

# The Great Potential of Rural Areas in Spain and Portugal for the Implementation of New Technologies

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The population density of the least populated regions in Spain is below 0.98 inhabitants per square kilometer, which is lower than in Lapland. These data cause great concern among European institutions. To solve this problem, efforts are being made to boost the technological potential of those areas through Precision Agriculture Solutions. IoT is often resorted to as a means of combatting this problem.

The regions of western Spain and central Portugal must take further steps towards updating and digitizing their production systems.

It is highly important for Europe to offer equal technological opportunities to all regions, and not only to the most developed ones. No one should be left behind in the technological revolution.

One of the keys to beginning the implementation of technological processes in chiefly rural areas is the generation of infrastructures prepared to support Research and Development. Once these infrastructures are generated, a technological and business network must be created to sustain and expand research, development, and innovation, and to ensure that it reaches all places. Specifically, our focus is on the regions of western Spain and central Portugal.

The technological potential of those areas arises from the possibility of industrializing and automating the processes involved in crop and livestock farming, and tourism. The implementation of technology in areas that suffer from depopulation will be a new opportunity for their population to flourish.

Livestock and agriculture are the sectors that will have the greatest opportunity to benefit from technology. Access to different data sources makes it possible to take timely decisions and to create automated and intelligent processes in agronomic activities. This will lead to the revaluation of the sector, making it more profitable and attractive for the population, thus promoting an increase in population.

For agriculture to become a more sustainable sector; conserving our resources and the biodiversity of the environment, rural resources must be managed as efficiently as

possible, and this makes the Internet of Things an essential tool in the rural environment.

Farmers who want to know the ideal moment for sowing or harvesting, or want to stay informed on the exact state of their crops (humidity, temperature, the toxicity of the soil, fertilization, etc.) can find their best ally in sensorization. If they also wish to carry out actions promptly, they can automate processes on their farms and control through their smartphone, saving time and money, and achieving great improvements in the quality of the products.

Likewise, livestock farmers can obtain great advantages from technology. Herds may be monitored employing sensors and connection tools that allow them to control the animals (feeding, health, etc.) and locate them.

Another key sector for the settlement of the population is tourism, which will also benefit from technology in that it will facilitate access, monitor the flow of visitors, a closer interaction between the visitor and the environment.

One of the uses that are becoming more common in the rural environment is that of devices connected through wireless communications. Such devices become intelligent tools that connect, forming a large information network that allows its users to act immediately in areas as diverse as agriculture, livestock, forest control, conservation, tourism or local and regional administration, etc.

The implementation of new technologies opens up great opportunities for the creation of employment and thus, the generation of wealth. However, the sensorization of processes entails possible security problems, so users and companies will have to invest in cybersecurity systems, VPN networks, intrusion detection systems, etc.

In connection with those efforts, the IoT Digital Innovation Hub has promoted several projects aimed at the implementation of ICT in the above-mentioned regions.

These projects are within the interregional program PocTep that promotes crossborder cooperation projects with the financial and structural support of the European Union.

The DISRUPTIVE project's objective is to enrich state-of-the-art of ICTs through collaboration among different entities in the PocTep region. This project strives to improve research and innovation infrastructures in the area. By achieving excellence in research and innovation, boosting business competitiveness through technological growth, and encouraging financial and social growth, those regions will have new possibilities. Moreover, those objectives are of great interest to European institutions. Within the PocTep region, this project focuses on innovation in Castilla y Leon and northern Portugal.

This is a challenge in which the Bisite Research Group of the University of Salamanca, CARTIF, the National Institute of Cybersecurity, the University of Valladolid, the Higher Institute of Engineering of Porto, ProducTech, the Polytechnic Institute of Bragança and ICE are participating.

In addition to the already mentioned objective of promoting research, technological development, and innovation, the project also seeks to bring scientific excellence to the area, as well as productive transformation.

This project will produce notable changes in the development and competitiveness of the region.

The pursuit of the IOTEC and DIGITEC projects is similar to that of the Disruptive project, however, they focus on generating a network of technical and technological participants that, like the latter, will promote research, technological development, and innovation in Castilla y Leon and central Portugal.

In this case, the participants of the project are the BISITE research group, AETICAL, ADEZOS, CARTIF, ICE, IPN, Tice.pt, and Inovcluster.

Similarly, this project intends to use the created infrastructures to generate a technological network throughout the territory.

In addition to the development of projects that generate wealth in the areas where IoT Digital Innovation Hub is implemented, it will participate in the organization of the IEEE GLOBECOM 2021 conference, which will take place in Spain for the very first time in 2021. It will be held at the IFEMA and is a reference event for the communication and innovation of society worldwide. The General Chairs of this edition will be Professor Juan Manuel Corchado from the University of Salamanca and also Professor Ana García from the Universidad Carlos III de Madrid. This conference brings together more than 2000 researchers from around the world and this time will be held in Madrid between 7 and 11 December next year.

Other professors who will be part of the organizing committee, include experts such as Sennur Ulukus (University of Maryland) who will act as the Technical Program Committee Chair, Joel Rodrigues (National Institute of Telecommunications of Brazil) the Executive Chair, or Javier Prieto (University of Salamanca) the Operations Chair.