Enhancing the agri-food chain through innovation: Grupo La Caña

Beatriz Molina[1]

Corresponding Author: beatriz.molina@grupolacana.com

Abstract:

The concepts of the bioeconomy, the circular economy and sustainability are timely ones today, prompting us to ask whether there really are companies that are based on them, with these ideas shaping their strategies and them assigning enough importance to sustainability at a strategic level (Junta de Andalucía, 2018). The answer is yes, at both the normative and legislative levels, as the orientations of companies are, in fact, headed in this direction. As an example of this, the Grupo La Caña is presented, a producer, marketer, exporter and importer of horticultural products based on Granada's "Tropical Coast" and operating throughout the Andalusia region. Through sustainable socioeconomic development, it stands out for a business model characterised by its efficient use of tools and natural resources. Hence, it has been crucial to carry out an optimisation of the processes, methods and protocols that provide goods and services well-adapted to the management of the industry, as well as to reduce waste generated and its effect on the immediate environment.

Keywords: Bioeconomy, Circular economy, Sustainability, Agri-food industry, Functional food

Revalorización de la cadena agroalimentaria a través de la innovación: Grupo La Caña

Beatriz Molina[1]

Resumen:

Actualmente los conceptos de bioeconomía, economía circular y sostenibilidad se han convertido en tendencia. Nos podríamos preguntar si realmente hay empresas que se basan en estos conceptos para marcar su estrategia y si se da la suficiente importancia a la sostenibilidad a nivel estratégico dentro de una empresa (Junta de Andalucía, 2018). La respuesta es que sí, tanto a nivel normativo como a nivel legislativo, la orientación de las empresas va en esta dirección. Como ejemplo de ello, se expone el caso del Grupo La Caña, empresa productora, comercializadora, exportadora e importadora de productos hortofrutícolas que tiene su sede en Costa Tropical de Granada, y trabaja en toda la región de Andalucía. A través del desarrollo socioeconómico sostenible, destaca su modelo de negocio mediante el uso eficiente de herramientas y recursos naturales. Por ello, ha sido crucial llevar a cabo una optimización de procesos, métodos y protocolos que proporcionen bienes y servicios adecuados para la gestión de la industria, así como reducir los residuos generados y su efecto en el entorno más inmediato.

Palabras clave: Bioeconomía, Economía circular, Sostenibilidad, Industria agroalimentaria, Alimentación funcional

[1] Grupo Empresarial La Caña, Motril, Granada (ESPAÑA), beatriz.molina@grupolacana.com

UNIÓN EUROPEA
PROYECTO COFINANCIADO POR EL FONDO EUROPEO DE DESARROLLO REGIONAL (FEDER)
Una manera de hacer Europa

Junta de Andalucía

Andalucía se mueve con Europa

1. EXAMPLES OF THE APPLICATION OF BIOECONOMY: R+D+I PROJECTS OF THE GRUPO LA CAÑA

The strategic Research, Development and Innovation lines currently translate into projects aimed at cleaner, more sustainable and efficient food production (reducing the number of by-products and co-products), with the ultimate goal of returning to the beginning of the product cycle. The working lines defined to realise these goals are based on the maximum use of raw materials, the recovery of by-products or co-products from the activity, and environmental care and conservation. Some of the R&D&I projects of the Grupo La Caña will be shown below as an example of the implementation of the bioeconomy.

1.1 BioREFINA project

The BioREFINA project is an initiative that arose from a heightened awareness of the volume of non-commercial category product that is currently generated at the Grupo La Caña. In this regard, the Agri-food industry adopts as this project's main objective the exploitation of plant waste, such as that from pruning, fruit detritus, and organic debris (Kennet & Winterhalder, 2006) from the company's activity, from the field to the industry itself. These, together with organic waste from livestock, such as pig slurry, are ultimately transformed for use as biofertilizer, compost and even biogas.

The creation of biorefineries is one of the potential results of the project; that is, facilities to transform biomass into bioenergy and/or sustainable bioproducts. Work is ongoing along this line in which, in addition to overcoming the limitations that have arisen over the course of the project, a scenario has arisen integrating producers from different areas of the fruits and vegetables sector at the national level.

Figure 1. Biodigester

1.2 "Efficient use of water in greenhouse horticultural crops" project

In relation to water consumption, agricultural activity accounts for an estimated consumption of 70-75% of the total, the rest for urban networks and industry. Specifically, Eastern Andalusia features an intensive greenhouse cultivation area of more than 35,000 hectares, distributed between the provinces of Almería, Granada and Málaga. Around 6 million kilos of vegetables are produced each growing season. As a result, any improvement in efficiency has a direct impact on water use and availability. In this regard the "Efficient use of water in greenhouse horticultural crops" Regional Operative Group has made it possible to establish irrigation strategies that minimize spending on water for greenhouse horticultural crops, using low-cost sensors.

The use of systems that make it possible to control the use of water, and nutrients, as well as the leachates that are generated, the crop's production and environmental factors, combine to optimise its use, at both the environmental and economic levels. In this way, the project promotes precision agriculture, with a maximum use of irrigation water and the efficient use of supplies (fertilizers and biostimulants), which seeks to reduce the contamination of natural resources and contribute to the maintenance of natural ecosystems and environmental sustainability (Harris, 1989).

1.3 AVOCEMTUM Project

Within the by-product recovery lines, the AVOCEMTUM project stands out, consisting of a specific range of a certain product on the market: the use of avocados for the development of functional guacamoles having healthy properties by incorporating new ingredients obtained from the recovery of co-products. This line stands out for its functionality, as the Grupo La Caña focused on obtaining a product with properties healthy for the consumer, such as its antioxidant and fibre content, and limited fat.

Food is taking a 360-degree turn, going from sophisticated or ready-to-eat products to what today we commonly consider the consumption of traditional and fresh products of agricultural and livestock origin, the primary basis of our diets. But, could these primary resources be considered unlimited? Is it possible to get everything we want, when we want, from natural resources? These questions can be answered as follows: we know that resources are limited, to which we must add global population growth. Therefore, society, governments and the sector have the obligation to (i) become aware of the limitations of natural resources and the impact of their exploitation (ii) strategically plan industries' policies and procedures (iii) distribute food as efficiently as possible, reducing waste and ensuring zero hunger. This is why at the Grupo La Caña, aware that we must look for alternatives to the consumption of food as it is currently conceived, and continuing with our strong commitment to improving the organoleptic qualities of our fresh products, we are taking another step aimed at processed foods that, minimally processed at a certain stage, can maintain their organoleptic properties and have their shelf lives extended. These are what have been called "ready-to-eat" products.

The increase in population and global climate change are significant obstacles calling for a commitment to sustainable agricultural production over time, due to the limitations of available arable land. Thus, it is necessary to explore new food sources with high production capacities, that do not require fertilization, and are less sensitive to environmental effects, such as drought, pests and diseases. Coupled with this, a reduction in meat consumption is

detected in Western diets, associated with health factors and trends towards vegetarianism and veganism, with a market opportunity being detected, given the growing demand for plant products as alternative options.

As can be seen in Figure 2, within the framework of this project, different formats of Guacamoles (original premium, light, fibre and antioxidant) have been introduced, all in collaboration with the University of Granada and the Functional Food Technology Center (CIDAF). Based on these premises, we have worked on a laboratory scale on the formulation of food matrices yielding five recipes for each. Each recipe has been subjected to different analyses to determine its microbiological and nutritional/compositional quality and physicochemical classification. Using these formats, a sensory analysis was carried out to select the winning recipe for the final consumer. Additionally, it was possible to guarantee, at both a microbiological and nutritional level, that it was a stable product over time and complied with the quality parameters established. Once the productive stages for its conservation were defined, cold pasteurization using high hydrostatic pressures was selected, which was key to obtaining a stable, high-quality product. The last phase of the study has been the pre-commercial validation of the formats and their functional properties through a population intervention trial to validate claims regarding antioxidants and their high fibre content, through analysis of the blood plasma of consumers at different times relative to consumption to determine their antioxidant capacity and their "high fibre content" functionality. Based on the results of the project, the Grupo Empresarial La Caña launched its new line of ready-to-eat functional products, constituting a new business initiative called Caña Nature, S.L., in which it produces and markets these products, among others.

Figure 2. Functional guacamoles

1.4 ACTILIFE project

Meanwhile, the ACTILIFE Project addresses the interrelation between physical activity, health, and quality of life. To function optimally and prevent disease, the human body needs physical activity. We must emphasize that part of the population is aware of this and exercises to improve its physical condition. Coupled with this, a complete, varied diet must be followed, with the necessary amounts of food. Hence, specific food products must be created that feature all the macronutrients and micronutrients necessary to satisfy the requirements of an amateur athlete, in order to contribute to the maintenance of his health. This is the main objective of this project, which also delivers a technological innovation by developing a mobile application that includes a knowledge network, from sports to nutritional medicine, obtained through a nutritional intervention trial. With this information a personalized profile will be created for each user based on his activity, the types, amounts and doses of food consumed, and the optimal time for consumption. For all these reasons, three companies in the food sector have become involved in the framework of this project, covering the contribution of ingredients in order to meet the needs and expectations of an active society that demands healthy food, together with a management tool favouring a healthy lifestyle and improved diet. This project is currently in the production phase for two liquid-based food matrices for

consumption before and after exercise. The nutritional needs of the amateur athlete have been studied to be able to define the food product to be developed, and the food products have been selected through an analysis and description of the different raw materials from a nutritional point of view.

1.5 FOOD4STROKE project

Continuing with the strategy to develop a food product focused on improving the healthiness of people's lives, the FOOD4STROKE project focuses on the senior market as a target, the health problems associated with an aging population, and other public health problems related to the increased prevalence of certain chronic diseases, such as vascular conditions that can cause neurodegenerative disorders. The trend in a society aware of this problem has led to the more responsible consumption of food, as people realise that a balanced diet delivers nutrition and support, and also that these foods play a key role in shaping people's quality of life. Thus, this project arose from the need to research and develop new functional foods, with added value, based on the investigation of raw materials with which we regularly work at the Grupo La Caña. These raw materials have a beneficial neuroprotective effect, with potential for the prevention of neurodegenerative diseases.

The project's major innovation is that, once these functional components are known, it explores combinations of the raw materials selected in search of synergistic effects on the previously unexplored neuroprotective effect. In order to reinforce this strategy, while promoting an adequate diet, the agri-food industry is faced with the challenge of developing new foods having a preventive effect against these diseases, especially given that in recent decades there has been change in food trends in developed countries, and the concept of a balanced diet has come to mean maintaining an adequate diet based on the consumption of foods that promote health and improve social well-being.

1.6 AGUACAVALUE project

To close the circle, and as an example of the Circular Economy, the AGUACAVALUE project is presented. Society is increasingly concerned about the impact of industrial activity on the environment, and demanding environmental legislation promoting actions towards more sustainable activity by means of practices and processes that protect the environment. In this case, we focus on by-products or co-products generated by the Agri-food industry, defined as products that, commercially, do not meet quality standards, or that have some type of defect. In Spain, in general, there are many products rich in bioactive components that have beneficial effects, the recovery of which entails a reduction in the total cost of waste treatment, thereby increasing the sustainability of production processes. This project is focused on avocado as a product, especially since, to meet demand for it, the area cultivated has increased nationwide in recent years. Today lifestyles, health concerns, and a lack of time to cook, among other factors, have led to an increase in the marketing and consumption of prepared foods. Avocado consumption is mainly fresh and prepared in guacamoles and sauces. 3% of the by-product is generated fresh, and 30% is generated as prepared food. In Spain, approximately 2,000 tons of eggs and avocado skin are discarded, which is a problem for industries; on the one hand, due to the economic cost of their management and, on the other, the ecological impact of their disposal. Thus, these raw materials must be reused, reduced and recycled, as they are bioactive resources of significant commercial value, and healthy, which makes them potential sources to develop and recover a new processed product. Avocado skin is composed of components with antioxidant, antimicrobial, bioadsorbent and even insecticidal capacities. Its seeds, moreover, are even richer, as, in addition to the previously mentioned capacities (with the exception of their use for insecticides), they feature antihypertensive and antidiabetic, anticancer properties, are a source of dietary fibre, and have hypocholesterolemic, dermoprotective, colouring, thickening and biofuel effects. (Brown et al., 2008).

In short, the recovery of these by-products results in a significant

increase in the environmental sustainability of the fruit's exploitation. The transformation and use of these by-products reduce the negative impact that their elimination can generate. The complexity of the treatments may vary (fertilizers, composting, combustion, anaerobic digestion, etc.), their conversion into a recovered product with greater added value being important. All these factors can have a direct impact on employment, requiring the intervention of biotechnology companies for their subsequent use in sectors like nutraceuticals, foods, cosmetics, pharmaceuticals or animals. In the agri-food industry, fresh raw materials can be used in two ways: fresh or processed. Given the major production of by-products that are not commercial, and certain parts of fruits that, after being processed, are not valuable to the food matrix, there will be a potential environmental impact that should be placed in the crosshairs of the agri-food industries, for its proper management. The large volume of these by-products, featuring a high percentage of water, makes them challenging, mainly due to the rapid degradation of the by-product if it is not dried or processed immediately and properly. The existence of these by-products and co-products has a great impact from the economic, social and nutritional points of view, especially in the event of ineffective or inappropriate management, which may mean it ends up contaminating natural resources, soil, water and air. This impact can be significantly reduced through the transformation of these by-products, recovering their use, with this representing a source of opportunities through the rational usage of these components for their conversion into useful products. To obtain products delivering added value, several previous stages must be taken into account, from their treatment to the formulation of the final products, obtaining and monitoring bioactive compounds throughout the entire process.

Aware of the agri-food chain, from the farmer to the consumer, the Grupo La Caña undertakes the challenge of responding to demands for more sustainable and environmentally friendly production, for which it has adopted innovative technologies taking into account sustainability, food safety and

quality criteria for its products.

REFERENCES

JUNTA DE ANDALUCÍA (2018). Estrategia Andaluza de Bioeconomía Circular. Recuperado de: https://www.juntadeandalucia.es/export/drupaljda/Estrategia_Andaluza_Bioeconomia_Circular_EABC_18.09.2018.pdf

KENNETT, D.J., & WINTERHALDER, B. (Eds.). (2006). *Behavioral ecology and the transition to agriculture*. Berkeley: University of California Press.