

AGRICOOOP BIGDATA: intelligent processing of useful data in the production processes of cooperatives

Summary

This project produced intelligent reports, comparisons and forecasts for the cooperative sector to improve decision-making thanks to advanced analysis of the annual data generated based on the DUN agricultural declaration with machine learning and knowledge discovery methodologies. A cloud platform integrating this data, these models and these reports with other public databases that complement this information in a non-relational environment (big data) that can be used for strategic decision-making was designed, defined and validated.

The starting point was the data for the years between 2015 and 2021, obtained from the DUNs of the members of agricultural cooperatives in the DUN-CGE FCAC Group.

The different levels of data confidentiality and their use subject to data protection legislation were analysed.

Summary reports were obtained at various levels (campaign data, comparisons with the sector, geographical environment, historical comparisons) in order to be able to display the data in a simple and highly graphical format to facilitate strategic decision-making by cooperatives and by the FCAC itself. Tools were given to the managers of the organisations so they had more information to be able to produce new services and business models.

Objectives

- a. Establish the main indicators for descriptive analysis of the data included in the DUN, and assessment of the quality of the information it provides (detection and quantification of errors). Segmentation of indicators according to the interests of producers and other decision-makers.
- b. Propose an intelligent predictive model (based on the study of trends) to support strategic decisions for producers, agricultural cooperatives which are members of the DUN-FCAC group, and the Federation itself.
- c. Define an Agricoop-BigData platform that integrates DUN data with their records, the Spanish Agricultural Plots Geographic Information System (SIGPAC) as a mapping medium for locating producers and cooperatives, and other public or private databases which the FCAC and its partners can access.
- d. Apply innovative big data methods to analyse and exploit data from the Agricoop-BigData platform, in order to extract and display useful information for the recipient organisations, and perform the pilot tests necessary to validate it.
- e. Assess the trends in each data set analysed. Study an innovative system for forecasting and estimating future (prospective) developments using trends based on the study of economic, social and environmental data from each cooperative in the DUN-CGE FCAC group.
- f. Analyse the various levels of confidentiality of the data and its exploitation, while complying scrupulously with the provisions of applicable data protection legislation.

g. Obtain results that help facilitate decision-making by farm managers, cooperative managers and the representative organisation to create new business models and generate new services.

Description of the actions carried out in the project

1. Analysis of main indicators in the DUN.

Data analysis of the 6 DUN campaigns (2015-2021).

2. Predictive model for strategic decisions

Analysis of historical DUN data to identify strategic decisions at economic, social and environmental levels.

3. Define an Agricoop-BigData platform

Integrate data from various sources and frequencies: DUN, SIGPAC, public agricultural statistics databases and FCAC private databases.

4. Application of innovative big data methods

Analysis of the appropriate methods for the exploitation of data so that useful information for its users can be extracted and displayed.

5. Design of scenarios and production alternatives.

Proposal for an innovative system for forecasting future developments (based on trends) in production activities based on the data accumulated in the DUN and considering different production scenarios. Statistical techniques will be combined with machine learning techniques.

6. Implementation of an SaS platform.

Creation of a cloud-based platform to ensure location independence with 24/7/365 access, able to act as a data warehouse and generate and display the reports generated within the project.

7. Dissemination of the results

Dissemination of the project on different levels: on a sector level, with press releases and seminars aimed at the cooperative world and at the cooperatives involved in the project in particular. The project has also been disseminated on social media, on the FCAC website with the publication of various articles and news items during the project. Radio interviews and seminars have taken place.

Final results and practical recommendations

The main result obtained as a result of the project is an intelligent expert system (Agricoop-BigData) that enables quantitative and qualitative analysis of the historical data accumulated from 2015 to 2021 in the DUN databases, in order to be able to undertake a prospective analysis of the future based on various scenarios.

This system (Agricoop-BigData), which is based on techniques involving handling large volumes of data with advanced mathematical and statistical knowledge, provides valuable information for decision-making in various areas of the cooperative agrifood sector, ranging from individual answers for each member, strategic information for each cooperative and at the highest level, information for the sector organisation that represents them.

The system analyses the information, systematises it, orders it and can generate summarised reports which provide this strategic information, under the supervision of trained human resources.

The entire system comes together in the generation of high value reports that enable the analysis of information and strategic decision-making based on reliable data generated in the cooperatives themselves, and which enable new services to be implemented.

Finally, it is anticipated that the project will enable Catalan agricultural cooperatives and their members to make a qualitative leap, by using this information to improve their decisions at both the individual farm level and at the cooperative level. This qualitative leap must also lead to greater integration of cooperatives in the research field, and enhance relations with one of the country's leading universities in the field of agrifood, promoting collaboration in future projects.

The end result of the project is annual records for each cooperative in the DUN-FCAC group, listing all the campaign information, and providing comparative records between the cooperative and the DUN-FCAC group at the level of FCAC-Catalonia. Comparative records for the cooperative with its productive sector (8 sectors), a historical comparison of the years between 2015 and 2020, as well as future information (on the trend), which is displayed in the same historical record, have also been produced.

Conclusions

A large amount of data is generated annually by the members of agricultural cooperatives, which is not transformed into information which is useful to the cooperatives. The DUN is the annual declaration that enables the farms belonging to all producers in Catalonia to be updated systematically, as well as updating various government records and applications for grants. The result of the project is that data from the DUN can be combined with other data from different sources for the first time, and turned into information that can be exploited. As a result, each cooperative can obtain a set of individually relevant information, and draw conclusions from it.

For the FCAC, using knowledge based on real data of the different sectors represented (both agricultural and livestock farmers) to be able to negotiate new agricultural policies with the government, and to be able to achieve benefits for the sector based on the data processed is also innovative.

Leader of the Operational Group

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Other members of the Operational Group (not recipients of the grant)

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Subject area(s) of application

- ☒ Agricultural production system
- ☐ Agricultural practice
- ☐ Agricultural equipment and machinery

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| ☐ | Livestock farming and animal welfare |
| ☐ | Food quality/processing and nutrition |
| ☒ | Supply chain, marketing and consumption |
| ☒ | Competitiveness and agricultural and forestry diversification |

Geographical area(s) of application

PROVINCE(S): Catalonia.

ALL REGIONS: Catalonia. All

Dissemination of the project: publications, seminars, multimedia, etc. (State links)

- Dissemination on the website and social networks of the Federation of Agricultural Cooperatives of Catalonia.
- Speech at congresses
- Transfer seminar and seminars aimed at agricultural cooperatives
- Media interview (radio and industry magazine)

Project website

<https://www.cooperativesagraries.cat/ca/innovacio.html>

More information on the project

PROJECT DATES	TOTAL BUDGET
Starting date: October 2019	Total budget: €127,789.61
End date: September 2021	DARP funding: €50,988.05
Current status: Executed	EU funding: €38,464.67
	Own funding: €38,336.88

With funding from:

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Order ARP/133/2017 of 21 June, approving the regulatory bases for grants for cooperation for innovation by promoting the creation of European Association for Innovation operational groups in the areas of agricultural productivity and sustainability and the execution of innovative pilot projects by those groups, and Resolution ARP/1282/2018, of 8 June, announcing the call for the grant.



Generalitat de Catalunya
Departament d'Acció Climàtica,
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