

Foodtech in Spain

Fuelling a more
sustainable
and efficient
Food System



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Dear reader,

I am very proud to present you with the first ever report **Foodtech in Spain : Fuelling a more sustainable and efficient food system**, which aims to give a detailed overview of the vast ecosystem of innovation and opportunities linked to our food and gastronomy industry, made up of multiple players including startups, universities, research centers, corporations and of course, investment.

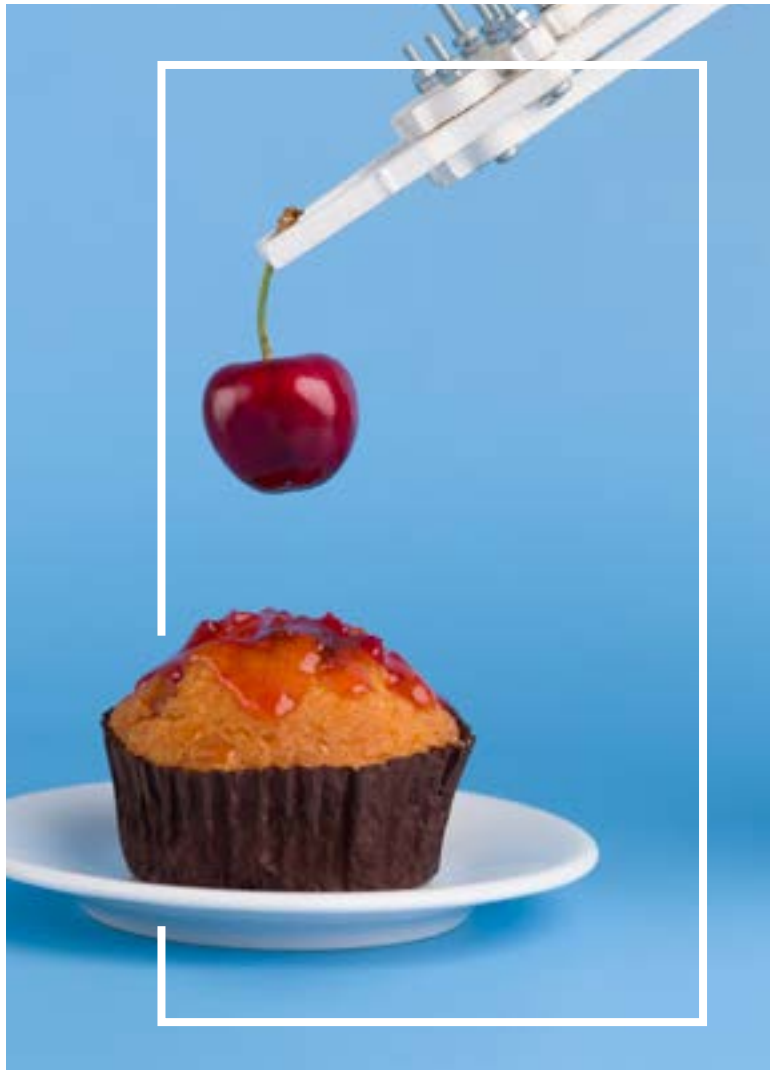
Just as Spain acts as a powerful food benchmark across the world for its robust food industry as well as its efficient value chain it also boasts an inviting gastronomic background; a benchmark in the field of foodtech. Only a country such as Spain with its vast gastronomic background could offer such a favorable and unique ecosystem on which to build the future of food.

From ICEX Spain Export and Investment we believe that it is essential to support the internationalization of the sector and thus contribute to making its innovative capacity a differentiating factor that positions us as pioneers of the Foodtech world. We want our FoodTech industry to be a referent for international investment flows and integration in the agri-food supply chain.

Currently, Spain has more than 400 startups who are working hard on developing and improving ingredient production, transformation efficiency and optimizing the sustainability of people and the planet through innovative technological solutions that impact the entire agri-food value chain, all in all facilitating the access to better food whether in more local and remote places or in reducing food waste and the negative impact of industrial waste.

This is just the tip of the iceberg for an ecosystem that enables overall better efficiency, resilience and innovation of our food industry and that's exactly what we invite you to discover in this report.

I hope after reading it that you consider Spain as the #foodtechnation to watch.



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Introduction

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1 Introduction

Foodtech in Spain: Fuelling a more efficient and sustainable FoodSystem

Spain is synonymous with excellent gastronomy and has a cutting edge food sector that is growing year by year and expanding worldwide. If we look at the entire agri-food value chain, comprising the primary sector, the transformation industry and sales and marketing activities, it generates more than 9.1% of the country's GDP, positioning itself as a driving force for the country's growth and development. In Spain, the sector is 34% more productive and 30% more competitive than the average in the EU-28.¹

The importance of food exports, which account for 17% of total exports, is another key aspect of the Spanish agri-food sector's competitiveness. This position has been strengthened by the Covid-19 pandemic, in particular the primary sector, which has grown by almost one percentage point in its contribution to Spain's GDP compared with 2019, and has demonstrated its capacity and resilience.¹

It is precisely thanks to the excellent health of our food value chain, we are rising to the global challenges of the food system in a highly agile and competitive way.

Each of the players that make up the ecosystem strives to come up with solutions to the great challenges of the food system by contributing knowledge, the use of high technology and passion for gastronomy, building a solid FoodTech industry.

If we had to look for the common denominator of our FoodTech ecosystem, operational and industrial efficiency and sustainability stand out as above average, and constitute the two factors that make the biggest impact on the global food industry.

More than **30,000**
companies in
food transformation

More than **50**
specialised
universities

More than **20**
cutting edge
technological centres

More than
400 Foodtech
startups

¹ Observatory on the Spanish agri-food sector in the European context. 2019 report. Joaquín Maudos and Jimena Salamanca(2020). Cajamar Caja Rural-<https://www.publicacionescajamar.es/series-tematicas/informes-coyuntura-mografias/observatorio-sobre-el-sector-agroalimentario-espanol-en-el-contexto-europeo-informe-2019>



1 Introduction

Foodtech: A very broad sector, destined to be the next future of food

The term foodtech encompasses all the agents that are currently transforming the agri-food value chain by incorporating innovation into their main activities. Its a broad term that comprises a diverse typology of actors that are applying cutting-edge technology to the agri-food value chain, from production to food consumption, all the while provi-

ding efficiency, food safety and security and a significant improvement in sustainability.

The technologies applied range from the most traditional known as ICT, to those that leverage more innovative methodologies including biotechnology, robotics, blockchain, artificial intelligence, machi-

ne learning and big data among many others.

In order to study the Spanish ecosystem in more depth and be able to propose a clearer picture of the vast agents involved in each stage of the food chain, this taxonomy has been developed taking into account only the main agents involved.

FOODTECH

Agritech

- a. **Ag-Biotech:** soil regeneration, seed optimization, etc. through the use of biotechnology.
- b. **Crop automation systems:** Software and hardware for agriculture.
- c. **Robotics applied to agriculture.**
- d. **Water management.** and new growing systems: Vertical Farming, Indoor Farming, hydroponic and aquaponic crops, etc.
- e. **Intensive cultivation systems** (greenhouses and productive improvements).
- f. **Marketplaces for agriculture.**
- g. **Others.**

Foodtech: Food production and transformation

- a. **New sources of ingredients:** plant-based, fermentation, biosynthesis and insects.
- b. **New products** made with new ingredients. Includes all kinds of innovations
- c. **Technology applied to the improvement** of food production processes.
- d. **Packaging and Traceability** (including blockchain and IOT)
- e. **Food safety**
- f. **Food waste management** and circular economy.
- g. **Others**

Foodtech: Logistics, distribution and retail

- a. **Robotics applied to retail.**
- b. **Retail analytics platforms.**
- c. **New sales channels:**
Direct to Consumer models (online sales, meal kits, digital native brands, new generation vending, etc).
- d. **Smart tags.** Such as traceability, knowledge.
- e. **Delivery and last mile of packaged products.**
- f. **Food waste management** of packaged and retail products
- g. **Others**

Restaurant Tech

- a. **Reservation platforms**
- b. **Hospitality management platforms**
- c. **Cloud Kitchens.**
- d. **Cooking Robots:** kitchen applied robotics
- e. **Payment services development**
- f. **Restaurant marketplaces**
- g. **Delivery and last mile Horeca**
- h. **Food waste management Horeca**
- i. **Others**

A photograph of several glass tubes containing hydroponic plants. The plants have green leaves and yellow stems, growing in a clear liquid medium. The tubes are arranged in a row, and the background is a soft-focus green.

Spain's Foodtech Ecosystem

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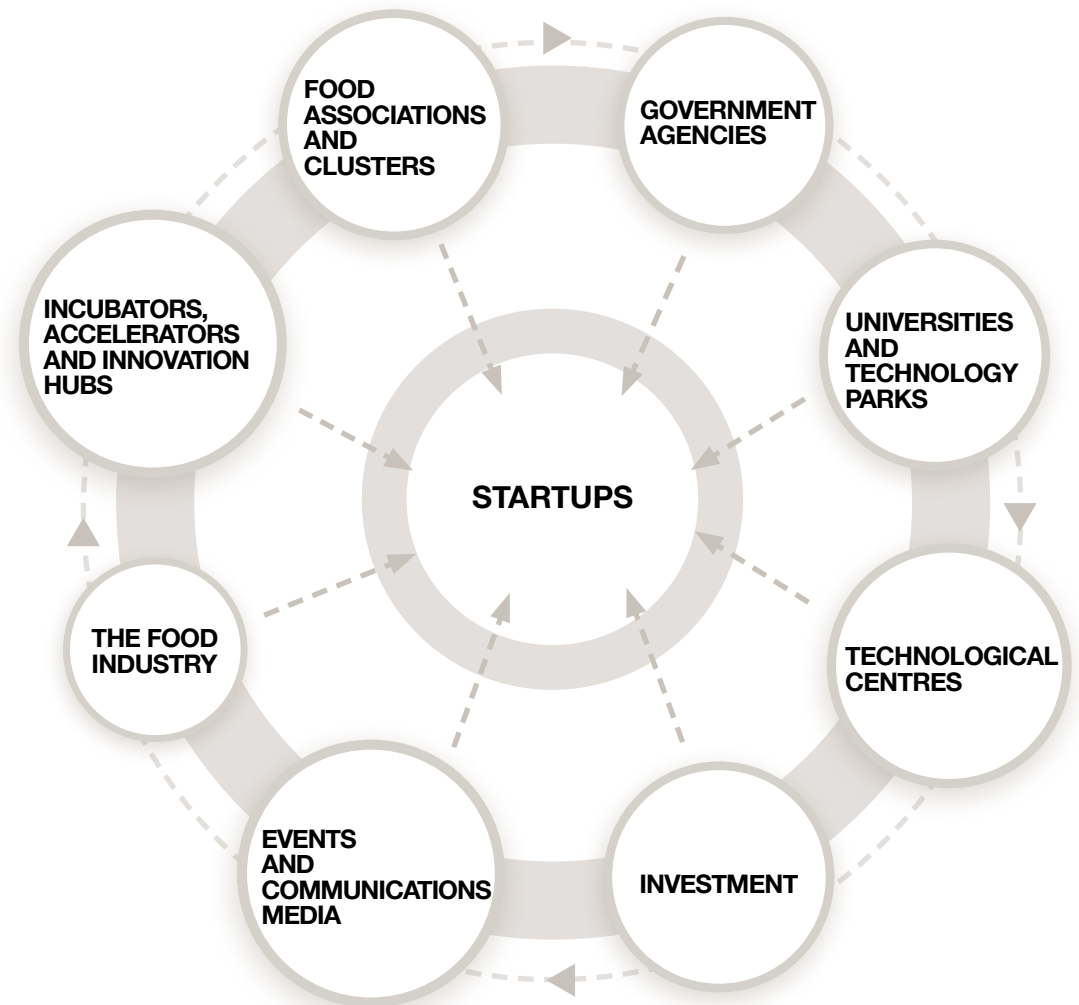
2 Spain's Foodtech Ecosystem

Introduction

Spain has one of the world's strongest agri-food ecosystems with the largest number of players.

The importance of the agri-food value chain in Spain's economy, as well as the need for continuous innovation and improvement of the efficiency of its agriculture and food industry, all also driven by the country's high gastronomic level, which has allowed us to develop an extensive ecosystem comprising national, regional and local government agencies, business associations, technology centres, science parks, universities, incubators and accelerators and of course, startups, which are playing an active role in building Spanish foodtech.

In the following pages, we will break down the role that each of these performs.





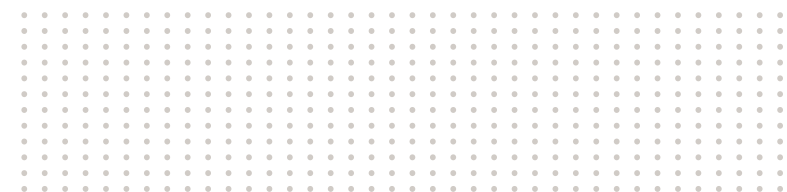
Spain's Foodtech Ecosystem

Government Agencies: fundamental support underpinning the ecosystem

The furthering of the different public administrations is key for the development of our flourishing Food-Tech ecosystem. At national level, **the Ministry of Agriculture, Fisheries and Food** recently announced that the total budget for 2021 will be €8,496.2 million (including the € 406.5 million of the Recovery and Resilience Mechanism), which represents an increase of **10.47% compared to the 2019 budget** (carried over to 2020). With this investment, it aims to contribute to the **digital transformation of rural areas** as a tool to make living, working and **entrepreneurial** conditions more attractive, and thus favor the installation of young people, women and talent in the territory.

For its part, ICEX Spain Export and Investments, from its Invest in Spain platform, has recently launched the “Rising up in Spain” program. This program offers foreign entrepreneurs numerous advantages to establish themselves in Spain. This same platform has also carried out Open Innovation programs, such as those organized with the EFKO Group in Russia. Another line of action is the reverse missions for startups, such as the one organized for **biotechnology startups with the Japanese pharmaceutical company Asahi**, which allows them to access its open innovation program. An additional program organized by ICEX in the field of entrepreneurship is **Desafia**, which makes it easier for small Spanish companies to enter the most innovative technological ecosystems in the world.

Within the Smart Agrihubs program, **the Andalusian regional government leads the Iberia Cluster** that brings together Spain's and Portugal's Digital Innovation Hubs, with the aim of establishing an innovation ecosystem in the open peninsula to all sectors related to agri-food.



Spain's Foodtech Ecosystem

The Agri-food Industry: united to create value

In Spain, the food and beverage industry is the number 1 manufacturing branch in the industrial sector¹, with a total turnover of €125,841.8 million, which accounts for 22.8% of the industrial sector, 21.5% of people in employment and 18.9% of total added value generated. There are 30,730 companies in the food and beverage industry, 15.4% of all of Spain's industrial manufacturing.

One outcome of the importance and large number of companies that make up the sector is a series of agglutinating agents that set out to join together the ecosystem's forces and promote a range of activities to drive foodtech. At the national level, there is AECOC, one of the main food industry associative institutions, which also includes the sales and distribution sector and Horeca. It is very active in the sphere of innovation in the food industry, with periodic training and promotional activities.

The Food Industries Federation (FIAB, in its initials in Spanish), brings together a large part of the country's food industry through its several associations and is the driving force behind the 'Food for Life Spain' platform, which supports the dissemination of advances in research, science and technology through public-private collaboration of the main players in the agri-food sector in relation to RDI and the detection of new demands in terms of Challenges of Society.

Food clusters are a major support for industry at the regional, national and European levels and in vertical sectors. These bodies undertake the task of encouraging training in innovation, connecting companies with universities and technological centres and managing public funding of R&D and innovation at the regional, national and European levels.

Main Associations and Clusters

AGENCY	LOCATION
Acuipus Cluster	National
AECOC	National
Asebio	National
Bioga	Galicia
Biovegen	National
FIAB	National
FOOD+i Cluster	Navarra
CLUSAGA	Galicia
Foodservice Cluster	Catalonia
VITARTIS	Castile and León
Aragonese Food Cluster	Aragon

Source: prepared by the author

¹ 2018 Companies Structural Statistics: Industrial Sector. National Statistics Institute (INE) (24/06/2020) www.ine.es

² Central Companies Directory DIRCE 2019.INE (20/12/2019)



Spain's Foodtech Ecosystem

Technological Centres: keys to combining technological excellence and flavour

In Spain, the foodtech sector has a very open-ended vision, which stems from the country's enormous cultural and gastronomic diversity, which has evolved throughout our history.

Precisely thanks to the conjunction of vision, technological superiority and gastronomic excellence, Spain's technological centres stand out. Most of them are present in the Food for Life in Spain platform.

Each of them is a world leader in specific areas of Foodtech, ranging from the development of new ingredients, the improvement of nutritional properties, the application of new preservation technologies, industrial scaling of the most innovative solutions to the reduction of the impact of packaging, to name but a few.

They also play a fundamental role in the transformation of scientific knowledge into industrially applicable and scalable solutions. Therefore, they are a source of innovative spin-offs, as well as key elements of the value chain.

Throughout Spain, we find centres that specialise in different areas, such as ANFACO-CECOPECA in the fishing sector in the region of Galicia, CNTC, which specialises in canned vegetables in Murcia, and CTIC CITA, which has developed a line of solutions for the meat sector in La Rioja.

Main technology centres with lines of work linked to Foodtech.

AGENCY	LOCATION
AINIA	Valencian Autonomous Community
ANFACO-CECOPECA	Galicia
AZTI	Basque Country
CARTIF	Castile and León
CNTA	Navarra
CSIC	National
CTAEX	Extremadura
CNTC	Murcia
CTIC CITA	La Rioja
EURECAT	Catalonia
I+DEA	Castile and León
IRTA	Catalonia
LEITAT	Catalonia

Source: prepared by the author



Spain's Foodtech Ecosystem

University and Technology Parks promote applied research and the creation of startups and spin-offs

As a result of the great importance and impact of the food sector on the country, there is a large field of research dedicated to it in Spanish Universities and a high degree of specialisation is applied at each campus. In addition to producing high-quality research studies and papers, patents and other types of intellectual property, we have begun to see universities rolling out scientific specialisation that promotes the growth and development of cutting-edge startups and spin-offs that both materialise and monetise food research.

Proof of this is that many of the startups that have secured the highest injections of investment come from the university sphere. Examples of startups that have emerged from research carried out by Spanish universities include **Plant Response**, a spinoff of the Polytechnic University of Madrid; **BioFlytech** from the University of Alicante and **Novameat** from the Polytechnic University of Catalonia.

The APTE association includes all the technology parks, startup development vehicles and university spinoffs.

Science and gastronomy come together at the **Basque Culinary Center**, an academic institution whose mission is to promote higher education, research, innovation and gastronomy, and which since 2011 has striven to become a renowned world leader in this field.

Main technology parks and institutes developing Foodtech in Spain.

Basque Culinary Center	Parque (Euskadi Technology Parks)
ESADE Creapolis	Parque Científico de Alicante
ETSIAM-Universidad de Córdoba	Parque Científico de Madrid
Fundación Aula Dei	Parque Científico Tecnológico de Almería
IMDEA Alimentación	Parque Científico Tecnológico de Cartuja
Instituto Tecnológico de Murcia	Parque Científico Universidad Carlos III de Madrid-Leganés Tecnológico (UC3M)
Parc Científic de la Universitat de València	Parque Científico y Tecnológico de la Universidad Politécnica de Madrid
Parc UPC - Universitat Politècnica de Catalunya - BarcelonaTech	Parque Tecnológico de Galicia-Tecnópole

Source: prepared by the author



Spain's Foodtech Ecosystem

Innovation hubs, incubators and accelerators drive the creation and growth of foodtech startups

In recent years, incubators and accelerators have become fundamental levers for the development of the entrepreneurial ecosystem in the food sector in our country.

While many of the main startups in the sector began their journey in generic incubators, normally linked to universities or government agencies, many incubators and accelerators that specialise in the agri-food value chain have emerged, which support early-phase startups.

They offer recurring programmes of varying durations and with a specific focus on concrete areas of the agri-food industry value chain.

Main accelerators / hubs in the Spanish food sector

AGENCY	FOCUS	CAPITAL
Bar Lab	Rest Tech	Corporate
Business Food Factory	Agri-foodtech	Public agency
Culinary Action!	Agri-foodtech	Academic institution
Eatable Adventures	Agri-foodtech	Private
EIT Food	Agri-foodtech	Government agencies + businesses
Fishing Tech	Agri-foodtech	Private
Ivoro Food Innovation Hub	Agri-foodtech	Private
Km Zero	Agri-foodtech	Corporate
Lanzadera	General	Corporate
Orizont	Agri-foodtech	Public agency
Porcinnova	Agri-foodtech	Public agency
Spain Foodtech	Agri-foodtech	Private + Public Collaboration
The Hop	Rest Tech	Corporate
Wayra	General	Corporate

Source: prepared by the author

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Spain's Foodtech Ecosystem

Industry: increasingly involved in driving foodtech innovation

As has been happening in other ecosystems, in recent years we have seen that large Spanish food companies are increasingly active in promoting R&D in collaboration with other ecosystem agents in order to promote their competitive development through innovation.

We identify three main models to manage this drive, which can co-exist in different companies:

Development of in-house research centres: in collaboration with universities and technological centres.

Development of Open Innovation activities, ranging from meeting programmes with startups, launching business challenges to the scientific community to startups or setting up their own incubators and accelerators.

Development of investment vehicles in startups, which allows corporations to make investments in strategic companies.

The implementation of these models makes it possible for the country to establish itself as a point of reference for collaboration, validation and the scaling of new technologies, as well as for the implementation of startups with technology that need infrastructure for scaling and implementation.

Innovative Food Companies in the Spanish food sector

COMPANY	ACTIVITY
Agrolimen	Investment branch
Aidelis	Startup investment
Angulas Aguinaga	Open Innovation Programs
Calidad Pascual	Investment branch
Campofrío	Open Innovation Programs
CAPSA	Investment branch
Coren	In-house research centre
COVAP	Open Innovation Programs
Damm	Open Innovation Programs
Eroski	Open Innovation Programs
Estrella Galicia	In-house acceleration programme
Europastry	Open Innovation Programs
Familia Torres	Open Innovation Programs
IAN Group	Open Innovation Programs
Siro Group	In-house research centre
Iberfruta	Open Innovation Programs
Mahou- San Miguel	In-house acceleration programme
Mercadona	In-house acceleration programme
Nueva Pescanova	In-house research centre
Primaflor	Joint Projects with Universities

* Spanish companies selected on the basis of turnover and innovative activities.

Source: prepared by the author



Spain's Foodtech Ecosystem

Foodtech evangelisers in Spain

We have many communities, events and media that permanently inform both startups and other industry agents about the most important news in the sector.

The main events that we find in the Spanish ecosystem range from those focused mainly on the digitalisation of the field to events focused mainly on innovation in the hospitality sector.

Regarding media, we find specialised sources such as **Foods and Wines from Spain- Foodtech**, **Gastroemprendedores** and **TechFood Magazine**. We can also find the latest news in general media in the sector, such as **Alimarket** and other entrepreneurship media, including **El Referente** or **Emprendedores**.

Main Foodtech Events un Spain

EVENT	LOCATION
Alibetopías	Madrid
Alimentaria Foodtech	Barcelona
Datagri	Zaragoza
F Talks	Valencia
Foodture	Barcelona
Gastroemprendedores	National
Hospitality Innovation Platform (HIP)	Madrid
Smart AgriFood	Málaga
Startup Olé	Salamanca
Trend Builders	Barcelona

Source: prepared by the author



Spain's Foodtech startups

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Spain's Foodtech startups

Startups: championing innovation in the food system

The health of a strong innovation ecosystem is the number and quality of startups that emerge and thrive in it. In recent years, Spain became one of the few “foodtech” nations. With more than 400 startups along the entire agri-food value chain, it stands out as a country that generates startups of high technological value, only behind the United Kingdom, Israel or the United States. However, these data are skewed by the startup ecosystem youth. More than 60% do not exceed 3 years of life and 13% of startups have been created during the pandemic.

The company's youth contrasts with the maturity of the entrepreneurs who decide to start these startups in this industry; with an average age of almost 39 years, well above the average in other countries.

But the key factor supporting the competitiveness of Spanish foodtech startups is their technological component and their use of what is known as “deep tech”.

64% of startups develop their technology “in house” and more than 60% of projects use at least one of the technologies considered as deep tech, thus positioning themselves in the “avant-garde” of the food sector.

400
STARTUPS

35%
HAVE
PATENTS

Degree of use of deep tech.

TECHNOLOGY	PERCENTAGE
Biotech	24.73 %
Artificial Intelligence	23.66 %
Machine Learning	20.43 %
IOT	17.20 %
Blockchain	5.38 %
Robotics	16.13 %

Source: Eatable Adventures, 2020



Spain's Foodtech startups

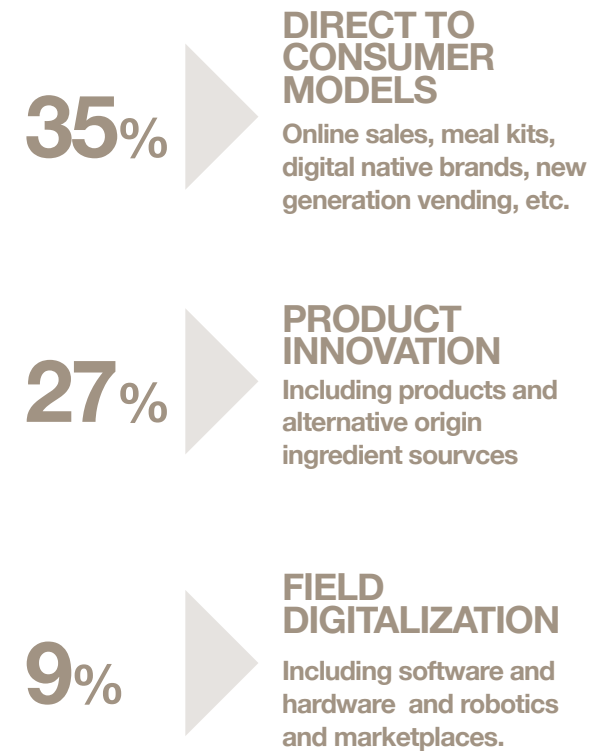
Startups: championing innovation throughout the value chain

The flourishing Spanish foodtech ecosystem has more than 400 startups that are distributed throughout the national territory, many of them close to Universities and Technology Centres and, above all, supported by the food industry. Due to the concentration in the food industry, Catalonia has become the main generator of startups with a 22.45%. They are followed closely by the Community of Madrid, which accounts for 20.21%, thanks to its proximity to universities and business decision centres, and by Andalusia, with 14.29%, with a major presence in both the food and agriculture industries.

Percentage of foodtech startups by area of the agri-food value chain



Ranking by global areas



Source: Eatable Adventures, 2020

3

Spain's Foodtech startups



Startups: championing innovation throughout the value chain

To encompass all the startups working in Foodtech, we must analyse the entire food value chain, from those most focused on Agritech to those that bring food to the final consumer.

If we look at the startups involved in Agritech, we find many crop automation solutions, which account for 33% of the total in Agritech, followed by new cultivation systems, with 28%. In transformation, packaged CPGs developed with novel ingredients lead this category, with 42%, followed by those startups that are working on new sources of ingredients, such as plant-based, fermentation and cellular. It is remarkable that the great challenge of sustainability is promoting a major boost to new farming systems and new food sources, with substantial growth in the last year in the number of startups operating in the sector. This sustainability can be observed across the entire chain, with the majority of foodtech startups including sustainability as part of their value proposition.

Within the solutions for the **distribution of food to the final consumer**, Spain is a world leader in delivery as a result of the success of Glovo, one of the two Spanish unicorns in 2020. The category of **direct-to-consumer models** is the overwhelming leader in the distribution and retail category with **85%**, as well as in the overall ranking of Spanish Foodtech startups.

In the restaurant tech section, although there is no clear winner, **back office** management and digitalisation platforms, with **22%**, and **robotics applied to the kitchen** are the leading categories, closely followed by the emergence of more and more startups operating with the **dark kitchen** model.

Below is a map of the main Spanish foodtech startups, selected by degree of investment and innovation, classified in the different phases of the chain according to our own taxonomy. (Available on page 6).

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Spain's Foodtech startups

Startups: championing innovation throughout the value chain

FOODTECH

Agritech



Foodtech: Food production and transformation



Foodtech: Logistics, distribution and retail



Restaurant Tech





4

Invest in foodtech in Spain

Foodtech: A sector on the rise

The Foodtech sector is one of the areas that shows the greatest future growth potential and therefore major opportunities for investments willing to take on the risks inherent in new markets.

In recent decades, investment in hi-tech firms has been decisive for the development of market segments that are fundamental in our economy today. Until recently, the agri-food sector has been reluctant to incorporate advanced technologies; however, in recent years we have seen a turning point promoted by numerous startups that provide technological developments that promise to transform this sector.

Investment in the agri-food sector is growing and promises to transform the largest productive sector on the planet by making it more efficient, more predictable and capable of meeting the needs of a growing market; it is already the second sector in investment after the software industry and we have no doubt that it will overtake it in the next few years.

In 2019, the total amount of global investments in foodtech startups was 19.8 trillion dollars, according to AG Funder, and positioned the United States as the undisputed leader as it received 44% of this investment, followed by China, India, the UK and Israel.

In the same year, in Europe, investment in Foodtech stood at 2.3 trillion euros, according to Five Season ventures, a growth of 106% compared with 2018. The United Kingdom is the leader in terms of fund raising, fundamentally thanks to Deliveroo, followed by France and, at some distance, Spain, which ranks third thanks to Glovo's two successful fund-raising rounds.

While 2019 was an excellent year, 2020 - if we exclude the Glovo effect - will end with **investment growth of 16,1%**.



2020 European Agri-FoodTech Investment Report.(2020) Ag- Funder. <https://agfunder.com/research/2020-european-agri-food-tech-investment-report/>

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Invest in foodtech in Spain

Invest in Foodtech in Spain

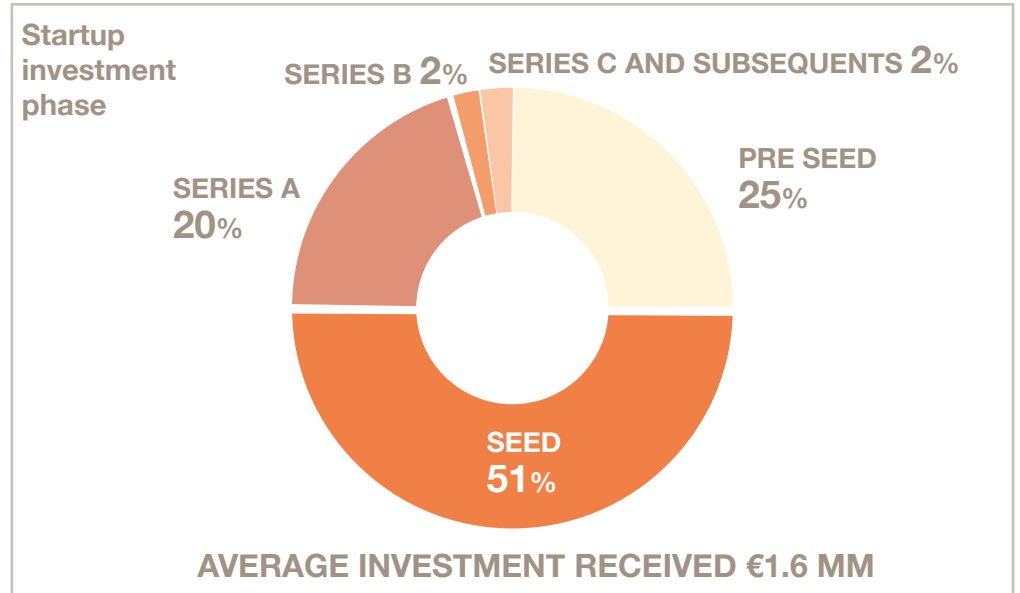
A very young ecosystem with very high potential for investors

Spanish startups are relatively young: 60% have been in operating for less than three years and almost 75% are in very early stages of investment.

The average funding received by local Foodtech Startups is 1.6 Million. Taking into account that Glovo accounts for the vast majority of the investment in this region, the actual average investment is still tiny compared to other regions.

Although agri-food is one of the leading contributors to Spain's GDP, investment in startups in this space is emerging, receiving a minor part of the total startup investment in the country. Most startups are bootstrapped, not launching investment rounds, and the majority are looking for rounds below €500,000; normally an inadequate amount to allow a fast progression in the market.

Nevertheless, for the upcoming year there is a significant interest in reaching larger rounds, a sign of initial maturity in the ecosystem and evidence of startups ready to achieve growth phases.



Source: Eatable Adventures, 2020

Forecast of sizes in rounds

ROUND SIZE	2021
No round raised	33.71 %
Between €1 and €350,000	23.60 %
Between €350,001 and €500,000	16.85 %
Between € 500,001 and € 750,000	10.11 %
Between € 750,001 and € 1,000,000	4.49 %
Over € 1.000.000	11.24 %

Source: Eatable Adventures, 2020



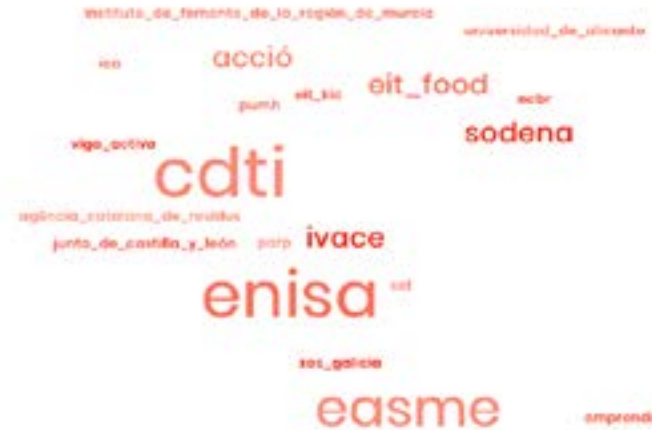
Invest in foodtech in Spain

Invest in Foodtech in Spain

Most Spanish Foodtech startups rely on public financing to sustain their operations, among the lead entities are ENISA and CDTI. ENISA is supporting startups in their early phases through fixed term loans; CDTI is supporting the development of innovation through fixed term loans associated with specific projects targeted to foster new developments and Intellectual property. They are both a popular source of financing for Foodtech entrepreneurs.

Regarding private funding, and similarly to other segments, Business Angels play a predominant role supporting early ventures. A few players are leading investment in this market segment like Caixa Capital Risk, Faraday Venture Partners, BStartup and Inveready. Accelerators like Lanzadera; KM Zero or Eatable Adventures are equally finding and supporting emerging talent. In general Investment is still very atomised with no predominant players appearing at the moment. International Venture funds are taking limited positions in this market, Brinc, Artesian Ventures, Blue Horizon Ventures and New Crop Capital are among the few currently holding positions in this territory.

Public Investors Ranking



Private Investors Ranking



4 Invest in foodtech in Spain

Invest in Foodtech in Spain

As previously mentioned Glovo is a local outlier, receiving the vast majority of the investments. Other relevant players, albeit smaller in size, are receiving sizeable attention by investors. Other downstream players like Wetaca and Mr Noow are receiving good attention by investors too.

Agritech is the leading area in terms of number of operations, with sizeable investments in the areas of soil treatment, analysis and regeneration, by investors such as Plant Response, Agrasys and Agroptima. Marketplaces are equally well represented with Consentio and Ethichub. Insect-based livestock feed producers are receiving noticeable funding, although smaller compared to other European operations. Finally, Pure-play Foodtech companies creating novel ingredients, like Cubiq Foods and Bio Tech Foods are growing and receiving more significant funding, still lower than other comparable European startups.

RANKING OF STARTUPS BY TOTAL INVESTMENT RECEIVED

NAME	DESCRIPTION	FUNDING RECEIVED IN €M
Glovo	Glovo is a food delivery solution that connects customers with independent food providers who acquire goods from local restaurants or shops.	513.1
Plant Response	Plant Response Biotech Ltd. creates synergy in crop protection research programmes to meet current agricultural market needs.	91.4
Tebrio	Tebrio is one of the leading European companies in the manufacture and supply of insect products, delivering Insect Biomass for livestock feed and natural plant fertilizers.	56
BioFlyTech	BioFlyTech is a technology-based company that specialises in artificial breeding and intensive production of insect biomass for the manufacture of flour, fat and compost.	16
Cubiq Foods	CUBIQ FOODS is a cell-based fats producer that generates nutritional new sources of ingredients, including those enriched in omega-3 and SMART FAT to replace coconut oil.	15
Biotech Foods	Biotech Foods develops technology to produce Ethicameat: fresh meat that supports human health, animal welfare and environmental sustainability.	5.1
Agrasys	Agrasys develops new crops with added value for human health, animal feed and biomass including cereals like Tritodeuam with agronomic and nutritional advantages.	4.3
Agroptima	Agroptima is a farmer-centric mobile-based farm management software that makes farms more profitable and easy to manage.	3.8
Mr Noow	Mr. Noow is crafting the new era of restaurants, offering remote control inside users apps and allowing the seamless discovery of nearby restaurants and pre-ordering of food.	3
Consentio	Consentio is an end-to-end food supply chain transaction platform with a state-of-the-art user interface that delivers deep connection with providers and customers.	2.4
Wetaca	Wetaca helps people to eat well by selling and cooking enjoyable, healthy, and varied meals delivered once a week.	2.2
VEnvirotech	VEnvirotech transforms organic waste into bioplastics for the good of the environment and better compatibility with the human body.	2
EthicHub	Ethichub is a blockchain-powered platform that connects small unbanked farmers with users and buyers from all over the world, generating an ecosystem where everyone wins	1.4

Source: prepared by the author.



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Spain, foodtech nation



Spain is internationally regarded as one of the world's leading powers in gastronomy. Our acclaimed chefs, the excellence of our food products and the quality of our gastronomic product range positions us at the forefront of food innovation. We are leading experts in good nutrition and we have key factors to build the future of food.

The efficiency of our agri-food value chain together with the technological developments generated by the various players in the ecosystem, the major commitment to the sustainability of the entire value chain together with the considerable increase in both public and private investment in the Foodtech sector are leading to the creation of an entire Foodtech Nation. In the following pages we will see how Spain is responding to the different challenges of the food system and blazing the trail of foodtech development:

- **Leading the wave of alternative protein**
- **Development of healthier and more sustainable ingredients**
- **Driving a more efficient and sustainable agri-food system**
- **Transparency and traceability in the value chain**
- **Gastronomy and Foodtech join forces to provide solutions**
- **The reinvention of foodservice**

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Leading the wave of alternative protein.

There is a protein revolution that is transforming the food system worldwide. Plant-based approaches, cell agriculture, and the production of protein from fermentation processes are ways to respond efficiently and sustainably to the challenge of protein production without exploiting animals.

With a powerful meat sector, with an annual turnover of almost €30,000 Million, Spain is undoubtedly one of the big players working on the development of alternative protein and its global expansion.

Among the main startups working on this “protein revolution” is Barcelona-based Foods for Tomorrow, the plant-based startup with the highest growth in Europe, which with its Heura Foods brand has seen a 460% increase in sales in the last year. It sells and markets its products throughout Europe, North America, Singapore and Hong Kong.

To promote the development of new and better plant-based products, Zyrular Foods, with its innovative approach in Europe, integrates development, production and distribution of new vegetable protein products, supporting the growth of emerging brands in the sector throughout Europe.

For future cell agriculture developments, one of the fundamental technologies, CRISPR, originated in the University of Alicante, created by the team led by Francisco Mojica and later developed by the 2020 Nobel Prize winners in Chemistry Emmanuelle Charpentier and Jennifer A. Doudna. This accessibility to knowledge is causing the transitioning of researchers (and startups) from the

medical and biotechnological field to foodtech. This is the case of Biotech Foods, Novameat and Cocuus.

Fermentation is one of the most promising ingredient production techniques for developing high-quality protein from sustainable sources. Currently, there are several Spanish startups carrying out highly significant developments in this area that will come to fruition throughout 2021.



Biotech Foods, with its “Ethicameat”, is the first cultured meat startup to receive investment from the European Union to develop its activity.



Spain, foodtech nation

Development of healthier and more sustainable ingredients

According to the 2021 Bloomberg Healthiest Country Index, Spain is the healthiest country in the world, thanks to its favourable living conditions, but especially thanks to the quality of its food and the Mediterranean diet.

As a result of the effort for a better diet and a growing demand from consumers for quality food and clean labels, great advances are being made in the research and development of healthier ingredients with functional properties that make it possible to improve people's lives.

Our great work in this area has aroused the interest of large companies such as one of the largest American producers of cereals and vegetable oils, Archer Daniels Midland Company (ADM), which has recently acquired the spin-off Biopolis, located in the Science Park of the University of Valencia, a company that specialises in the development of healthy ingredients applicable to different industries, including food.

Working on functional ingredients, there is also Nucaps®, a CNTA spin-off startup that markets a unique nanoencapsulation technology for the industrial development of nanocapsules and biocapsules for bioactives and probiotics and that is currently developing projects with large food corporations in several countries. The reduction of sugars and fats in food production has become the great challenge for companies in the sector. Legislation and consumer demands are causing the development of solutions in this area.

With a novel solution in sugar substitutes, we find Baía Foods, one of the few startups globally that is developing the incorporation of miraculin into the food matrix, and that in 2021 will see its first commercial products with miraculin.



In the field of lipids, Cubiq Foods is a leader in the generation of cell-based fat, and has also developed hybrid and innovative ingredients that incorporate all the texture and flavour of lipids, allowing the development of clean labels on products.

The expertise in healthy and sustainable ingredients is evident in the development of microalgae, such as the company Fitoplancton Marino, the first company to obtain the European Novel Food authorisation, and the European Profuture project, led by researchers from the IRTA technology centre. There are also startups working in this field, such as Space Farmers, set up under the auspices of the University of Alicante.



Spain, foodtech nation

Driving a more efficient and sustainable agri-food system

Spain is one of the **main agricultural production markets in Europe** and that is why it has a great accumulated knowledge in this area, which has allowed the development of innovative technological solutions that promote a highly efficient and sustainable agri-food system.

Multiple actors compete from a business perspective with the aim of improving the quality and productivity of our agricultural sector, which already contributes **14.4% of the GVA of the primary sector of the EU-28¹**. We can find major developments of multinational companies such as the most important R&D facility in the world engaged in sunflower cultivation developed by the multinational Corteva in Seville.

Together with leading companies in the digitalisation of the field such as **Hispatec**, the great opportunities that the sector offers in Spain have led to the birth of technology startups and SMEs, which are developing multiple solutions to increase the efficiency of crops, including applications for monitoring the field, prediction and robotics to improve productivity. A significant example of the new players in the sector is **Agroptima**, a startup that offers software for the management of agricultural holdings and already has an investment of **€3.8 million and a presence in more than 20 countries**.

Shortening supply chains calls for a stronger connection between producers and distributors. Startups such as **Consentio, Plant on demand and Agrocompador** have developed management platforms to make this simpler. In addition, several platforms are emerging to link the producer directly with the consumer, offering the possibility of buying directly at source and receiving the purchase at home.

The cultivation of vegetables in increasingly adverse weather conditions and the objective of guaranteeing the food security of the population have led to the construction of greenhouses throughout Spain, until it has become the second-ranked country in hectares occupied by greenhouses², which have recently been evolving towards Industry 4.0 formats to increase the efficiency and control of these crops. This same motivation has led to the professionalisation of hydroponic cultivation in recent years on a global scale. Since 1991, consolidated Spanish companies such as NGS offer high-value extensive hydroponic solutions, becoming pioneers in their sector. In recent years, hydroponic cultivation together with the intensive use of other technologies, has led to the development of startups that focus on innovative crops such as vertical farming and indoor farming in startups such as Ekonoke, Groots, H2hydroponics, Vertical Green and Z Greens,

¹ *Observatory on the Spanish agri-food sector in the European context. 2019 report. Joaquín Maudos and Jimena Salamanca(2020). [Cajamar Caja rural- https://www.publificacionescajamar.es/series-tematicas/informes-coyuntura-monografias/observatorio-sobre-el-sector-agroalimentario-espanol-en-el-contexto-europeo-informe-2019](https://www.publificacionescajamar.es/series-tematicas/informes-coyuntura-monografias/observatorio-sobre-el-sector-agroalimentario-espanol-en-el-contexto-europeo-informe-2019)*

² *Estimated greenhouse vegetable production area and vertical farming concentrations . World Vegetable Map 2018. Rabobank.*



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Driving a more efficient and sustainable agri-food system

Leaders in technology for ecological cultivation

Spain is the country with the most hectares under organic cultivation in Europe, with 2,355 million hectares, which accounts for 9.3% of the total cultivated area. With an average annual increase of 7.5% in recent years, the growth of Spanish organic agriculture and livestock is driving the emergence of a large number of operators throughout the entire value chain¹.

A key aspect is **biofertilisers and the development of technology to improve naturally arable soils that improve the quality and efficiency of farms, such as Biome Makers**, with offices in Spain and the US, **which develops models on functionality soil to improve crop productivity**.

Xtrem Biotech, a spin-off of the **University of Granada**, is working along the same lines. Its objective is the development, production, marketing and sale of bio-stimulants and biopesticides

The search for animal welfare and the enhancement of biodiversity is fostering a reflection on extensive livestock farming and the development of technological solutions such as the innovative SME **Ixoriguè** that through the IOT and AI helps the extensive livestock farmer increase the profitability and productivity of their livestock in a few months.

Insects as a boost for sustainability

One of the areas that is receiving most attention from investors and industry is related to the **production of insects for the improvement of the production of proteins for animal consumption or as fertilisers for organic crops**. With an investment of €56 million, **Tebrio** is one of the world's leading startups. It focuses on the production of organic manure, protein for pets and aquaculture using “te-nebrio molitor” mealworms. **BioFlytech, a spin off of the University of Alicante**, with more than €16M of investment received, has focused on the use of insects to produce animal feed, and is building the largest insect production farm in Spain, with a production capacity of 1,000 tons per year of insect protein.

¹Avance de datos provisionales de producción ecológica 2019 en España: <https://www.mapa.gob.es/es/prensa/ultimas-noticias/la-superficie-eco%C3%B3gica-crece-el-48--en-2019-y-se-sit%C3%BAa-en-235-millones-de-hect%C3%A1reas/tcm:30-541106#prettyPhoto>



Spain, foodtech nation

Transparency and traceability in the value chain

The transparency of the value chain and food traceability are essential in a country where the quality of food production is exceptional and where its origin is increasingly important for the consumer. The commitment to the 211 PDOs endorsed by the EU, among which are some types of products such as oils with 29, 69 in wines, 26 in cheeses and 13 in fruits and vegetables.¹

In recent years, the development of solutions and the accessibility of these solutions, based on block chain technology, has accelerated and we find several interesting developments in multiple areas, but especially in one of the country's star products: olive oil, of which Spain is the world's n°. 1 producer and exporter.

In this area, we find institutes and universities such as the University of Cordoba working on projects, which has developed one with the brand Almazaras de la Subbética that shows the origin of the olive from when it reaches the factory until it is bottled. This oil is considered to be the best in the world.²

Large technology firms such as IBM Spain are also developing solutions together with companies engaged in the production of olive oil such as Galpagro, Rurápolis and Oleocano with the OliveTrace project.

This same company has developed for Carrefour Spain the first blockchain food traceability system in Spanish distribution in collaboration with the poultry company Coren and its IBM Trust solution.

Telefónica, a Spanish telecommunications company, is actively working on the digitalisation of the field, with an agreement with the FAO and the development of projects such as VisualNACert, included in its Wayra accelerator, from which very interesting solutions are being applied, among which is food traceability for the ACOR Agricultural Cooperative, with almost 4,500 farmer members.

Projects such as Sharebeef focused on the traceability of livestock, developed by experts in the field from the University of Cordoba-ETSIAM, are also growing in importance. The UCO also manages pilot projects that are deployed in 6 European countries: Spain, Portugal, Italy, Bulgaria, Croatia and Ireland.

In the final part of the value chain, some food companies are actively introducing these systems in their products for the consumer, such as Navidul, which will implement traceability for its Serrano ham throughout this year, so that the consumer can know in detail the origin of the product.

¹ Search for Geographical Indications across the European Union and beyond: <https://www.tmdn.org/giview/gi/search> . Retrieved 10 January 2021.

² Ranking of the World's Best Olive Oils 2019-2020. World Best Olive Oils (2020): <http://www.worldsbestoliveoils.org/worlds-best-olive-oils.html>

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Spain, foodtech nation

Gastronomy and Foodtech join forces to provide solutions

Spain is a world leader in gastronomy that we can quantify by observing its prominent presence in the list of the best restaurants in the world, where 3 Spanish establishments are among the top 10 and 7 among the 50 best restaurants in the world¹.

In addition to the quality of its restaurants, Spain has a long history in Food Technology research, and the output of scientific publications in this area in Spain is on a par with that of countries like the US and China.

This combination of avant-garde gastronomy that we find in Spanish restaurants, added to its great prestige in food technology research, has motivated collaboration between technology companies and renowned chefs, essential to achieve innovative foods, which are also tasty and beneficial for both human health and the planet.

This is the case of the startup Novameat, which recently announced the collaboration with chefs Oriol Castro and Eduard Xatruch, experts in molecular cuisine from the restaurant Disfrutar, with 2 Michelin stars, ranked ninth in the world.

Another example of synergies between gastronomy and food technology in Spain is the case of hydrolysed egg, patented by the CSIC, for which chef Mario San-

doval has developed different applications in order to maintain a taste and texture similar to original products such as yoghurts, ice cream or desserts, with healthier nutritional profiles.

In the field of production of new sustainable foods, Angel León and the Aponiente R&D team have been researching, together with the University of Cadiz and other scientific bodies, the marine eelgrass from which “the marine cereal” is extracted, successfully cultivating it for the first time in history. Its cultivation is in a controlled environment and it the most sustainable crop in the world as well as a new super-food cereal thanks to its nutritional properties and its numerous health benefits.



¹. <https://www.theworlds50best.com/>. Retrieved 10 January 2021.

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Spain, foodtech nation



The reinvention of foodservice

Spain is the country of gastronomy par excellence, not only for the quality of its cuisine, but also for the large number of restaurants, which stands at 277,539, and their diversity. In 2019, restaurant and catering sales exceeded €123,612 million, contributing 6.2% of Spain's GDP, double the contribution of countries such as the US, China or the United Kingdom.¹

A more efficient restaurant and catering trade thanks to the application of technology

The large number of restaurant establishments has led to the birth and development of multiple technological solutions in the areas of operations management, reservations and customer loyalty, payment management and the supply chain, among many others.

After the COVID-19 explosion, this sector, globally, has shown great vulnerability and there have been investments in solutions that increase the efficiency of restaurant management.

In Spain, in addition to international operators, startups such as Katoo are emerging. **Katoo** is developing digital tools for restaurants and suppliers that save time and money and prevent misunderstandings. It has finalised an investment of €3M.

Also gaining prominence are solutions that can expedite reservations and payments. **Mr Noow** succeeded in securing financing just before the onset of COVID-19 and we have witnessed numerous solutions in this field throughout the pandemic. **Proppos** is an automatic payment solution through the use of artificial intelligence, as it detects the food placed on a tray and is able to charge automatically without the need for a cashier. It was able to attract investment in the midst of the global lockdown of the restaurant and catering trade.

¹ Impact of COVID-19 on the restaurant and catering trade in Spain (April 2020). EY and Bain & Company.

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Spain, foodtech nation

The reinvention of foodservice

Undoubtedly, COVID-19 has consolidated the growth of Delivery as a commercial chain in the restaurant trade. Already in 2019, the food home delivery service in Spain grew by 16.8%, driven by growing consumer demand.

Spain's market leader, one of its two unicorns, with a total received investment of €450 million, is **Glovo**, which has meant a revolution in the way we consume food. It is the startup with the largest investment in Spain and, together with its international competitors, has fostered the development of an industry based on this service in which what are known as "dark kitchens" are beginning to play a key role.

This is the case of **Booh! Food**, a workplace and logistics centre focused on the world of 'food delivery', whose business model comprises two lines: a digital restaurant, with its own brands "that will work through the main applications of food delivery"; and the rental of these "ghost kitchens" to external restaurants. It has recently closed an investment round of **€1.2 million**.

Within this delivery boom, startups such as **Ordatic** and **Sinqro** have emerged with the aim of centralising all orders from the different delivery platforms and integrating them with the establishment's POS, thus making operations easier for restaurants.



Glovo has revolutionized the delivery sector and already has a total investment of 450M€

A SOLID INNOVATION ECOSYSTEM IN FOODTECH

More than **30,000**
companies in
food transformation

More than **20**
cutting edge
technological centres

More than **50**
specialised
universities

Leading the
transition
to alternative
protein

**SPAIN,
FOODTECH
NATION**

More than
400
Foodtech
startups

Leaders in
hydroponics
and indoor
crops

Developing
healthy,
innovative
ingredients

Leaders
in organic
cultivation

Leaders in
biotechnology
applied to
sustainability
in the food chain

Foodtech in Spain

Fuelling a more
sustainable
and efficient
Food System

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