colombia, export, green business, environmental sustainability.

**JEL classification:** F1

## **Introduction**

One of the trends that currently highlights the issues of environmental sustainability and circular economy, how it is contributing to the care of the planet, from production to consumption, to change the term "end of life cycle" to reduce, reuse, recycle and recover materials throughout the supply chain. Society and companies are becoming increasingly aware, and in the case of the packaging industry, it is one of the sectors that is beginning to adapt, manufacturing them with more environmentally friendly materials, for example, made with corn starch or corn husk, sugar cane bagasse, pineapple crown, cassava starch; made with recycled material or made with biodegradable plastics.

(Fernandez Gamboa, 2019) in his research "Identification of new biodegradable packaging technologies in the food industry with greater development potential in Colombia", mentions the different biomaterials in trend and biodegradable and compostable packaging technologies with greater manufacturing potential in Colombia, which can serve as alternatives to replace plastic, a material that is widely used in the food packaging industry.

The agricultural sector is connected to the manufacture of these compostable and biodegradable packaging, since Colombian agricultural products and waste can be used. According to (Peñaranda Gonzalez, Montenegro Gómez, & Giraldo Abad, 2017) point out that "important sources of agroindustrial residues in Colombia can present an alternative for the generation of by-products in which their characteristics and properties are used to obtain materials that can be used in other processes", as is the case of the packaging industry, which can develop its products by means of the raw material that is taken from agriculture. In addition, it favors that Colombia due to its geographical location, its variety of climates and biodiversity, benefits the agricultural production and of good quality; regions of the country such as Valle del Cauca, Antioquia, Cundinamarca, Boyacá, Meta, Tolima, Huila, Eje Cafetero, the Santanderes; stand out for the production for example of sugar cane, pineapple, coffee, banana, cassava, corn, rice, etc.

On the other hand, (Buitrago Avellaneda, Barragán Salas, Lizarazo, & Rodriguez Aldana, 2019) the results show that environmentally friendly food packaging influences the purchase decision. The perception of packaging that contributes to the care of the environment depends

on variables such as age and education; the older and more educated, the greater the relevance and influence of the packaging. In addition, the culture and responsible consumption is growing.

Environmental sustainability and responsible consumption is a global issue, in the programming of the 2030 sustainable development plan, the United Nations (PNUD, 2021) establishes global objective number 12, called "Responsible production and consumption", which encourages countries to integrate their processes and consumption patterns in order to reduce the negative environmental impact and protect the planet. Factors such as high pollution in the environment, global warming and the amount of waste generated, affect natural areas, animals and their habitat; a clear example of this is the plastic 8 million tons enter the ocean each year (Parker, 2019), that arrive from land surfaces by wind or by rivers that flow into the sea; more than 1,200 species of marine fauna are killed by this material every year (MASP de la facultad de Derecho de la Universidad de los Andes y Greenpeace Colombia, 2019).

Ecofriendly packaging has a greater impact, profitability over time and importance in international markets, including in 2019 in eight Caribbean countries initiated a ban on the use of plastic (Semana, 2019) and 12 other countries have banned the use of plastic bags, including Kenya, which charges fines of up to 30,000 euros. (Sibaja, 2019) this encourages the importation of products that have an added value related to environmental care and motivates the consumer.

There are companies that have had to reinvent themselves to remain in the market, creating an ecological line or completely changing the packaging they offer. Likewise, some companies in the industry after an environmental and conscious approach, seek to close the product cycle through reuse and reintegration, however, in view of the complexity of the ecological management and recycling, since they depend on regulatory entities and mainly the consumer to obtain the materials returned to be reprocessed in the packaging industry. Therefore, they take the initiative to manufacture biodegradable and compostable packaging, which would not have to worry about the final disposal of their products, since it is produced from the beginning guaranteeing that there would be no environmental impact from the

packaging. For this reason, a trend has begun to be more responsible with the products that are consumed and the proper management of these wastes. Therefore, there is a need for packaging companies in Colombia to join this change, taking advantage of the raw materials that can be extracted from agriculture in the country for the production of compostable packaging.

Therefore, the following questions arise: ¿Why should compostable packaging produced in Colombia be implemented for export to the European Union? What is Colombia's export offer of compostable packaging?

According to the above, the general objective of the research was to investigate the possible export offer of compostable packaging produced in Colombia for the food sector in the European Union.

For the purposes of the research, it was divided into the following specific objectives:

- Identify the requirements in the European Union for compostable packaging used in the food industry.
- Describe Colombia's exportable offer and its competition in the European Union in terms of compostable packaging for the food industry.
- To analyze the weaknesses and strengths (internal) and the opportunities and threats (external) in the production and possible export of compostable packaging for the food industry from Colombia to the European Union.

## **1. Reference framework**

### **1.1. Theoretical framework**

International trade or foreign trade refers to the commercial exchange between two or more different countries/economic regions, with a remote origin. (EALDE, 2018). This has had a historical evolution, where trade was born from ancient times as a barter system, in which man exchanged what he had left over for what he needed, whether products or services, in other words, exchanging goods for others of the same value. In ancient times there were difficulties with the previous system, so the exchange of goods for precious metals was established.

“As gold and silver coins began to be made around 500 B.C., trade between countries became possible, as these precious metals had a standardized value everywhere. Which allowed countries with a surplus of certain goods to sell these to other nations that needed them.”  
(Banco Interamericano De Desarrollo, 2017 )

Later, in the Middle Ages, with the feudal system, warehouses, banks and bills of exchange were born. Then came the discovery of America due to the search for new trade routes to India, and with the gold found in America, banking grew. With the passing of the XIX and XXI centuries, innovations in transportation were advanced; globalization was born (free trade zones) and the technological era began.

“International trade in goods and services has grown steadily over the past six decades due to lower shipping and communication costs, globally negotiated reductions in government barriers to trade, widespread outsourcing of production activities, and increased awareness of foreign cultures and products.” (Krugman, Obstfeld, & Melitz, 2016)

In other words, world trade has grown enormously thanks to technological advances that have streamlined means of payment, distance negotiations, insurance, etc. Also, due to the growth of treaties and free trade agreements signed between countries and companies worldwide.

In the last decades of the 20th century, the term sustainable development began to gain strength, due to the global concern for the search for economic and social development that, in turn, has an impact on nature. (Gómez Gutiérrez, 2015). It acquired great relevance, due to its magnitude and extension, because of the problems caused by the actions of the human being to achieve the growth of the economy and generate profits without measure, which causes unsustainable production and consumption. As a result, there is an increase in the effects of climate change and pollution, in addition to other negative environmental impacts, as evidenced by the droughts, floods, loss of biodiversity, depletion of arable land and shortage of drinking water that have been witnessed. Due to the seriousness of these problems, which endanger the present and future of the planet, including the permanence of human beings, awareness was raised worldwide; within the framework of the United Nations, the Commission on Development and Environment was created in 1983 with the need for development based on equity, with changes in production and consumption patterns. In April 1987, a report entitled "Our Common Future" was published introducing the term sustainable development:

“It is in the hands of humanity to ensure that development is sustainable, i.e. to ensure that it meets the needs of the present without compromising the ability of future generations to meet their own needs”. (Brundtland, 1987)

In order to achieve sustainable development, goals were proposed based on three essential aspects: social, economic and environmental. Several countries created ministries and institutions to promote these issues in order to achieve these goals.

The United Nations organization promoted some global purposes, which after the rise of the Millennium Development Goals (MDGs) consisting of 8 purposes that were agreed to be achieved by 2015 among the member countries of the UN, after expiring, were replaced by 17 "Sustainable Development Goals" that "world leaders adopted a set of global goals to eradicate poverty, protect the planet and ensure prosperity for all as part of a new sustainable development agenda"; It is worth noting that goal number 12 refers to "Responsible

production and consumption, which consists of doing more and better with less". (ONU, 2015)

A new "green" philosophy has emerged in order to minimize environmental impacts. Due to the focus on responsible production and consumption, logistics has acquired this philosophy, since it is based on the fact that all activities such as raw material purchases, production, storage, packaging, distribution and transportation are clean and environmentally friendly from the beginning; additionally, green logistics helps to make efficient and rational use of resources.

The advent of globalization, the development of environmental awareness, new technologies and increased consumer demands cause greater force to implement the circular economy, where it is proposed to change the linear economic model that has been running. Therefore, the main objective is to design without waste and pollution, to use renewable raw materials and to regenerate ecosystems where long-lasting products with extended shelf life are used and where packaging plays an essential role. (Gaviria, Morales, & Osorio, 2020)

The development of the sustainable economy of each country and companies seek opportunities for expansion in international markets, so they propose new strategies with the idea of reaching with corporate social responsibility to positively impact all stakeholders both internal and external, this generates a more responsible company with society and the environment causing it to be more valued in international trade.

Economics has been trying for many years to explain the competitiveness factors of countries and their companies, which is why several theories have emerged, of which the most relevant ones are mentioned below to understand the reasons for trade between nations, its impacts and its different implications and how it positively affected the research.

Competitive advantage was taken as a reference theory for the development of the research work, in which there is a unique and sustainable advantage over competitors, such advantage allows obtaining better results, therefore, having a superior position in the market. This refers



to the skill that a country, company or person develops over time, since applying this advantage improves the brand vision and positions the company in the market as a reference of good practices, optimizing the use of resources. In addition, it provides a differentiation due to the characteristics of the materials used in the packaging that will be discussed in this work, these packages generate a positive impact on the environment and will be attractive to conscious consumers.

Adam Smith's absolute advantage indicated that countries should focus on the production of goods for which they have an absolute advantage, in addition, he openly attacked international trade controls and fought against the imposition of high tariffs, monopolies and prohibitions of the period. On the other hand, David Ricardo's comparative theory also emerged, in which costs are relative, since a country should specialize in those goods and services that it can produce more efficiently and acquire from other countries those that it produces less efficiently, therefore the theories were used in the research to identify, value and take advantage of Colombia's existing agricultural riches, thus promoting the manufacture and distribution of compostable packaging in the European market.

## **1.2. Conceptual framework**

To understand this research it is necessary to specify some concepts and take into account the different packaging that may exist in international trade throughout its distribution chain, from the primary packaging where the product is contained and protected, the secondary packaging that seeks to protect the product for its commercial distribution and finally the tertiary packaging which groups the primary and secondary packaging in a container that unifies them for transportation (Legis, s.f.). In addition, the types of packaging that are adapted to the needs of international trade are analyzed, as consumers are increasingly looking for more sustainable products.

For the understanding of this research, it is also necessary to define packaging and packaging designs, highlighting their differences, starting with compostable products, which can decompose biologically by the action of organisms, thus producing water, biomass and

organic compounds in a controlled period of time. Compostability is one of the most interesting concepts for sustainability, since it manages the end of the product's useful life, while biodegradable materials can decompose into natural chemical elements by the action of biological agents, such as the sun, water, bacteria, plants or animals. It can be said that all compostable materials are biodegradable, but not all biodegradable materials are compostable. (Gaviria, Morales, & Osorio, 2020)

It is also important to highlight the difference between recyclable and reusable. Recyclable products are products that undergo recycling processes to return to the initial life cycle and generate a new one; when products do not have to undergo this type of procedure, they are reusable products.

Currently, compostable packaging types dominate the plastics market in Europe, where two-thirds of all products made from this material are bags, so demand is expected to grow significantly in that market. (Redacción Interempresas, 2016)

### **1.3. Legal framework**

The following Colombian decrees and resolutions related to the project will help to contextualize them and to understand how packaging is being handled in the industrial sector, especially those produced with plastic, and to realize the advantages that environmentally friendly packaging has at the national level and what advantages it could have in international trade.

**Decree 640 of 2018 amending Decree 1625 of 2016 Sole Regulatory Decree on Tax Matters** (República de Colombia. Presidencia de la República, 2018)

In this decree there is section 1.3.2.1.16 which talks about the tax instrument of the Sales Tax (VAT) which is applied on the sales of waste, waste and scrap plastics for recycling which are specified in the NANDINA 39.15 nomenclature, this tax is caused when this type of products are sold to companies engaged in the production of basic chemical products and chemical substances that are used for the creation of plastic products in primary form, the

manufacture of plastic products not previously qualified and the production of synthetic and artificial fibers, the aforementioned article is denominated as "Sales Tax Withholding - VAT for sale of plastic waste for recycling (waste and scrap).

In many countries these types of decrees are in force, and if they are not, it is because they have banned plastic, this is a sign of how governments and society are becoming more conscious when it comes to consumption, in this case it applies to packaging produced with plastic.

These small changes are the steps of a new global consumer trend, opening more and more doors to the implementation of ecofriendly packaging in commerce.

**Decree 2198 of 2017 "Consumption tax on plastic bags"** (República de Colombia. Presidencia de la República, 2017)

This decree specifies the differential rates of the National Consumption Tax on Plastic Bags, plastic bags that offer environmental solutions have differential rates of 0%, 25%, 50% or 75% of the full value of the rate, provided that compliance with the requirements is given. This is done with the idea of discouraging the use of plastic bags with this reduce the environmental impacts caused by them, since 2017 which was when this decree was implemented, innovations began to be noticed much more, by implementing environmentally friendly packaging, it is considered that this generates a change of mentality in the Colombian packaging manufacturing companies, in the not too distant future, thanks to the natural resources that the country has and thanks to the consumption trends, these types of ecofriendly packaging will have greater national consumption allowing to enter foreign trade more easily.

**Resolution 1407 of 2018** (República de Colombia. Ministerio de Ambiente y Desarrollo Sostenible, 2018)

The Colombian Ministry of Environment and Sustainable Development establishes resolution 1407 of 2018 *"by which it regulates on the environmental management of packaging and packaging waste of paper, cardboard, plastic, glass and metal"* which aims

*to make use of and manage the waste of these materials, which they discard after use."*  
According to (Ministerio de ambiente y desarrollo sostenible, 2018)

"In Colombia, the relevance of the packaging sector is high, as it has become an important consumer of raw materials and intermediate processes of very large, complex production chains that are representative of the national economic dynamics. It is estimated that 60% of the demand for containers and packaging is mainly concentrated in the beverage, pharmaceutical, food and cosmetics industries".

It is no secret that waste derived from industrial processes are those that have more negative components in the environment, it can be seen how from this resolution the scope of waste management and utilization of these is noted, in this case in which the packaging is in high demand, hence the importance at social and environmental level of ecofriendly packaging globally.

**Resolution 683 of 2012** (República de Colombia. Ministra de Salud y Protección Social, 2012)

Resolution 683 of 2012 "Whereby the Technical Regulation on the sanitary requirements to be met by materials, objects, containers and equipment intended to come into contact with food and beverages for human consumption is issued" establishes in Article 7 the requirements for the use of recycled and reused materials.

### **Resolution 834 of 2013**

It talks about "the technical regulation on the sanitary requirements to be met by cellulosic materials, objects, containers and equipment and their additives, intended to come into contact with food and beverages for human consumption" it is important to note that the objective of this resolution is "Article 1. The objective of this resolution is to establish the technical regulation, through which the sanitary requirements to be met by cellulosic materials, objects, containers and equipment and their additives, intended to come into contact with food and beverages for human consumption, in order to protect human health and prevent practices that may mislead or deceive consumers." (Ministerio de salud y protección social, 2013)

## **International technical standards**

There are international regulations governing eco-labels and environmental declarations, as mentioned in the labeling guide for containers and packaging by (Ecoembes, 2018) in which ISO created the following standards:

ISO 14020 contains general principles on eco-labels and environmental declarations.

ISO 14021 consists of controlling environmental indications corresponding to the logo, labeling and text used by the packer or producer, which express the product's life cycle or specifications of being recyclable, compostable or biodegradable, etc.

ISO 14024 refers to type I environmental labeling corresponding to voluntary qualification and certification, in strict compliance with the environmental criteria established, which therefore officially indicates and gives veracity to certain services or products by measuring their level of impact on the environment considering their life cycle.

ISO 14025 bases type III environmental labeling on indications and procedures, which, compared to type I environmental labeling, do not impose minimum criteria to be met. Therefore, this regulation provides quantitative environmental information taking into account different standards.

## **2. Methodology**

A documentary research was conducted, analyzing the implementation of compostable packaging produced in Colombia for export to the European Union, so we want to broaden and deepen the knowledge about these types of packaging by performing an analysis of information, content classification and applying methods in research such as inductive, since it will start from the analysis of the facts and factors that have led society to begin with the implementation of compostable packaging in the daily life of consumers, their relevance and potential in the European market was investigated with this could determine the possible demand.

Due to the type of research, the technique used will be documentary analysis and content analysis; this work will be supported by means of instruments for collecting information from secondary sources, mainly from data published and disseminated by printed and digital media by public and private entities and reference to previous works such as research or thesis, by means of the above, bibliographic cards will be made, since they help to identify and summarize the documents to be examined to write the thesis.

Considering the above, it is delimited to an innovative product, which is at the forefront with the current global megatrends and how Colombian companies can contribute to positively impact the care of the planet. It should be noted that the trend is recent, it has been around for about five years and is being implemented more and more.

In this sense, this research focused mainly on the progress of the adaptation of compostable packaging produced in Colombia and the possible demand in the European Union, helping to identify its exportable supply, determining the characteristics, requirements, opportunities, strengths and weaknesses that provide opportunities to enter the international market.

### **3. Results and/or Findings**

#### **3.1. European regulations for compostable packaging.**

In the processes of the entire supply chain from production to service, before finally being consumed, food products come into contact with a variety of substances, articles and materials, these according to the European Union are defined as food contact materials (FCM). Examples include food processing machinery; food transport containers; packaging and packing materials; kitchen equipment, cutlery and crockery. Materials in contact with food must meet certain requirements, such as their components, so that they do not have a negative impact on the health of consumers and do not alter the ideal condition of the food.. (Unión Europea, 2015)

Given the importance of food safety, which provides measures to ensure food safety, i.e., that it is healthy, hygienic and safe, it has become the focus of attention of food industries throughout the supply chain, in addition to ensuring the quality and safety of the packaging for these products and helping to preserve the food.

The European Union (EU) legislation on food contact materials aims to "protect the health of consumers" and "ensure the effective functioning of the internal market" (Unión Europea, 2015). In fact, to ensure the safety of FCMs so that they do not raise safety concerns, change the composition of food in an unacceptable way or have adverse effects on the taste and/or smell of food; and to promote flexibility in the marketing and transit of goods in the European Union, there are legal requirements, rules and regulations set out in EU legislation with which commercial operators must comply (the natural <sup>5</sup> or legal <sup>6</sup> persons, natural or legal persons are responsible for ensuring that the requirements of Regulation (EC) No 1935/2004 are met within the company under their control).

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<sup>5</sup> Natural persons are defined as any human being who possesses obligations and rights granted by the Law or the Constitution, who is competent to exercise professional or business activities, purchase goods, etc. (González, 2021)

<sup>6</sup> Legal Persons, refers to an entity "with legal existence, formed by a person or an organization, established by public deeds, where all the rules, rights and obligations it owns will be specified". (González, 2021)

“EU standards on food contact materials may be general in scope, i.e. apply to all food contact materials or apply only to specific materials. EU legislation may be supplemented by national legislation in the Member States if no specific EU standards exist.” (Unión Europea, 2015)

Therefore, according to the general regulations, Regulation (EC) No. 1935/2004 establishes a number of principles in which requires that the materials must not:

- Harmful to the consumer's health due to the release of their components.
- Alter the taste, smell and constitution of the food that transgresses the nature of the product.

Likewise, the framework establishes:

- Special regulations on active and intelligent materials.
- Ability to promote new strategies in the EU concerning specific materials, for example, for plastics.
- With the intervention of the European Food Safety Authority, they carry out inspections to ensure the safety of substances used in the production of food contact materials.
- Requirements for labels specifying the handling of materials and their relationship to food, taking into account the appropriate symbol.
- Documentation of compliance and traceability (Comisión Europea, 2015)

According to new consumption patterns, the incorporation of innovative materials and technologies has generated changes in the regulatory framework, in addition to environmental concerns. "At a global level, responsible consumption practices, the implementation of strategies to reduce the impact on the environment and, in general, an increase in awareness of the use of certain materials in multiple industries and production chains have become relevant". (CONNECT, 2020)

The European Union promotes organic production for sustainable development, which is considered as a general procedure, in which agricultural management and food production is



carried out based on good management to positively impact the environment and climate; applying standards that help the conservation of natural resources, biodiversity and increase good development in production, taking into account consumer demand for products from natural materials, substances and processes. Likewise, it focuses on two important social areas, first, to satisfy the need for consumption of ecological products and, secondly, it provides that these contribute to the conservation of fauna, flora, rural development and, in general, to the care of the environment. (Unión Europea, 2020)

Likewise, the EU on organic production refers to a procedure in agricultural production that contributes to the corresponding environmental scope of producers (farmers and aquaculture), however, on this issue also cover a whole segment of the industry, including from the supply of raw materials, treatment and transition, food production, distribution and marketing to the final consumer. In the European Union there are standards that regulate organic production, linked to supervision and certification procedures.

Due to the continuous increase in demand, it cannot be satisfied only by manufacturing in Europe, but they resort to the import of environmentally friendly products, bearing in mind that they must comply with similar or equal procedures and standards among the countries involved. (Weissenberger, 2015)

For this reason, the EU production regulations also regulate products that are made from a variety of agricultural raw materials or processed agricultural products that are intended to be used for human consumption. It also defines the concept of an organic product as a product derived from organic production; products from fishing and hunting of wild animals are not considered organic products. (Unión Europea, 2020)

On the basis of Regulation (EC) No. 834/2007 on organic production and labelling of organic products, which came into force on 1 January 2009, a number of initiatives to promote organic farming have been established within the framework of the regulation. This regulation regulates agricultural products which are intended for human consumption and which have not been modified or processed. Furthermore, in this regulation, the European

Union (2018) also states that it is possible to import organic products, as long as they can meet the requirements, regulations and have undergone verification. These verifications and controls are carried out by a body authorized by the EU or accredited by it.

Corresponding to the Regulation of the European Parliament and of the Council (EU) 2018/848, concerning organic production and for organic product labels, by which Council Regulation (EC) No 834/2007 was repealed, it refers to the applicable principles and rules established for organic production, to the corresponding certificates and to the use of advertising and labels concerning organic production. According to Annex I of this regulation, its scope of applicability is for products that are related to agriculture, when they are manufactured, processed, distributed, marketed, exported or are going to be exported; or when they are imported into the European Union.

Therefore, it is worth highlighting Chapter VII of Regulation (EU) 2018/848, which deals with trade with third countries, in which Article 45 refers to imports of organic and in-conversion products, in which it is mentioned that:

Subject to the following conditions, a product may be imported for placing on the market in the European Union, taking into account that:

1. Be the product as defined in the concept referred to in paragraph 1 of Article 2<sup>7</sup>;
2. Compliance with some of these conditions:
  - According to this regulation, it stipulates in chapters II, III and IV that the product must comply with what is indicated in these, in addition to which, both the operators mentioned in article 36, including exporters from countries that are not part of the European Union, must undergo verification, inspection and controls by the entities accredited or authorized by the EU in accordance with article 46; once the controls are passed and the regulations are complied with, these entities will grant these operators and exporters a certificate confirming their compliance.

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<sup>7</sup>According to Regulation (EU) 2018/848, referring to Article 2, paragraph 1. The scope of application corresponds to products originating from and derived from agriculture, including beekeeping and aquaculture, when these products are labelled, placed on the market, exported from the Union or imported into the European Union. (Unión Europea, 2020)

- The product must comply with the requirements established in the trade agreement between the European Union and the third country from which it originates, with the understanding that the latter must have production procedures that are in line with the aims, objectives and purpose of the Union's regulations, which guarantee compliance.
- If the product originates from a country that is not part of the European Union that has the recognition of conformity with article 48, the product must comply with the stipulated regulations of the foreign country on production and controls, which, consequently, is imported into the European Union with the inspection certification issued by accredited or authorized entities for such controls in the foreign country, in which it is guaranteed that it complies with the regulations.

3. Both EU and non-EU countries may, at any time, provide national authorities and importers with data that will help to inform and identify the operators that are established as their suppliers, and that will also help the authorities in charge of controls to identify these operators, in order to ensure the traceability of organic products. This information will also be available to the control bodies of the importers. (Unión Europea, 2020)

The European Union (EU), in order to provide clearer information to consumers throughout the EU market, established in this regulation the organic production logo of the European Union, which must be compulsory on all packaged organic foods produced in the EU. When this logo is used, the location from which the agricultural raw materials from which the product was made were extracted must be indicated, and it must be in the same space where the logo is displayed. The implementation of the logo may be used for educational and informative purposes. Also, private and national logos may be implemented on labels, both in advertising and presentation of all products that apply to what is stipulated in the regulation (EU) 2018/848.

The use of this logo shall be voluntary for imported organic products from third countries



Source: (European Union, 2018)

According to Chapter V on certification, the certification system is in Article 34 which relates to the following:

- Before launching an in-conversion or organic product into trade, persons listed in Article 36, who are operators producing, preparing, distributing or storing in-conversion or organic products and which are brought or intended to be exported to third countries or perhaps to be traded, must inform, as the company must be subject to the control system, that for this reason there must be a competent authority carrying out the procedures and must be aware of the situation.
- Operators must report to the competent authority as stipulated in the previous paragraph, they must be clear about their role, tasks and responsibilities, for that reason they will be in charge of verifying whether the process guideline complies with what is stipulated in the regulation and whether they can grant the certificate referred to in Article 35 (1).

Regulation (EU) 2018/848 at the time of consultation was in force from 1 January 2021.

On the other hand, the European Union also implements measures in order to make progress on the impact of packaging and on the management of packaging waste in the European territory, to improve the management of packaging and thus lead to the protection, preservation and improvement of the quality of the environment, as well as to protect human health and the rational use of natural resources, and to promote the transition to the circular economy, in which Europe is a pioneer in this field. Therefore, it is public on 30 May 2018 that directive 2018/852 will amend directive 94/62/EC on packaging and packaging waste, which is in force as of 4 July 2018, on specific requirements on the manufacture and composition of packaging (Unión Europea, 2018) indicate that:

- Packaging products should be produced in such a way that the weight and volume is kept to a minimum to avoid breaching the level of safety and hygiene, as well as to regulate the quantity packaged and to increase consumer acceptance.
- Packaging should be constructed, designed and marketed, but with the aim that it can be recycled, reused, etc. The important thing is that it does not create a harmful impact on the environment and that if it does it should be as minimal as possible in the waste management of the packaging when it is no longer used.
- Packaging or containers should be constructed in such a way that any type of material or substance that creates damage to the environment by its composition and generates emissions, leachate that is generated by landfilling of containers or by leftovers after waste management or that generates ash should have its impact reduced as much as possible.

In addition, specific requirements are laid down in the specific requirements applicable to recyclable packaging:

- Compostable packaging must be biodegradable to facilitate the composting process and not affect the waste management process to which it is subjected, nor hinder the separate collection of the packaging.
- Biodegradable packaging must have certain characteristics which must be met in order to be able to decompose mostly with water, biomass and carbon dioxide, but for this the packaging must undergo chemical, biological, physical or thermal decomposition.

It is worth mentioning that the sustainable growth of the bioeconomy is important for the European Union (EU) because they consider that it will contribute to reducing the EU's dependence on imported raw materials. In addition, they stress that biodegradable compostable packaging and recyclable packaging of biological origin can represent an opportunity to promote the manufacture of packaging with the implementation of renewable sources, showing its usefulness in the life cycle.

There is a regulation that talks about the requirements that containers and packaging must comply with in their composting and biodegradation process, where the conditions that a

material must have to be considered compostable and its recycling and biodegradation process are evaluated, these conditions are analyzed through an organic assessment that determines the digestion and anaerobic composting, at the end of this process an opinion is given for the final acceptance of the packaging or container, this regulation is harmonized by the European Committee for Standardization and its name is EN 13432 on Containers and packaging. (Unión Europea, 2015).

According to this standard, the term compostable refers to all the rules related to the toxicity that a decomposed material may present if left in the environment.

In addition, according to EN 13432, the following characteristics must be met in order to be defined as a compostable material:

- The degradation time must be at least 90% within 6 months, if exposed to a carbon dioxide rich environment, the above values are tested through the standard method EN 14046 (also called ISO 14855).
- After 3 months of the mass being in contact with organic components, the mass of the material must constitute at least 90% of fragments with dimensions less than 2mm, the above values must be tested through the standard method EN 14045.
- The component must not have negative consequences on the composting process.
- The material must have a low concentration of heavy incorporated materials.
- The pH values must comply with and be within the established limits.
- The salt content of the materials must be within the established limits.
- The density of volatile solids must be within the established limits.
- Nitrogen, phosphorus, magnesium and potassium levels must not exceed established limits. (Ecozema s.r.l., 2021)


Moreover, in seeking to provide information related to the nature of the product to end consumers as to facilitate its marketing and increase credibility. In packaging and/or packaging may have different types of environmental seals that certify a product, which comply with environmental and other regulations.



TÜV are bodies originating in Germany that are responsible for inspection and certification, have a presence in Colombia and other countries of the world, which is responsible for ensuring that the inspection standards that can be applied to such products, services and processes are met to ensure quality and safety to generate credibility TÜV Austria is one of those authorized certification bodies, which aims through certification to provide an instrument for the market of bioplastics and compostable, bio-based and biodegradable products, being an independent agent applies the same rule for all.

For packaging, products or containers that comply with EN 13432. TÜV Austria can grant labels that guarantee biodegradability and/or compostability, this organism indicates that the composting process helps to reduce in a relevant way the amount of waste and organic waste, thanks to the fact that the compost produced can be used for agricultural and horticultural purposes, approximately 50% of domestic waste contains organic material, a percentage that is increasing due to the trend of products such as biodegradable plates, containers, packaging and other biodegradable products. (TÜV Austria Belgica, 2017)

Among the certificates of the TÜV Austria, it can award a label according to the characteristics of the product, container or packaging according to the fulfilment of technical requirements; among these logos are:

**Table 1. Certifications guaranteeing the compostability of products.**

Name	Label	Description
OK Compost industrial		Products with the "OK Compost Industrial" certification or label ensure that they are biodegradable products in an industrial composting facility. Based on the EN-13432:2000 standard, all their components, additives and inks are certified, as they are governed by

		<p>this standard, products with the OK Compost Industrial label certify that they comply with the requirements established in the European directive on packaging and packaging. (TÜV Austria Belgica, 2017)</p>
Seedling		<p>It is a certification body accredited by European Bioplastics and can therefore award the Seedling logo or seal to products that meet all the requirements set out in EN 13432. Products with TÜV Austria certification are recognised in the European market for their compostable products. (TÜV Austria Belgica, 2017)</p>
OK compost HOME		<p>Ok compost Home is a certification based on all the technical conditions that a product must have to be compostable, in this case home composting is a more extensive and difficult process as it is done in a slower way due to the volume of waste involved, the Ok compost Home seal guarantees the biodegradability of the home compost. (TÜV Austria Belgica, 2017)</p>

Source: own elaboration



Other international standards, related to biodegradability and compostability can be found:

- International Standard ISO 14855: Where the final aerobic biodegradability of plastic materials is determined under controlled composting conditions, in this method the variables are analyzed according to the analysis of carbon dioxide generated.
- International Standard ISO 17088: Specifications for compostable plastics.
- International Standard ISO 16929: In which the degree of disintegration of plastic materials is determined under defined composting conditions in a pilot-scale test.

## **3.2. Compostable packaging supply in Europe and worldwide**

### **3.2.1. European suppliers**

The European Environment Agency mentions the importance of reducing plastic waste as it is increasing, with reduction and prevention being the priority, where it seeks to create new alternatives and use plastic products in a circular way, ensuring that they will be recycled on a larger scale than is currently the case. (Reichel, 2020).

Due to the change in the thinking of consumers and their governments, a new ideal was generated in the processes of the plastic industries in order to adapt, generating changes in the desire to create or use different raw materials for the production of packaging based on maize, potato, cassava, etc., replacing plastic with materials from renewable sources.

In the following, you can see the offer of compostable packaging found in the four countries with the highest interest in Europe due to their market, population, etc., namely Spain, France, Germany and Italy. In it, you will find a summary description of the products available, the channels, the approximate sales prices and if they have promotion strategies.

**Table 2. Companies producing compostable packaging in Europe**

<b>Countries</b>	<b>Company name</b>	<b>Products offered</b>	<b>Sales channels</b>	<b>Selling prices</b>	<b>Promotion strategies</b>
<b>Spain</b>	<p>PRODUCTS 3B S.L (Take away)</p> <p>(PRODUCTO S 3B S.L., 2021)</p>	<p>Containers with lids, menu holders, gravy boats, and compostable bowls made from bamboo fiber, wheat, sugar cane, 70% recycled plastic bags.</p>	<p>Virtual and point of sale in Barcelona</p>	<p>Packing units from 50 units and upwards with prices ranging from 50 euros and upwards</p>	<p>They do not have promotions, but it is important to note that they have very attractive catalogues for consumers.</p>
	<p>ECOOLOGIC.COM</p> <p>(ECOOLOGIC, 2021)</p>	<p>Compostable bags, bowls, cups, sugar sachet packaging, and compostable cutlery: sugar cane and bamboo fibre or polylactic acid (PLA) bags derived from corn or</p>	<p>Virtual, shipments in 76 to 92 hours</p>	<p>Packing units from 2000 up to 12 units with prices from 39.83 euros and upwards</p>	<p>Promotions such as:</p> <ul style="list-style-type: none"> <li>• Free shipping on purchases from 360 euros onwards</li> <li>• 5% discount on the first purchase</li> </ul>

		other vegetables.			
	ALTES/ENVASES ECOPACKAGING  (Altes/ envases ecopackaging, 2021)	Plates, saucepans, cups, bowls, sauce pans, compostable	On-site and Virtual 24-48 hours delivery	Packing units from 50 and upwards and prices ranging from 16.76 euros and upwards.	Promotions such as: <ul style="list-style-type: none"> <li>• Free shipping on purchases of 59 euros</li> <li>• 5 euros discount on the first purchase</li> </ul>
<b>Germany</b>	LEAF REPUBLIC  (Leaf Republic by Pedram Zolgadri, 2016)  (ANDINA PACK , 2021)	They make plates from wild leaves from Asia and South America in three different sizes: 18 cm, 21 cm, and 25 cm. It is an enterprise of two German people.	Virtual and go to trade fairs, they also sell in some supermarkets in Germany.	Packing units from 1 onwards price 5,99 Euro.	They don't have promotions; through Instagram they help people to be more aware of the use of plastic and that is a way to offer their products.
	BIO4PACK	It is a specialist in	Virtual and sales points	They do not specify prices	They don't specify if they give

	<p>_(BIO4PACK, 2021)</p>	<p>the field of sustainable compostable packaging, selling starch bags, laminated films, saucepan, trays, cups, PLA tubs.</p>		<p>on their pages, but their sales, payment and delivery policies state that payment must be made in euros.</p>	<p>promotions, but they have a very complete website, additional they go to fairs.</p>
	<p>GREENBOX (GREENBOX, 2021)</p>	<p>Glassine bags (natural cellulose, resists grease), bowls, boxes, sugar cane jars and lids, cups, PLA bags, palm leaf trays... all of this makes them compostable products.</p>	<p>Onsite and virtual deliveries take 1-3 days.</p>	<p>6.90 euros for shipping. The prices of the products range from 40 euros and upwards.</p>	<p>Promotions such as:</p> <ul style="list-style-type: none"> <li>• Free shipping on purchases of 200 euros</li> <li>• Discount on some products</li> <li>• Catalogue sales</li> </ul>
	<p>BIO4EXPO (BIO4EXPO, n.d.)</p>	<p>Compostable cups, plates, cutlery, lids, pots, as they are made of materials</p>	<p>Virtual and on-site.</p>	<p>They don't show their prices</p>	<p>Promotions: not specified.</p> <ul style="list-style-type: none"> <li>• They have an interesting</li> </ul>

<b>Italy</b>		such as bamboo and sugar cane.			website for their consumers
	ECOZEMA  (ECOZEMA, 2021)	Bags, cutlery, plates and trays, containers, cups, tubs are compostable and their raw materials come from cellulose pulp from plant bagasse, sugar cane or corn starch biopolymers.	Virtual and on-site.	Packing units from 50 pieces upwards, the price ranges from 3,99 Euro upwards.	Promotions: <ul style="list-style-type: none"> <li>• Catalogue sales</li> <li>• Attractive website and social media</li> <li>• Cheaper prices when buying larger quantities</li> </ul>
	GOPACKBIO  (GOPACKBIO, 2021)	Sushi trays, plates and trays, compostable bags and cups made from bamboo pulp	Virtual and on-site.	Packing units from 25 and upwards, prices are not shown.	Promotions: not specified <ul style="list-style-type: none"> <li>• They have a catalogue</li> <li>• Web page</li> </ul>
	MONOUSO  (MONOUSO, 2021)	Compostable plates, bowls, trays, bags, cutlery made from sugar	Virtual and on-site.	Immediate dispatch.  Packing units from 8	Promotions: <ul style="list-style-type: none"> <li>• Best price online</li> <li>• 40% discount if</li> </ul>

<b>France</b>		cane, palm leaves, wheat, chinet pulp, wood.		upwards, with prices ranging from 1, 20 Euro upwards.	you register on the site <ul style="list-style-type: none"> <li>- Best price according to quantities</li> </ul>
	UNIKECO (UNIKECO, 2021)	Compostable plates, cups, cutlery, bowls, pots, dessert cups, salad bowls in PLA (corn starch) and palm ramekin.	Virtual and on-site.	Packing units from 100 and upwards, with prices ranging from 20 euros and upwards.	Promotion: <ul style="list-style-type: none"> <li>• Free delivery on purchases over 200 euros</li> <li>• 10% discount on products</li> </ul>
	CELLULOPACK (CELLULOPACK, 2021)	Trays, cup holders, wine or liquor boxes, egg cartons, cups, compostable plates as they are made of	Virtual and on-site.	Their prices are not specified.	Promotion: not specified <ul style="list-style-type: none"> <li>• It is important to note that they make new developments giving</li> </ul>

		paper pulp (molded cellulose).			you a plus as a company. • Web page
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Source: own elaboration <sup>8</sup>

Companies selling compostable packaging in Europe were investigated and found to have a market that is becoming stronger over time due to the awareness of people and the emergence of a circular economy, as consequence packaging material industries are starting to look for ways to adapt to the emerging ecofriendly market.

The companies presented in table 2 have already adapted or are responding to this trend, and have in common many of their raw materials, packaging units and prices.

These companies are establishing their brand, in other words, they are not globally recognized companies, which means that for the time being there is competition on a level playing field in Europe. The fact that there is competition along the same lines helps the companies to emerge in the same way, with similar technological resources and similar packaging, etc. An important point was found since the result of this research showed that there are not so many compostable packaging companies in these countries and that finding their information at a global level is not easy, this helps to open doors for Colombia in the European market.

Colombia has a wide agricultural wealth that facilitates the production of these products and allows them to create new product developments due to the diversity of agriculture and agronomy. By implementing quality advertising and the requirements of the European Union, they can become potential suppliers to the industry producing compostable packaging for the food sector that is manufactured in Colombia. Most of the packaging companies in

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<sup>8</sup> For the creation of table 2, the marketing mix or commercial mix was taken into account as a theoretical and methodological reference point.

the EU sell biodegradable products, which means that they want to start adapting to the new trend. If Colombia offers its compostable packaging to these companies, it will open up a large market niche throughout Europe.

### **3.2.2. International suppliers**

An analysis of the existing export offer was carried out and it was found that some countries such as the United States, Panama, Costa Rica, Peru and Mexico have companies that manufacture and export bags, some of which are mentioned below, as well as the main characteristics of their products, the certifications they have and the countries to which they are exporting.

Grupo Galaxys is a company located in Panama, they are manufacturers and suppliers of compostable and biodegradable products, their main products are 100% compostable and biodegradable with modified resins for different applications. The company has certificates of conformity where it is verified that the packaging is compostable, the company manufactures all types of shopping bags, rubbish bags, non-woven bags, mulch films, plates for seedlings, straws, cutlery, among others. (Grupo Galaxy Internacional S.A, 2019)

Eco Sunrise is a Costa Rican brand dedicated to the manufacture of products 100% friendly to the planet, its main raw material is cane bagasse with bamboo, polylactic acid from plants and corn waste, has certifications that support the manufacturing processes and raw materials of the products. The company has international clients such as Walmart and Burger King. (Ecosunrise Global Company, 2021)

In the United States, the company AMS compostable is a world leader in the category of compostable disposables, working with UN agencies and private companies to reduce plastic consumption and lead the market with environmentally friendly solutions. (AMS, 2021)

In the case of Mexico, we found the company PlastiBIO, which offers not only bags but also food containers, spoons, knives, straws and compostable cups, a company that expands the



offer of compostable products, and the company compost packing, which is a commercial partner of the company AMS compostable. (Compost Packing, 2021)

In Latin America, the company "Peruvian bioproducts S.A.C." in Peru also manufactures compostable bags as well as compostable stretch film used as adhesive wrapping for food and paper film to protect objects from scratches. (Bioproductos Perú, 2021)

When studying the companies that offer compostable products, it was found that few of them are exporting worldwide, although compostable products have been well accepted in other markets in more advanced countries, as the law prohibits the use of plastic bags in everyday life. In addition, it was observed that many of these companies have focused their offer on products for the food sector, adding innovative products such as knives, cups, containers, among others, to complement their catalogue and be more competitive in the international market.


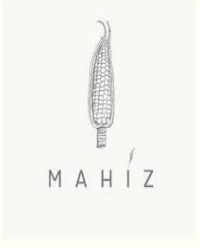
Colombia could easily adapt to the demands of the international market, given the importance given by these companies to showcasing agricultural raw materials, becoming certified in the relevant standards and entering the compostable packaging market for the food industry, which is not as saturated as others where the country has tried to make inroads.




### **3.3 Potential Colombian packaging export supply**


The potential Colombian export supply was identified and the following companies were found:

**Tabla 3. Colombian companies with compostable packaging on offer**


<b>Name of the company</b>	<b>Products offered</b>	<b>Sales channels</b>	<b>Selling prices</b>	<b>Promotion strategies</b>
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<p><b>Uman</b></p>  <p>Medellín Antioquia</p> <p>(UMAN , 2020)</p>	<p>Cups, lids, bowls, dip packs, portioners, spoons, cutlery, popsicle sticks.</p> <p>They use different raw materials in their transparent line (polylactic acid), white line (sugar cane) and paper line (sugar starch).</p>	<p>Online sales, Whatsapp sales</p>	<p>Units from 104 pesos to \$1.400 COP and packs of 50 units from \$5.200 COP to \$50.000 COP.</p>	<p>They have an extensive sales catalogue with innovative products to meet the needs of customers, they also personalise cups and bowls, in some lines for purchases over a thousand units they mark the container in one ink free of charge.</p>
<p><b>Mahíz Biopack</b></p>  <p>Medellín Antioquia</p>	<p>Corn-based bags, ecommerce packaging.</p>	<p>Sales via Instagram, Whatsapp and Facebook</p>	<p>Prices: unit \$33.500 COP, they have customers like (Justo y bueno, Naf Naf, among other Colombian brands) that buy high quantities and that depends on their final value.</p>	<p>In their catalogue they reaffirm the various uses that can be given to the bags such as rubbish bags, packaging, among others, they personalise the bags with ink printing.</p>

<p><b>Interecológicas</b></p>  <p>Valle del Cauca (Interecológicas Colombia, 2021)</p>	<p>Maize starch-based bags and packaging and maize starch-based biodegradable disposables</p>	<p>Sales by Whatsapp and website.</p>	<p>Prices subject to quotation according to product and measurements.</p>	<p>Bags in different shapes (roll, oval, T-shirt die-cut, among others) and with personalisation if requested by the customer.</p>
<p><b>CompostPack</b></p>  <p>Bogotá (Compostpack, 2021)</p>	<p>Compostable bags and compostable resins.</p>	<p>Sales by Whatsapp and website.</p>	<p>Products from \$22.00 COP to \$175.000 COP</p>	<p>They have a catalogue of bags for different uses and needs such as home, office, garden, waste, pets, with handle among others.</p>
<p><b>Alphaflex</b></p>  <p>Bogotá</p>	<p>Bags, food packaging, sacks, baskets, ties and gloves.</p>	<p>Social networks and websites.</p>	<p>Price subject to quotation depending on product, dimensions and quantity.</p>	<p>The company Alphaflex is a pioneer in the manufacture of this type of bags in Colombia and its catalogue is adjusted to the needs of the client (food, home,</p>

(Alphaflex, 2021)				transport, bakery, among others).
<b>Ekuox</b>  Cali (Ekuox, 2021)	Bags, bathroom litter bin, ultra resistant bags	Social networks and website	Precios unitarios desde \$1,500 COP hasta \$4,700 COP y en Kits desde \$25,000 COP hasta \$45,000 COP	Unit prices from \$1,500 COP to \$4,700 COP and in Kits from \$25,000 COP to \$45,000 COP.
<b>Acelflex / Natpacking</b>  Cali (Natpacking, 2021)	100% organic, biodegradable cassava starch bags are compostable in natural environments and are water soluble. Non-toxic	Website, social networks and Whatsapp	Pack of 30 or 100 bags from \$5,350 COP to \$28,560 COP, depending on size, colour and presentation.	They offer bags for all types of use, packaging and transporting food preferably dry, semi-dry or as secondary packaging; and also, according to the quantity and volume they can make to order and in the colours, calibres and sizes required. Additionally, they promote and support ecological

				enterprises.
<p><b>Lifepack</b></p>  <p>Cali</p> <p>(Lifepack, 2021)</p>	<p>Ecological packaging, among them offer 100% compostable packaging and are germinable. The germinable tableware containing plates and cutlery; germinable food boxes and germinable heat insulator stand out.</p>	<p>Website, social networks, Whatsapp, markets its products in chain supermarkets.</p>	<p>Prices from \$2,480 COP to \$2,616,000 COP</p>	<p>It has a catalogue of ecological packaging which, in addition, manufactures germinable dishes or trays which, after use, can be sown to grow a plant.</p>
<p><b>GreenPack S.A.S</b></p>  <p>Mosquera, Cundinamarca</p> <p>(Green pack, 2021)</p>	<p>Bags, boxes, foils and special products.</p>	<p>Website, social networks, Whatsapp</p>	<p>Prices to be quoted according to dimensions, material, design and quantity.</p>	<p>They offer a variety of designs, they are manufacturers and marketers of biodegradable, compostable and recyclable packaging. In addition, they design special 100% biodegradable</p>

				packaging that meets the requirements of the international market for export products such as fruit, chocolates, organic coffee, tea, panela, etc.
<b>ECOCOSTA</b>  Barranquilla (ECOCOSTA, 2021)	Bags, cutlery, trays, bowls, soup plates, saucepans, food holders, in corn starch and sugar cane pulp	Website	Prices to be quoted according to dimensions, material, design and quantity.	They offer different types of packaging, they do not specify promotions or discounts on the website.

In the research in table 3, it can be concluded that Colombian companies have a wide offer of compostable packaging with a catalogue that has a great variety, not only with compostable packaging, but also with products such as straws, cutlery, bowls, among others. It also showed that Colombian companies are at the forefront of international trends and have great potential to take advantage of the agricultural riches found within the country.

It is worth noting that of the 10 companies that are presented as the Colombian offer of compostable packaging, 4 are from Valle del Cauca, a department in the Pacific región, this area of Colombia is known for the production of sugar cane, which is mainly used to produce fuel alcohol and sugar, also in the sugar cane production process, 250 kg of bagasse stalks

are generated per tonne. (Peñaranda Gonzalez, Montenegro Gómez, & Giraldo Abad, 2017), this bagasse can be used for the production of compostable packaging such as cane residues that are used for compost, soil cover and pulp and paper production. In addition, Valle is one of the main producers of maize, together with the departments of Meta, Tolima and Córdoba (CIAT & CIMMYT, 2019).

Another positive aspect, to develop in this region, especially in the city of Cali, in order to take care of the environment and use them to generate by-products based on agriculture, is that it has laboratories as well as different research centres, such as the Centro de Investigación de la Caña de Azúcar de Colombia CENICAÑA located in Cali, is a non-profit corporation that seeks the transformation of agribusiness, this corporation conducts research programmes in agronomy and in manufacturing processes and specialised services. (CENICAÑA, 2017). Another entity is CIAT, which is also located in Cali, its main objective is to work with partners to help developing countries to promote more profitable and competitive agriculture, improving the management of natural resources (CIAT, 2021), this entity is a member of the Consultative Group on International Agricultural Research (CGIAR) which is the world's largest union of corporations and agricultural research organisations seeking development and sustainability.

For the above, the presence of these centres dedicated to research and innovation can encourage the development of disruptive packaging proposals that make use of agricultural waste and are sustainable. It can be seen that for Valle del Cauca, which belongs to the Pacific region, it is of great importance to innovate in green business, as shown in Graph 1.

Grafica 1. Participation with green businesses by region in Colombia, verified by the Ministry of Environment.



Fuente: (SIAC, 2020)

In the specific case of compostable packaging, it was found that there is no supply of this type of product in other cities or agricultural regions of the country, for example, in the case of Neiva, a municipality where there are green business enterprises, most are focused on the benefit and valuation of waste as a possible source of sustainable energy and sustainable construction initiatives all of these initiatives were promoted by the CAM (Corporación Autónoma Regional de Alto Magdala) in a campaign in November 2020, it is expected that over time, Neiva can diversify its offer and include compostable materials in it; something similar is happening in the department of Tolima, which is one of the main producers of technified maize in Colombia (CIAT & CIMMYT, 2019) that can use corn starch as raw material for the production of compostable packaging, however, there are green businesses in this area, but they have focused on organic and natural products such as coffee, aloe vera and chachafruit, in addition to agrotourism in Cajamarca and ecotourism in El nevado del Ruiz, Otún Lake, Ibagué, Melgar, among others. The same is true in Boyacá where green



businesses have also focused on green products, coffee, handicrafts, organic livestock and ecotourism.

In addition to the various approaches that green business has taken in the different regions of the country, despite the fact that there are areas that are large agricultural producers, for example of corn, sugar cane, pineapple or cassava, most regions do not have laboratories or governmental entities that support the initiative to use agricultural by-products to reduce the use of single-use plastics. Such support is necessary, because the raw material extraction process and cross-linking with the polymer chains to create compostable packaging.

On the other hand, when comparing the prices of the European market against the Colombian ones, we find that the Colombian ones are much more favourable, since they are even from 1 EUR to 10,27 EUR and in the European market their prices oscillate between 1,20 EUR and 39 EUR although the prices of the Colombian products are cheaper, it is worth highlighting that the cost of transport or possible export must be added to these unit or sale values, as well as the possible offers that can be offered in price according to the quantity that is demanded from Colombia to Europe, Due to the COVID-19 pandemic, plastic is once again taking centre stage due to the health emergency in many countries, which can serve to promote the use of compostable packaging for the disposal of household waste, containers and packaging for internet sales, alcohol gel containers and increase the demand for this type of product in order to reduce transport and export prices.

## **Strategic analysis (DOFA)**

### **Analysis of the environment**

#### Opportunities

1. It benefits Colombian companies that produce compostable packaging, as they are obliged to be certified by European Union entities and to some ISO standards.

2. There are not many companies that produce compostable packaging, most of them are biodegradable packaging.
3. Most companies producing compostable packaging in Europe have not been in operation for long, which opens doors for Colombia to make an impact on the market.
4. Competitiveness according to the exchange rate of Colombia against the dollar and the euro at the time of the consultation we found 1USD= 3.630,81 COP/  
1EUR=4.368,52 COP.

### Threats

1. European regulations and requirements, because, although not impossible to implement, a strictly rigorous process has to be carried out.
2. Companies from European countries with higher levels of productivity and competitiveness than Colombian companies.
3. It was noted that some Colombian companies manufacturing compostable packaging such as MAHIZ import raw materials from Spain, which affects the country's agricultural wealth and additionally increases the cost of products by importing raw materials.
4. There is no Colombian environmental seal for eco-packaging, which affects the potential reliability in the international market.

### **Internal analysis**

#### Strengths

1. It was found that Colombian companies dedicated to the manufacture and distribution of compostable bags have a broad portfolio of products that are not limited to bags, but add to their catalogue cups, bowls, cutlery and other items.
2. Most of the companies have a website and have knowledge of e-commerce, which would facilitate their possible distribution in other countries.
3. It became evident that Colombia has the capacity to face or comply with the requirements suggested by the European Union in its strict regulations.
4. In Colombia there is a wealth of agricultural and organic waste that serves as raw material for the creation of compostable packaging, which is favoured by its variety of climates and geographical location.
5. Colombia is an official member of the OECD as of 2020.
6. There are agricultural research centres in Colombia such as CENICANA, CENICAFÉ, CENIPALMA that focus on the subtraction of agricultural by-products.
7. Existence of the ICONTEC entity to elaborate technical standards that achieve reliability in the market.

#### Weaknesses

1. A large part of the companies analysed are relatively new companies that are still in the process of adapting to the Colombian market, which is why they can be seen as weak or unprepared companies in the international market, especially to enter a competitive and pioneering market, not only in terms of regulations on the use of plastic, but also as one of the main promoters and distributors of compostable bags worldwide.
2. High prices domestically because they are biodegradable and compostable, however, they are attractive prices in the international market.

3. Some compostable packaging is made from an organic raw material that tends to weaken when it comes into contact with moisture or constant liquids.
4. According to the magazine portafolio, Colombia is increasingly dependent on the export of raw materials, which means that hardly any finished products are exported. (PORTAFOLIO, 2020)

## **Strategies**

### Strategies FO

These strategies result from a combination of strengths and opportunities:

- Take advantage of the fact that Europe does not have sufficient agricultural resources and Colombia does, making them understand the great capacity that Colombian companies producing compostable packaging would have to meet the needs of the market.
- Benefit from ISO standards and the requirements demanded by the EU, as with this, Colombian compostable packaging companies can generate reliability and enter the European market more easily.
- Use the previous e-commerce experience of Colombian compostable packaging companies to impact the European market.
- Use local e-commerce experiences to expand the reach of channels internationally, making alliances with recognised distributors in the main countries of the European Union.
- Take advantage of the fact that Colombia is a member of the OECD to promote Colombian ecological packaging in the European countries that are part of that organisation, through the trade promotion mechanisms it provides.

- Stimulate the development of new raw materials and ecological processes through alliances with universities and relevant research centres (CENICAÑA, CENICAFÉ, CENIPALMA), to explore the use of by-products from these production chains.
- Take advantage of the advantageous exchange rate differential generated by the current devaluation of the Colombian peso, to penetrate the European market with competitive prices compared to international suppliers of ecofriendly packaging.

### Strategies FA

These strategies are the result of combining strengths and threats:

- Use Colombia's capacity to produce good quality compostable packaging, based on its experience, to achieve compliance with the strict regulations required by the European Union.
- Opportunity for Colombian companies to compete and satisfy consumer needs, despite the fact that in the European Union there are companies that manufacture compostable packaging.
- Take advantage of the agricultural wealth to avoid importing raw materials from other countries.
- Develop with ICONTEC the necessary standards for the Colombian environmental seal, which will ensure the reliability of the eco-friendly designation of the packaging offered on the international market.

### Strategies DO

These strategies result from a combination of weaknesses and opportunities:

- Offer compostable packaging produced in Colombia to European companies that produce non-compostable biodegradable packaging.
- Take advantage of the fact that there is not enough raw material in Europe to produce compostable food packaging, which creates a niche market in which companies that produce compostable packaging in Colombia can become potential distributors.

### Strategies DA

These strategies are the result of a combination of weaknesses and threats:

- Vertically strengthen the local supply chain, integrating Colombian agricultural producers in the supply of raw materials necessary for the production of ecofriendly packaging. This will avoid unnecessary costs by eliminating intermediaries that, when analysed, do not contribute greater value in the supply chain.
- Generate spaces for dialogue with the national government or the local mayor's office, this will help them to understand more easily, why it is important to implement research, development and innovation programmes; technical assistance and training for Colombian producers, which will provide a great deal of knowledge, generating or allowing greater competitiveness in the European market.

The following analysis is a diagnosis of the result of the research showing the situation of compostable packaging in the international and national market, taking into account the internal and external characteristics; in addition, the strong and not so strong points that Colombia has to face the European Union (EU) market. In addition, possible strategies to face and analyse the market are established.

#### **4. Conclusions and/or recommendations**

- It was concluded that, although Colombian companies are not so well positioned in the market because it is a current trend and they are just adapting to the market, companies that produce compostable packaging in the EU are going through the same situation, so it could be said that there is no direct competition.
- The raw materials used to make compostable packaging in Colombia are the same as those used in Europe, which means that in terms of quality they are on an equal footing to compete, and this generates the search for improvements in characteristics such as quality, shapes, colours, etc. In addition, it allows Colombia to conquer the consumer through innovation, which means that the product is preferred by the European market.
- The European Union, being at the forefront of sustainable development and due to its commitment to achieving its objectives, has requirements and regulations that must be met by imports into the Union related to environmentally friendly products, compostable and biodegradable food packaging; these regulations aim to protect consumer health, manage packaging waste, achieve a circular economy and have a positive impact on the environment.
- According to EU requirements, there is an advantage with compostable packaging, as it is an environmentally friendly product, which presents an opportunity to enter and be accepted more easily in the European Union.
- The fact that companies producing compostable packaging do not have much experience and that EU regulations are strict creates some uncertainty in the process, however, it can be concluded that, although it is not an easy process, it is possible, the objective can be achieved and a new market niche can be opened for companies producing compostable packaging in Colombia.

- At present, Colombia is used to exporting raw materials and due to EU restrictions and regulations many businessmen would choose not to produce the finished product, affecting the country's economy and development.
- From the evidence collected, it can be deduced that there are more companies selling biodegradable than compostable packaging in Europe, which opens up an important market niche to satisfy, since if these companies have started to implement environmentally friendly products it is because they are looking to satisfy the ecofriendly market.
- According to the data analysed, it is concluded that Colombian companies dedicated to the production and distribution of compostable packaging have a wide range of products for export, as well as knowledge of e-commerce, which would facilitate their positioning in the international market.
- It is concluded that Colombia has several cities and regions that are adopting sustainable products based on a circular economy, although many of these regions have not focused on the production of compostable packaging, they have the necessary agricultural wealth to make this type of packaging, the government of the country is committed to strengthen and diversify the so-called "green business" which positions Colombia as a striking country at the international level for future exports.
- According to the analysis it is concluded that in Colombia there are initiatives that are encouraging entrepreneurs to have social responsibility and create sustainability, for this reason there are several companies dedicated to the production of compostable packaging that have developed an extensive catalogue and have experience in e-commerce and social media marketing.



## Recommendations

- As this is a relatively new trend, it is high time that government entities, in addition to supporting the export of exotic fruits, encourage, guide and support the packaging industry that has the initiative to produce packaging that helps the environment, as it favours the development of the country in environmental matters and is competitive in the international market.
- The Colombian packaging industry should take more advantage of the contribution of agriculture in Colombia, as the country is strong in agricultural production and generates large amounts of agricultural waste that can be used for the creation of packaging, in addition to making alliances to benefit farmers, producers, traders, local and international consumers, the development of the country and the most important thing is that we can all make a positive contribution to the care of the environment. In addition, the international market is offered an added value (finished product) thanks to the use of Colombian agriculture and not raw materials, as is often the case in this country.
- It is not enough that the packaging industry manufactures compostable packaging, but it is also important that society is willing to consume more consciously.
- Colombian companies dedicated to the manufacture and production of compostable packaging should exploit their catalogue of products, as it is wide and has a variety of products such as bowls, cutlery, packaging and customised packaging, in addition to their experience in e-commerce, which will make it easier to enter a possible market in the European Union, Due to the fact that the majority of commerce is currently carried out through virtual platforms, for this reason, they should publicise their extensive catalogue more frequently and promote discounts according to the quantity ordered, in order to promote international shipments of these products.
- Nowadays consumers are looking for companies or corporations with social and environmental commitment, therefore Colombian companies of compostable

products should focus their efforts on becoming more visible at an international level, making their values and business history known, as these types of companies seek to transform the way in which waste is treated and its final disposal, contributing to the environment, having corporate responsibility.

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