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The promotion of innovation and the management of knowledge within agro-industrial clusters. The case of Spanish clusters

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ABSTRACT
In an economic approach, clusters are groups of vertically and horizontally linked and interrelated enterprises that can play a significant role in increasing their competitiveness through the adoption of innovative techniques and the exchange of knowledge.
The cluster concept should be understood as a form of smart economy, supporting the participating enterprises in order to provide them with innovation, business strategies and technical support, thus increasing their competitiveness. However, there is little research that focuses on the performance of the agribusiness as such; most researchers have concentrated on understanding the role and benefits of clusters for the region as a whole.
To fill this gap, this paper seeks to determine whether the fostering of innovation, competitive management and knowledge democratisation that should occur within a cluster has a direct economic effect on participating SMEs.
To fill this gap, this paper seeks to determine whether the promotion of innovation, competitive management and democratisation of knowledge that should happen within a cluster has a direct economic effect on participating SMEs.
The results obtained through the analysis of the evolution of variables such as financial profitability and the number of workers of the participating enterprises in two Spanish agro-industrial clusters in contrast with the enterprises in their region and the OECD as a whole, show that for the small and medium-sized enterprise segments, the innovation and information diffusion provided by the cluster affects them very positively by improving their performance, creating new jobs and bringing sustainable development to the sector, based on innovation and the training of the workforce.

Keywords: Agroindustrial cluster, Agrarian enterprise, AEI, Innovative clustert, Democratization of knowledge.

1 INTRODUCTION

In an economic approach, clusters are a geographical concentration of interconnected firms, specialized providers, service providers, companies in related sectors, and partner institutions, including scientific and research institutions, that compete, but also cooperate, receive, and share knowledge (Enright, 2003). They are vertically and horizontally linked and interrelated groups of enterprises that can play a significant role in increasing their competitiveness, through the adoption of innovative techniques, in the market and in the activation of the local community and territorial transformation (Elsner, 2000; Bogoviz et al., 2017). Cooperation can be described in detail and with different results, with or without market linkages (Rabelotti, 1995), sharing infrastructures and provision of complementary services (Rosenfeld, 1997), specialization of participants (Guerrieri et al.,

2001), vertical and horizontal relationships on a local commercial basis (Asheim, 2001) and, economic independence of collaborating entities (Guerrieri et al., 2001; Havierniková et al., 2016a; Ližbetinová, 2017; Melnikova et al., 2020).

In this sense, an agrarian cluster is characterized by being a concentration of producers, agro-industries and educational and administrative institutions that support the sector, and that interact and build networks to address common challenges and opportunities (FAO, 2010). For this body, this type of approach recognizes that all actors in the agricultural value chain are more innovative and successful when they interact with support institutions and other actors in the supply chain, promoting vertical and horizontal linkages between local agricultural enterprises, as well as supportive relationships between them and accompanying organizations (FAO, FAO, 2010).

Therefore, European and global policies encourage the formation of agro-industrial clusters as a way to support both small farmers and agribusiness, strengthening and qualifying local companies to increase the demand for labour and income in the territories. In this way, what is sought is a sustainable local development, respectful with the environment and lasting over time, based on innovation in the sector and on the training and qualification of workers (Pimenta-Alonso, 2021).

In Spain, these policies are defined by the Ministry of Industry through the Support Program for Innovative Business Groups (AEIs), which is how clusters are officially called in this country. The objective of the AEIs is to promote the excellence of business groups by concentrating aid and subsidies on innovation projects, encouraging cooperation between companies and facilitating their participation in innovation and internationalization programs of other national and European organizations.

Taking into consideration the above, this work aims to determine whether the promotion of innovation and the management and democratization of knowledge that is intended to occur within a cluster cause a direct economic effect on participating SMEs.

To achieve this objective, from a quantitative perspective and using secondary data, the contribution of AEIs to regional economic development and the growth of participating companies is investigated, analyzing the evolution of financial profitability and the number of workers of these companies in comparison with the region where the AEI is located and with OECD data.

In view of the above, the structure of the document is as follows: first, this brief introductory part is presented to guide the reader about the study; secondly, it defines the theoretical framework on the concept of innovation and shared knowledge driven by clusters; The research methodology and its data sources are explained below; Fourthly, the results obtained are presented and, finally, the conclusions are presented.

2 THEORETICAL FRAMEWORK

Although the initial approach for the creation of a cluster is different depending on the country, the final objective is always the same: to encourage the local economy and favor the growth and strengthening of the participating companies by increasing their efficiency and competitiveness (Pimenta-Alonso, 2021).

Discourses on regional development have long pointed to the importance of agglomeration and proximity as the main driver of competitiveness (Porter, 1997; Marshall, 1920) and innovation (Schumpeter, 1934; Henry and Pinch, 2000). Bringing companies together, whether physically, organizationally, institutionally, socially and/or cognitively, to share knowledge and human capital, increases the likelihood of innovation occurring (Merrell et al., 2021). For Porter (2024), clusters are critical masses, in the same place, of unusual competitive success in specific sectors. For this author, clusters are a striking feature of virtually all national, regional, state and even metropolitan economies, especially in economically more advanced nations.

According to Leme et al. (2019), in the less favored territories, it is from agriculture and livestock that the organization of new clusters begins. For this author, the application of the concept of cooperation networks in agribusiness allows considering an alternative form of organization of the value chain, in addition to expanding the effects in terms of network links that are formed in these places, such as the emergence of new cities and the birth of a regional economy previously nonexistent (Mukumov et al., 2021). These new and incipient arrangements attract government investment and can be considered as regional development in its purest form, starting from the production of primary goods (Leme et al., 2019).

The phenomenon of clusters is an increasingly popular and significant topic among researchers (economists, urban planners and sociologists), practitioners and policy makers. In addition, the current competitive environment demands that not only individual companies, but all economic agents of a cluster have the ability to build and plan a network system to develop programs. This represents a task that economic actors are not able to provide individually (Brown, Burgess, Festing, & Royer, Citation2013).

SME clusters and networks can perform better than individual firms and facilitate the development of international markets and innovations (Pimenta-Alonso, 2021). In addition, they reduce the financial needs of companies, both for working capital and fixed capital components. Therefore, the sharing of investments leads to a distribution of risk between companies (Čolović et al., 2016).

Clusters, in a strict sense, are usually only a small part of the regional economy, but they are often instrumental as transmitters of knowledge and innovation to individual firms or entrepreneurs

(Brown et al., 2013). These organizations must function as a comprehensive growth tool for companies, as long as their principles are assumed as their own (Alonso, 2016; (Mukumov et al., 2021).

With respect to agricultural or agro-industrial clusters, Tapia et al. (2015), affirm that this type of cluster has been repeatedly described as one of the factors of competitiveness of agriculture in the XXI century, because they allow to improve processes and products, they are a means for developing countries to insert themselves in globalization, They are one of the ways in which territories can capture benefits, in addition to being promoters of productivity in the food industry.

Knowing that current agriculture must be connected to an environmentally sensitive production system, Silva et al., (2020), affirm that the practice of sustainable agriculture goes through the proper management of agricultural land and the adoption of correct and environmentally friendly practices. These authors affirm that, for this to happen, it is necessary to bring the farmer the necessary training, bringing him closer to innovation and technologies made available by research and research organizations. This is one of the main functions of an agro-industrial cluster, to base its actions on the formation of the human capital of its members in all those aspects that are necessary to improve their performance and income, in addition to reducing the environmental impact of their actions (Pimenta-Alonso, A.M., 2021).

The importance of clusters lies in their specific characteristics that increase the success of companies in the face of competitiveness, contributing to the generation of wealth and employment in the regions where they operate (Ferreira et al., 2018; Mukumov et al., 2021). Closely related to these effects is the role of rural development, which for Fawzy & Shaymaa, (2020) is the empowerment of low-income families, improving their social well-being (Gallego-Bono and Chaves-Ávila, 2020).

Given these statements, the idea arose to carry out this research to know if the policies to promote innovation and the dissemination of knowledge are really effective for improving the competitiveness of the agri-food company and for the development of the territory where they operate.

3 RESEARCH METHODOLOGY

The design of the research was carried out through the case study methodology, which, according to Eisenhardt (1989), allows to build the theory from the case. In this sense, Gudermann-Kröll (2013) points out that the case study, within social research, is one of the basic pillars that contributes to understanding the behavior patterns of the companies in question.

Other authors such as Cabeleira (2017), Fayos et al. (2017), Sagarpa (2017), Caja (2015), Pittaluga (2014), among many others, have also used the case study in their research on clusters or agglomerations of companies.

3.1 DATA SOURCE AND DESCRIPTIVE ANALYSIS

For the case study, the clusters CLUSAGA (Galician Food Cluster), created in 2010 and with 120 associated companies at the time of the research, and FOOD+i (in the Ebro Valley region), created in 2009, grouped more than 90 companies, knowledge centers and other entities related to innovation, were chosen. These clusters were selected for their representativeness in the Spanish agro-industrial sector, their objective of promoting the competitiveness and development of the sector and for their form of organization and transparency with institutional information.

The information was collected from secondary data by consulting the SABI (2020) and AMADEUS (2020) databases. Information was sought regarding the evolution of the financial profitability and the number of workers, in the period between 2007 and 2018, of the companies participating in the clusters comparing them with the set of companies in the region of Galicia and the Ebro Valley and with the companies included in the OECD territory.

To obtain more significant results by company size, these were divided into four categories: microenterprises (from 1 to 9 workers); small enterprises (from 10 to 49 employees); medium-sized enterprises (from 50 to 249 employees) and large enterprises (250 or more employees).

Using a quantitative approach, the analysis of the data obtained through statistical methods of time series with inference of behavior from the analysis was carried out. Simple regression models were used for each of the variables using time as a regressor and each model was validated in terms of significance of the parameters by the t test and jointly by the F test and the coefficient of determination (R2).

4 RESULTS

Below are the results obtained by each cluster and by company segment within the cluster compared to the cluster itself, the region of Galicia or the Ebro Valley and the OECD. First, the Financial Profitability variable will be analyzed and secondly the Number of Employees variable.

4.1 ANALYSIS OF FINANCIAL PROFITABILITY

The data obtained from the Financial Profitability variable are in percentage with respect to the previous year. Table 1 shows CLUSAGA data and Table 2 shows FOOD+i data.

Table 1.: CLUSAGA Financial Profitability Data

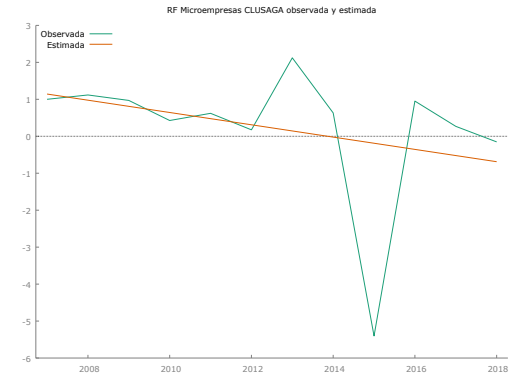
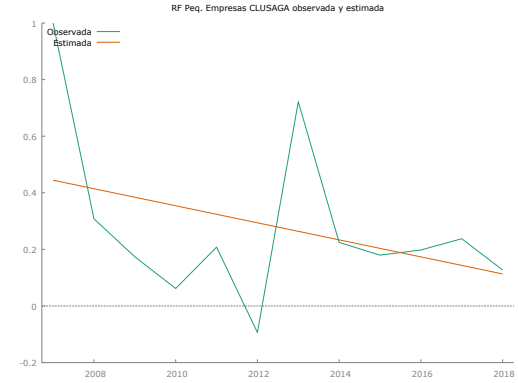
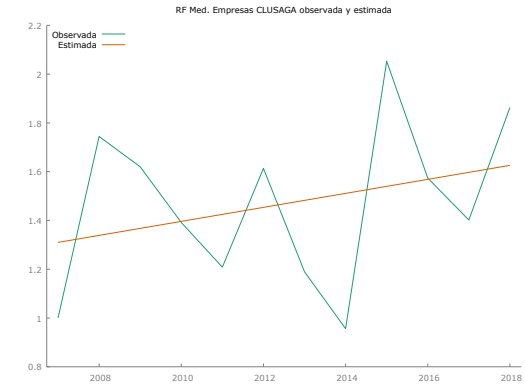
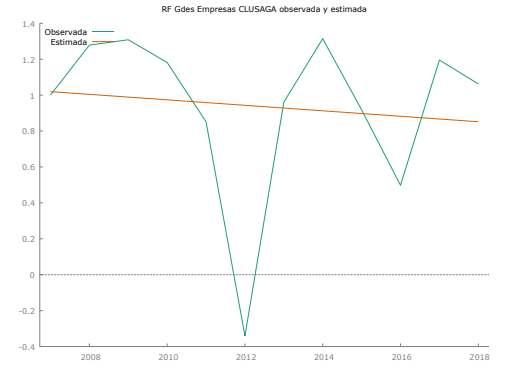
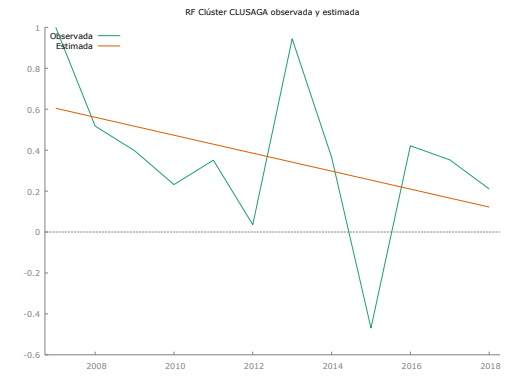
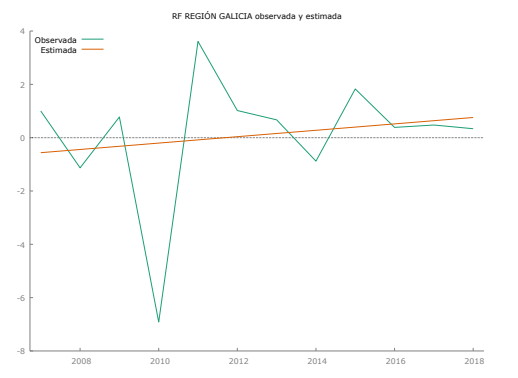
YEAR	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
MC	28,55	31,91	27,68	12,19	17,73	4,98	60,61	18,04	-154,26	27,18	7,68	-4,34
ON	48,88	15,06	8,50	3,02	10,17	-4,58	35,28	10,98	8,78	9,67	11,62	6,23
ME	7,20	12,55	11,66	10,01	8,69	11,61	8,56	6,88	14,77	11,32	10,09	13,41
GIVE	8,69	11,11	11,37	10,27	7,40	-2,96	8,35	11,43	7,98	4,33	10,39	9,23
CLUSAGA	29,44	15,23	11,69	6,82	10,33	1,06	27,80	10,77	-13,80	12,40	10,38	6,20
WALES	16,78	18,97	13,02	-116,03	60,56	17,09	11,22	-14,75	30,67	6,48	7,96	5,64
OECD				7,81	6,80	6,49	6,61	7,96	7,58	7,78	7,59	6,14

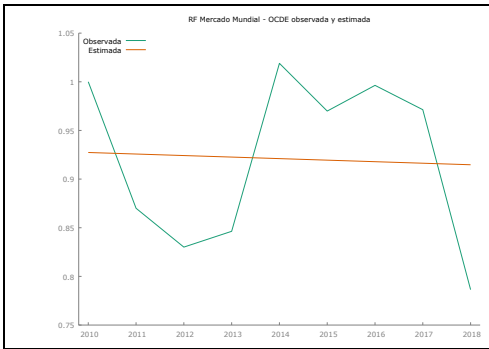
Table 2: FOOD+i Financial Profitability Data

YEAR	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
MC	-11,36	25,47	93,26	5,28	14,43	-75,26	16,99	4,29	17,76	14,72	-15,90	11,33
ON	3,66	31,42	-10,51	11,18	-2,33	2,13	3,01	8,41	4,60	13,81	12,63	13,31
ME	7,66	6,22	10,49	8,58	6,13	0,49	-9,05	6,42	12,99	19,54	8,91	15,28
GIVE	10,07	8,63	2,93	2,84	20,32	15,27	16,80	10,77	10,70	1,60	-15,94	-12,93
FOOD+i	2,03	19,01	27,42	7,95	7,37	-19,50	3,65	6,89	1,77	14,86	0,17	11,02
EBRO VALLEY	11,62	-4,55	16,72	18,57	-17,99	20,82	6,14	-122,65	14,67	23,91	80,65	7,41
OECD				7,81	6,80	6,49	6,61	7,96	7,58	7,78	7,59	6,14

Using the ordinary least squares method, the graphs and statistical models of Illustrations 1 and 2 were obtained.

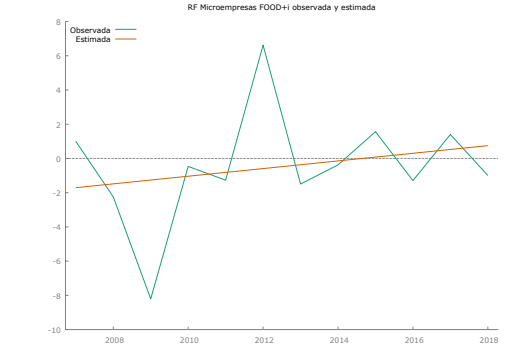
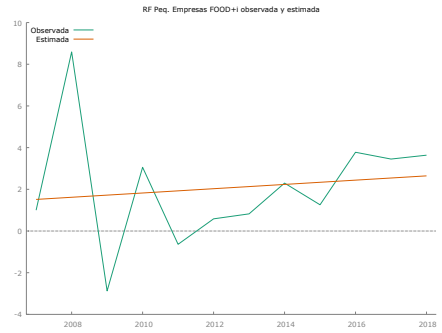
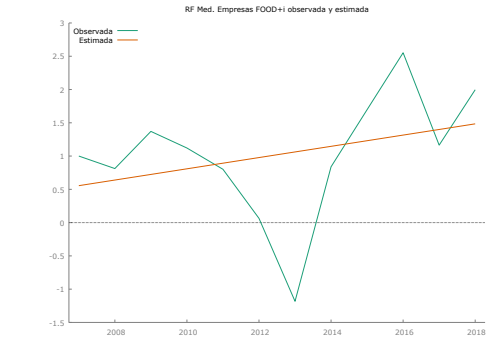
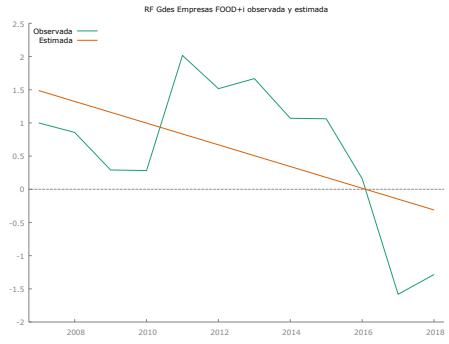
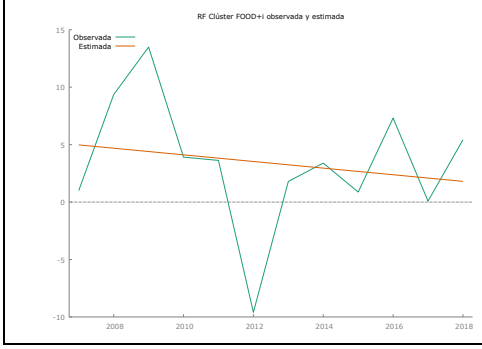
Figure 1: CLUSAGA Financial Profitability graphs and statistical models.Estimated variable (orange) and observed variable (green) against time

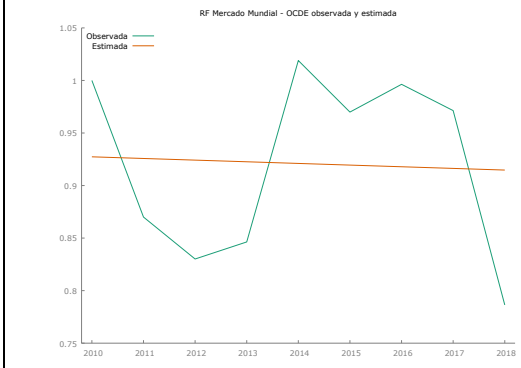
MICRO	SMALL BUSINESSES
	
$Y = 335.173 - 0.166433T$ R2 $_{aadjust}$= 0.013872 ds = 0.154880	$Y = 60.8687 - 0.0301067T$ R2 $_{aadjust}$= 0.048061 ds = 0.0241406
MEDIUM-SIZED COMPANIES	LARGE COMPANIES
	
$Y = -56.3380 + 0.0287235T$ *R2 aadjust*= 0.002501 *ds = 0.0283353*	$Y = 31.6381 - 0.0152559T$ *R2 adjust*= -0.084597 *ds = 0.0404820*
CLÚSTER CLUSAGA	REGION - GALICIA
	
$Y = 88.6612 - 0.0438748T$ *R2 aadjust*= 0.087847 *ds = 0.0305736*	$Y = -241.425 + 0.120011T$ *R2 aadjust*= -0.067498 *ds = 0.217497*
WORLD MARKET - OECD	


$Y = 4.09333 - 0.00157512T$ *R2 adjust*$= -0.140068$ *ds = 0.0120358*

Source: Authors.

Figure 2: FOOD+i Financial Profitability Graphs and statistical models. Estimated variable (orange) and observed variable (green) against time

MICROENTERPRISES	SMALL BUSINESSES
	
$Y = -450.008 + 0.223368T$ *R2 adjust*$= -0.037594$ *ds = 0.288019*	$Y = -204.644 + 0.102720T$ *R2 aadjust*$= -0.081180$ *ds = 0.246203*
MEDIUM-SIZED COMPANIES	LARGE COMPANIES
	
$Y = -168.924 + 0.0844439T$ *R2 aadjust*$= 0.014417$ *ds = 0.0783734*	$Y = 329.768 - 0.163568T$ *R2 adjust*$= 0.215296$ *ds = 0.0816001*
FOOD+i CLUSTER	REGION – EBRO VALLEY
	

$Y = 584.282 - 0.288643T$ *R2 adjust*$= -0.062725$ *ds = 0.487373*	$Y = -255.389 + 0.127098T$ *R2 aadjust*$= -0.085517$ *ds = 0.347962*
WORLD MARKET - OECD	
	
$Y = 4.09333 - 0.00157512T$ *R2 aadjust*$= -0.140068$ *ds = 0.0120358*	

Source: Authors.

The analysis of the main components of the Financial Profitability variable is shown in Figures 3 and 4.

Figure 3: Main components of CLUSAGA's Financial Profitability

Comunalidades

	Extracción
RF_MC_CL	,972
RF_PE_CL	,889
RF_ME_CL	,769
RF_GE_CL	,824
RF_CLUSAGA	,970
RF_GALICIA	,766
RF_OCDE	,735

Método de extracción: análisis de componentes principales.

Varianza total explicada

Componente	Sumas de cargas al cuadrado de la extracción		
	Total	% de varianza	% acumulado
1	3,016	43,082	43,082
2	1,776	25,366	68,447
3	1,134	16,194	84,641

Método de extracción: análisis de componentes principales.

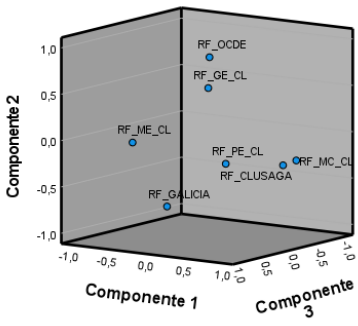
Matriz de componente[a]

	Componente		
	1	2	3
RF_MC_CL	,849	-,239	-,440
RF_PE_CL	,686	-,137	,632
RF_ME_CL	-,852	-,131	,161
RF_GE_CL	,384	,634	,525
RF_CLUSAGA	,958	-,222	-,039
RF_GALICIA	-,177	-,706	,487
RF_OCDE	,036	,856	,006

Método de extracción: análisis de componentes principales.

a. 3 componentes extraídos.

Gráfico de componente



Source: Authors.

Figure 4: Main components of FOOD+i Financial Profitability

Comunalidades

	Extracción
RF_MC_FI	,784
RF_PE_FI	,853
RF_ME_FI	,633
RF_GE_FI	,871
RF_FOOD+i	,919
RF_VALLE EBRO	,628
RF_OCDE	,274

Método de extracción: análisis de componentes principales.

Varianza total explicada

Componente	Sumas de cargas al cuadrado de la extracción Total	% de varianza	% acumulado
1	3,111	44,446	44,446
2	1,850	26,427	70,873

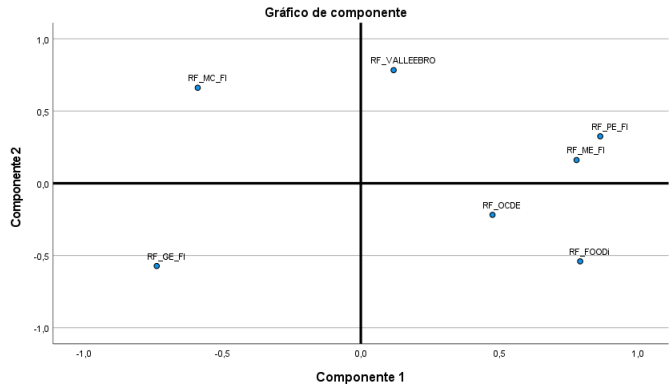
Método de extracción: análisis de componentes principales.

Matriz de componente[a]

	Componente 1	2
RF_MC_FI	-,589	,661
RF_PE_FI	,864	,325
RF_ME_FI	,779	,161
RF_GE_FI	-,737	-,573
RF_FOOD+i	,792	-,540
RF_VALLE EBRO	,118	,783
RF_OCDE	,475	-,218

Método de extracción: análisis de componentes principales.

a. 2 componentes extraídos.



Source: Authors.

Once the statistical analysis of the financial profitability data has been carried out, it is observed that the line of evolution of the cluster for this variable is not clear, there are increasing and decreasing moments, but that it only presents negative data in the years 2012 and 2015 - due to the fall of this variable in the microenterprise segment. It is also verified that in CLUSAGA the only segment that presents an ascending line for this variable is that of medium-sized companies, all other segments and the cluster present a decreasing line. However, in FOOD+i the micro, small and medium-sized enterprise segments present an ascending line.

In addition, there is no correlation between the cluster and the region where it is inserted and neither with the OECD. As for the statistical model, the explanation of the variation of the variable in question by the model is poor, not being able to reject the null hypothesis in any of the cases.

Finally, it should be noted that, although the line of evolution of the financial profitability of clusters and business segments is not ascending in all cases, the average profitability data of each cluster are higher than those of the region (9% in the case of CLUSAGA) and practically equal to or higher than those of the OECD (3% in the case of CLUSAGA) (Leme et al., 2019; Porter, 1999).

4.2 ANALYSIS OF THE EVOLUTION OF THE NUMBER OF EMPLOYEES

The data obtained from the variable Number of Employees are in absolute values and are the average of the employees of the companies over time. Table 3 shows CLUSAGA data and Table 4 shows FOOD+i data.

Table 3: Data on the Number of Employees of CLUSAGA

YEAR	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
MC	6,00	5,40	4,67	4,83	5,29	4,86	4,43	5,17	4,75	4,91	5,60	4,50
ON	12,90	12,21	13,16	14,72	14,39	14,52	14,97	16,32	17,42	20,16	21,50	22,67
ME	42,44	42,12	44,24	53,06	55,81	59,06	55,22	58,44	61,53	69,19	71,72	87,22
GIVE	397,40	473,83	441,43	448,00	378,17	431,00	427,86	420,57	498,86	529,71	497,13	538,63
CLUSAGA	92,65	95,80	93,43	99,37	82,85	91,84	87,68	90,03	98,45	100,67	101,27	105,00
WALES	18,53	17,36	17,94	17,99	17,60	16,67	18,32	18,04	18,53	17,98	19,09	18,22
OECD				25,68	22,59	23,61	23,65	21,74	22,41	22,30	23,16	22,11

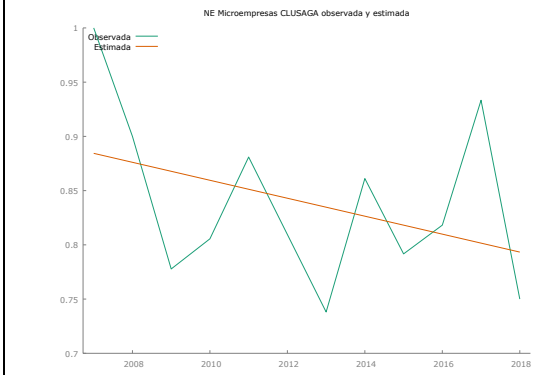
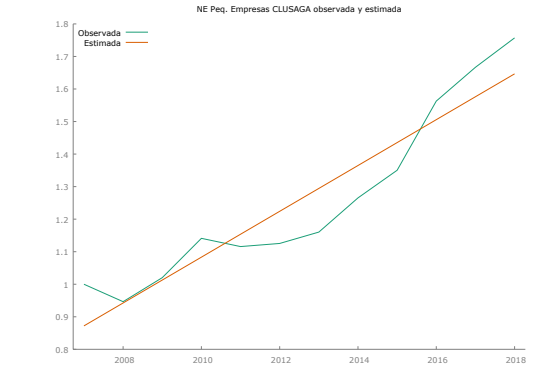
Source: Adapted from SABI (2020) and AMADEUS (2020).

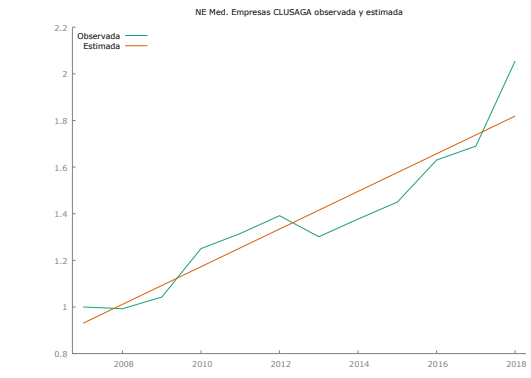
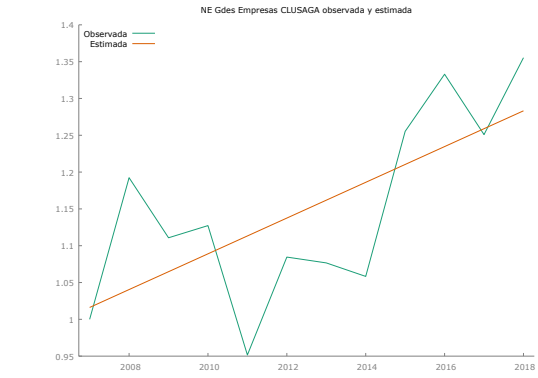
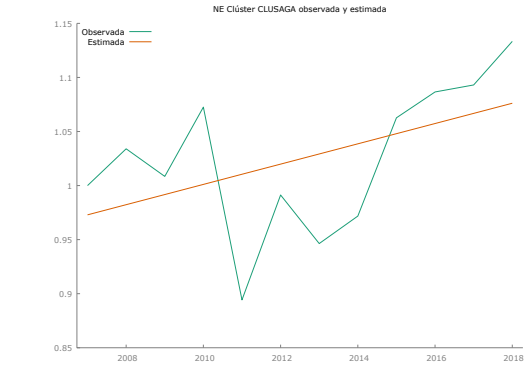
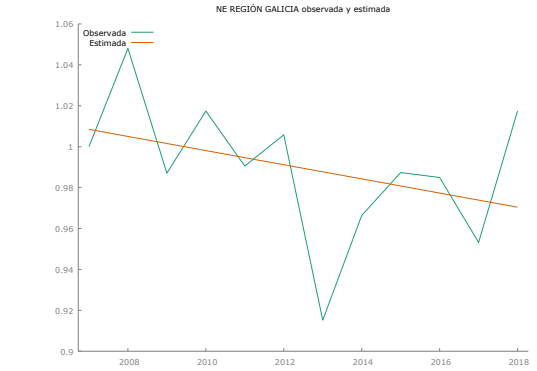
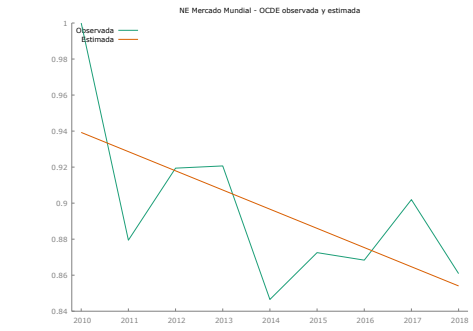
Table 4: Data on the Number of Employees of FOOD+i

YEAR	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
MC	7,43	6,67	6,17	6,06	5,75	5,61	5,19	5,06	5,94	5,41	5,16	5,32
ON	23,39	22,38	23,61	23,50	24,19	24,53	23,75	22,62	23,00	23,10	24,15	26,63
ME	71,15	74,56	67,60	72,70	66,47	67,30	67,13	70,87	77,65	84,18	86,78	92,18
GIVE	1506	1437	1303	1147	1374	1370	1291	1281	1311	1338	1412	1417
FOOD+i	402,09	175,80	137,77	139,34	153,34	141,37	151,52	149,58	157,08	160,55	162,53	168,80
EBRO VALLEY	19,47	18,05	17,08	17,11	16,51	16,62	16,79	17,19	18,03	18,23	18,30	18,53
OECD				25,68	22,59	23,61	23,65	21,74	22,41	22,30	23,16	22,11

Data source: Adapted from SABI (2020) and AMADEUS (2020).

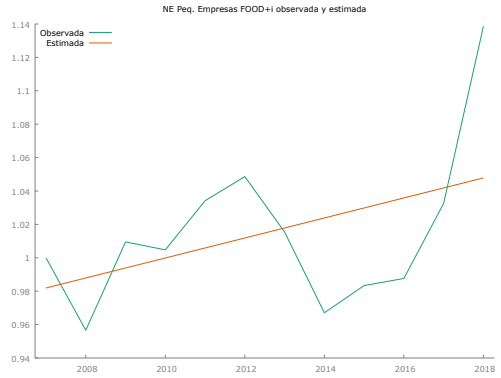
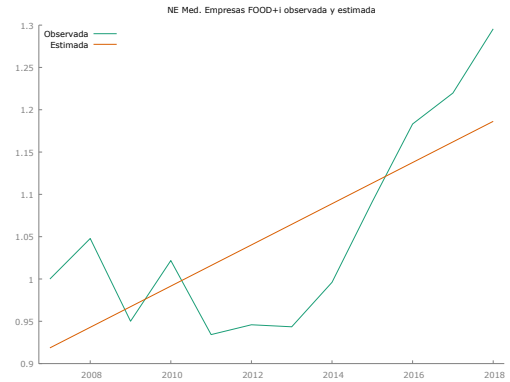
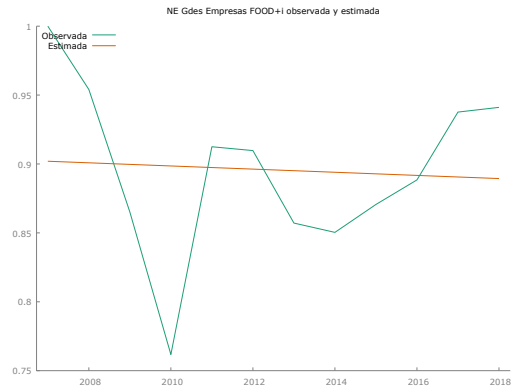
Figure 5: CLUSAGA Number of Employees graphs and statistical models. Estimated variable (orange) and observed variable (green) against time

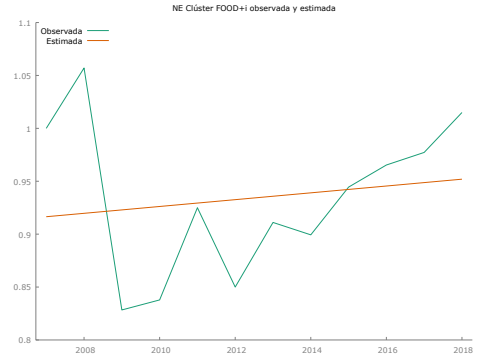
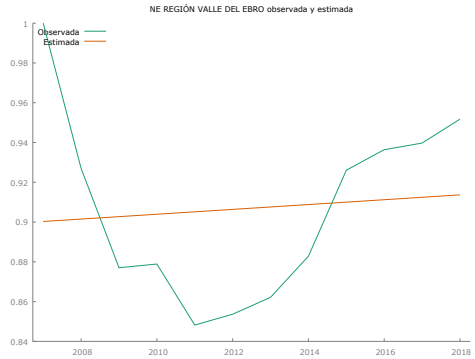
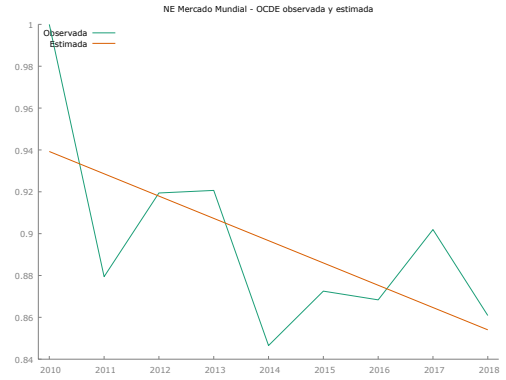
MICROENTERPRISES	SMALL BUSINESSES
	
$Y = 17.4988 - 0.00827821T$ *R2 aadjust*= 0.060168 *ds = 0.00634123*	$Y = -140.459 + 0.0704190$ *R2 aadjust*= 0.876345 *ds = 0.00792491*
MEDIUM-SIZED COMPANIES	LARGE COMPANIES

	
$Y = -161.148 + 0.0807564T$ *R2 aadjust*= 0.872041 *DS = 0.00926554*	$Y = -47.7117 - 0.0242789T$ *R2 adjust*= 0.413123 *ds = 0.00821093*
CLÚSTER CLUSAGA	REGION - GALICIA
	
$Y = -17.8574 + 0.00938230T$ *R2 aadjust*= 0.165911 *ds = 0.00525469*	$Y = 7.95093 - 0.00345912T$ *R2 aadjust*= 0.047404 *ds = 0.00278078*
WORLD MARKET - OECD	
	
$Y = 22.3523 - 0.0106533T$ *R2 adjust*= 0.307678 *ds = 0.00499141*	

Source: Authors.

Figure 6: FOOD+i Employee Number Graphs and statistical models. Estimated variable (orange) and observed variable (green) against time

MICROENTERPRISES	SMALL BUSINESSES
	
$Y = 43.5795 - 0.0212656T$ *R2 adjust*= 0.630347 *ds = 0.00478420*	$Y = -11.0450 + 0.00599250$ *R2 aadjust*= 0.126837 *ds = 0.00371791*
MEDIUM-SIZED COMPANIES	LARGE COMPANIES
	
$Y = -47.9271 + 0.0243377T$ *R2 aadjust*= 0.481399 *ds = 0.00726873*	$Y = 3.19612 - 0.00114306T$ *R2 adjust*= -0.095070 *ds = 0.00538725*

FOOD+i CLUSTER	REGION – EBRO VALLEY
	
$Y = -5.55603 + 0.00322497T$ *R2 adjust*$= -0.071929$ *ds = 0.00630207*	$Y = -1.54084 + 0.00121630T$ *R2 aadjust*$= -0.090276$ *ds = 0.00407267*
WORLD MARKET - OECD	
	
$Y = 22.3523 - 0.0106533T$ *R2 aadjust*$= 0.307678$ *ds = 0.00499141*	

Source: Authors.

The analysis of the main components of the Financial Profitability variable is shown in Figures 7 and 8.

Figure 7: Main Components of the Number of CLUSAGA Employees

Comunalidades

	Extracción
NE_MC_CL	,304
NE_PE_CL	,968
NE_ME_CL	,899
NE_GE_CL	,917
NE_CLUSAGA	,903
NE_GALICIA	,436
NE_OCDE	,702

Método de extracción: análisis de componentes principales.

Varianza total explicada

Componente	Sumas de cargas al cuadrado de la extracción Total	% de varianza	% acumulado
1	3,720	53,143	53,143
2	1,409	20,123	73,265

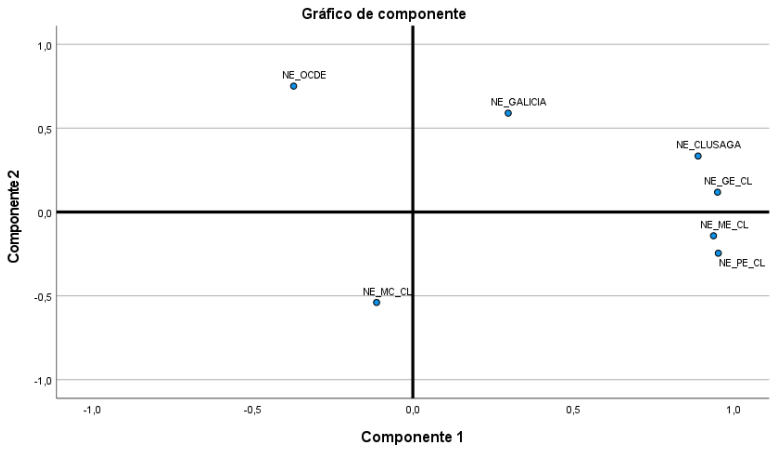
Método de extracción: análisis de componentes principales.

Matriz de componente[a]

	Componente 1	2
NE_MC_CL	-,113	-,539
NE_PE_CL	,953	-,246
NE_ME_CL	,938	-,142
NE_GE_CL	,950	,118
NE_CLUSAGA	,889	,334
NE_GALICIA	,297	,590
NE_OCDE	-,372	,751

Método de extracción: análisis de componentes principales.

a. 2 componentes extraídos.



Source: Authors.

Figure 8: Main Components of FOOD+i Employee Number

Comunalidades

	Extracción
NE_MC_FI	,651
NE_PE_FI	,951
NE_ME_FI	,974
NE_GE_FI	,871
NE_FOOD+i	,916
NE_VALLE EBRO	,987
NE_OCDE	,818

Método de extracción: análisis de componentes principales.

Varianza total explicada

Componente	Sumas de cargas al cuadrado de la extracción Total	% de varianza	% acumulado
1	3,909	55,847	55,847
2	1,246	17,805	73,652
3	1,011	14,440	88,092

Método de extracción: análisis de componentes principales.

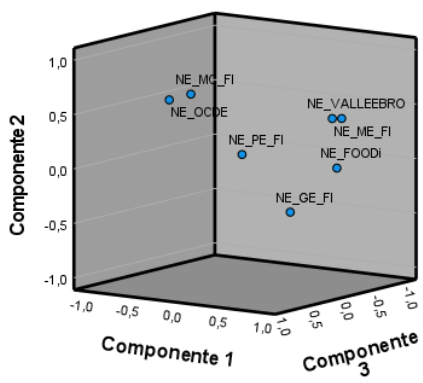
Matriz de componente[a]

	Componente 1	2	3
NE_MC_FI	-,531	,600	,096
NE_PE_FI	,518	,251	,787
NE_ME_FI	,848	,477	-,166
NE_GE_FI	,783	-,307	,404
NE_FOOD+i	,952	,044	-,090
NE_VALLE EBRO	,807	,444	-,372
NE_OCDE	-,686	,549	,214

Método de extracción: análisis de componentes principales.

a. 3 componentes extraídos.

Gráfico de componente



Source: Authors.

With regard to the number of employees, all business segments and the cluster, with the exception of micro-enterprises, show a positive trend in the evolution of their average number of employees. Small and medium-sized enterprises have achieved the highest growth, while regions have remained more or less stable, but the OECD has lost workers year after year.

Therefore, there is a positive correlation between the cluster and the small, medium segments and also between each cluster and its region, on the other hand, there is no correlation between the clusters and the OECD. As for R2, it explains the statistical model of the variable number of workers for small and medium-sized enterprises, for the CLUSAGA cluster and for the OECD. In these models, the null hypothesis is rejected. For the microenterprise segment and the Ebro Valley region, the model is poor and the null hypothesis is not rejected.

Finally, it is worth noting the growth in the average number of workers in small and medium-sized enterprises linked to the cluster (Mukumov et al., 2021; Navarro, 2019; Porter, 1997), 50% on average for small enterprises and 70% for medium-sized enterprises, with the only segment that lost

workers being microenterprises. On the other hand, the regions of Galicia and Valle del Ebro had an average negative growth of -3% and the OECD of -14%.

5 CONCLUSIONS

At the end of the study on the evolution of financial profitability and the average number of workers of the companies participating in an agro-industrial cluster in Spain compared with the region in which the cluster is inserted, Galicia on the one hand and Valle del Ebro on the other, and with the data of the companies that are part of the OECD territory, It is noted that:

- The average financial profitability of the companies linked to each of the clusters is higher than that of their region and practically equal to or higher than that of the OECD.
- The evolution of the average number of workers in companies, with the exception of micro-enterprises, linked to clusters is much more favourable than the evolution of companies in their region, and that, on the contrary, in this same period OECD companies have been losing workers year after year.
- Small and medium-sized enterprises are the ones that react best to the stimulus of the cluster, showing an average financial return between the two clusters of 10% and 9% respectively, well above the average of their region. Another strong point is the average number of workers, which increased by 50% for small businesses and 70% for medium-sized enterprises.

Taking into account the data presented, we must return to the initial objective of this work, which is to determine whether the promotion of innovation and the management and democratization of knowledge that is intended to occur within a cluster cause a direct economic effect on the participating SMEs. In this sense, it is clear that for the segments of small and medium-sized enterprises, between 10 and 250 workers, the innovation and dissemination of knowledge provided by the cluster affects them very positively in their financial performance both in their financial performance and in the size of this, and, therefore, they are the ones that best benefit from positive synergies and working in cooperation with other entrepreneurs and support institutions, improving its performance, creating new jobs and providing sustainable development to the sector, based on innovation and the training of the workforce.

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