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Article

Changes of dynamics in Local Productive Systems based on the Iberian Pig Transformation Industry in Western Sierra Morena (Spain)

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Abstract: Local Productive Systems (hereinafter LPS) based on agro-food industries constitute alternative models of development in peripheral rural areas that are subject to internal and external dynamics and processes. The main objective of the research is to investigate the processes and their consequences on four SPLs based on the Iberian Pig Transformation Industry (hereinafter LPS-IPTI) in SW Spain: Fregenal de la Sierra, Higuera la Real, Cumbres Mayores and Jabugo. Using secondary data, a comparison is made between 2002 and 2020 to establish the changes, causes and consequences on the LPS-IPTI studied. The results obtained indicate (1) business and territorial concentration of LPS-IPTI; (2) productive and territorial specialisation in standardised products and quality products; (3) simplification of industrial processes; (4) loss of employment, especially female; (5) external control of companies in the sector which, accordingly, results in the loss of prominence of local actors in favour of foreign companies, reduced social capital and the progressive loss of ownership of the LPS.

Keywords: Local Productive Systems; Meat Industries for the Transformation of the Iberian Pig; business processes; territorial processes; labour processes.

1. Introduction

Rural and marginal spaces have experienced a structural economic, demographic and territorial crisis since the middle of the 20th century [1,2]. They turned into marginal areas to the dominant development processes resulting in depopulation, lack of proper transportation connection and not adjusted to the markets [3,4]. These zones can also be considered disadvantaged in terms of absence of public and private services and low levels of investments [5,6] as well as marginalised due to the lack of demand thresholds, low profitability or "few voters" [6] where development seems to flee from [7].

In this unfavourable context, *The Future of Rural Society* [8] represents a turning point in Europe by proposing the "rural development from within" in which social and environmental endogenous resources replace exogenous resources in the processes of rural development [9]. Thus, rural development becomes the second pillar of the Common Agricultural Policy (hereinafter CAP) after the productive one, and community rural development policies set guidelines to generate multi-functionality and diversification, improve agricultural production, fix population, generate employment and income [10]. However, although the implementation of rural development policies produces obvious transformations [11], the effects of rural development have been uneven that further increased the differences between affluent and marginal rural areas [12] by contributing more to the development of the most central areas [4]. Given such circumstances, endogenous industrialisation models are observed as alternative models [13].

In 1890, Alfred Marshall observed the tendency to the spatial concentration of small and medium-sized companies (hereinafter SMEs) similar to each other, which generated specialised industrial areas, alien to those of large capitalist factories, which were called "Industrial Districts" [14], later known as "Marshallian industrial districts" [15,16]. This concept was recovered by Italian economists in the 1970s [17]. Later, the concept of Local Productive System (hereinafter LPS) is introduced [18,19] to define the levels of organisation of SMEs located in a territory that does not coincide with the vertical industrial structure, but rather corresponds to a specialised horizontal organisation [15]. Becattini [19](p. 38) defined an LPS as "a socio-territorial entity that is characterised by the active presence of both a community of people and a group of companies in a natural and historically determined area" that relates to historical, cultural and socio-economic reality [20]. Thus, the formation of an LPS in a territory has a positive impact on the competitiveness of the companies that are part of it [21](p. 7). These processes consequently contribute to the improvement of the economic and social conditions of the areas where the determining factors are controlled by local agents [21].

The birth of LPS is produced by the presence of primary elements such as raw materials [14,22,23] which generally emerge due to secondary factors like know-how, infrastructures, external stimulus [24] and achieve great economic dynamism through the generation of value chains. The study of LPS as rural industrialisation models based on their endogenous potential, quasi by analogy, passes to other disciplines, gaining special interest for territorial studies [25] despite changing of the themes. Thus, from local development perspective [26] this study encompasses the elements of territorial innovation [25,27,28], leadership and territorial management [29], political actions and governance [30,31], territorial marketing [32] or its strength in crisis situations [33–35].

In the case of agro-food industries, the proper agro-industrial districts are formed [36–38] defined by territorial and social embeddedness [39], generation of employment, benefiting from the know-how given that traditions and economic dynamism in terms of development of value chains [40]. However, the changes in the agro-food industry [41] significantly transformed since the 1990s due to both internal territories- and companies-related causes and external ones associated with the production, organisational matters, distribution and marketing and product quality of the markets [42]. The internal causes especially concerning rural areas such as demographic decline, unemployment, low dynamism and innovation, fragmentation and business conservatism and dependence on natural factors also contributed to these changes [42]. External causes, linked to processes derived from globalisation and regionalization of national economies [43], generated a true transformation of the food sector in terms of agriculture, industry, distribution and marketing of the production process, the organisation of companies, the institutional framework, distribution and the markets [44–49] particularly affecting Southern Europe [41,50]. These factors combined resulted in the restructuring which favoured the increase of external hierarchy where the competitiveness in globalised markets of large companies worsened the results of small ones by losing the importance of local skills [51]. Only the authentic products maintained the importance as local products combining the attributes of «product-process-place», known as 3P [52](p.116), by valuing the origin and traditional production methods [39]. However, given the segmentation, these strategies also captured the interest of large capitalist companies and large retail distribution [53].

In the SW of the Iberian peninsula, there is a unique agro-silvopastoral system that encompasses the *dehesa*, a historically cleared Mediterranean forest in which extensive livestock farming of the Iberian pig, known as *porco preto* or *alentejano* in Portugal, has traditionally arisen and taken advantage of the acorn of holm oaks and cork oaks during the *montanera*[1] (see Figures 1 and 2) [57].

[1] The period of autumn and winter during which Iberian pigs eat acorns in the *dehesas*.

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Figure 1. Distribution of dehesa in the Iberian Peninsula.

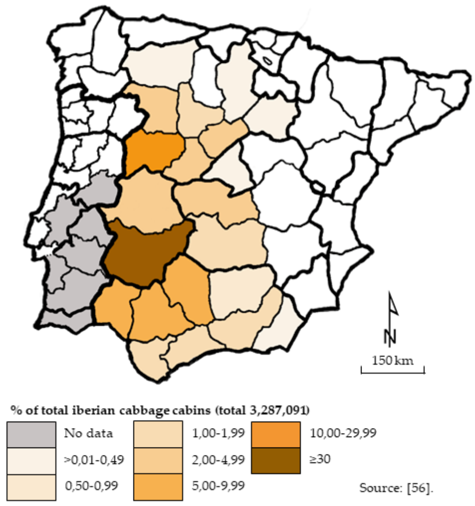
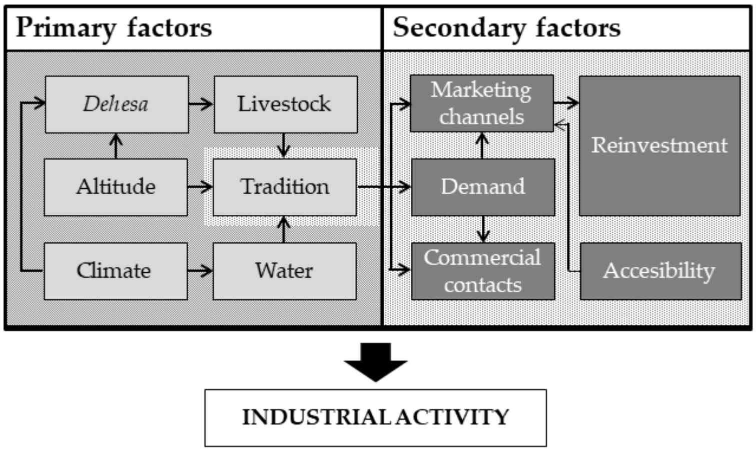


Figure 2. Distribution of Iberian Pig in the Iberian Peninsula (2018).

The Iberian pig transformation industries (hereinafter IPTI) are located around the traditional production areas that produce an international gourmet food, namely acorn-fed Iberian ham2. IPTIs are industries with specific production systems [45] and an important territorial base [59] whose origin and location are defined by the primary and secondary factors, as indicated in Figure 3 [60].



Source: [61](p. 126)

Figure 3. Primary and secondary factors of the IPTI.

The «territorial advantage» is among the primary factors [15](p.19) which related to the proximity of the raw material, namely, livestock, and the natural conditions such as climate and altitude necessary for curing products and water which is necessary for the industrial process that combined are fundamental for the location of the IPTI [62]. As in other agro-industries, these factors converge in the territory of tradition, know-how, ancestral values, non-transferable tacit knowledge, behaviours and institutions and social capital [15,20,25]. These factors also acquire identity values common to the population [63], which result in "the world of the Iberian pig" [57], where the know-how contributes to territorial development [63] through internal economies based on social capital.

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[2] The generic term "Iberian ham" includes shoulders. Three qualities are distinguished for hams, shoulders and loins, namely "Iberico de bellota", "Iberico de cebo de campo" and "Iberico de cebo" (intensive), and the variable racial purity is introduced (100% Iberian, 75% Iberian, 50% Iberian) [58].

The fact that the IPTI location does not fully coincide with those of production, as indicated in Figure 2 and 4, is due to secondary factors [60,64,65]. These secondary factors explain how to go from a primary, livestock-driven system to an industrial one of the IPTI. Particularly, the use of marketing channels, increased demand, reinvestment of agricultural and non-agricultural capital, increased accessibility by railways and development of commercial contacts between production areas that make up industrial districts since the end of the 19th century [60,61] were fundamental to the improved performance of the IPTI [66].

Often, IPTIs tend to generate agglomerations [67]. Although in the different regions there are industries in various municipalities[3] which could also be described by polycentric LPS [68] as industrial concentrations in the respective regions.

Through the scientific literature, 9 municipalities in 3 provinces and 6 agrarian regions are identified as LPS or LPS-IPTI (see Figure 4):

- Province of Salamanca: Guijuelo (RAg. Alba de Tormes) and Ledrada (RAg. La Sierra) [69–76][4].
- Province of Badajoz: Fregenal de la Sierra e Higuera la Real (RAg. Jerez de los Caballeros, hereinafter RAgJC) [70,71,77,78][5], Jerez de los Caballeros (RAgJC) [78], Monesterio [78] and Azuaga (RAg. Azuaga) [78].
- Province of Huelva: Cumbres Mayores (RAg. Sierra, hereinafter RAgSH) [72,77,79] and Jabugo[6] (RAgSH) [70–72,76,79].

[3] The Agrarian Regions (hereinafter RAg.; based on *comarca agraria*) were established by the regionalisation of the Ministry of Agriculture (1978). This regionalisation made it feasible to use the same criterion for the state as a whole, grouping municipalities by their common and uniform natural, economic and social characteristics.

[4] Boix & Galletto [70,71], Juste & Fernández [73] and Trullén [72] refer together of Guijuelo-district of Salvatierra-Ledrada (as Local Employment System in the first case, as industrial districts in the other two), while Seva-Larrosa [76] considers 46 municipalities, with a center in Guijuelo, as the Food Industrial District (hereinafter FID).

[5] Boix and Galleto [70] and Trullén [72] jointly consider Higuera la Real and Fregenal de la Sierra (see previous note), while Seva-Larrosa [76] considers Fregenal de la Sierra as the FIA of 5 municipalities and Higuera la Real of 4, noting that three municipalities from Huelva are included in this Extremadura FID).

[6] Seva-Larrosa [76] considers Jabugo as FID of 3 municipalities.

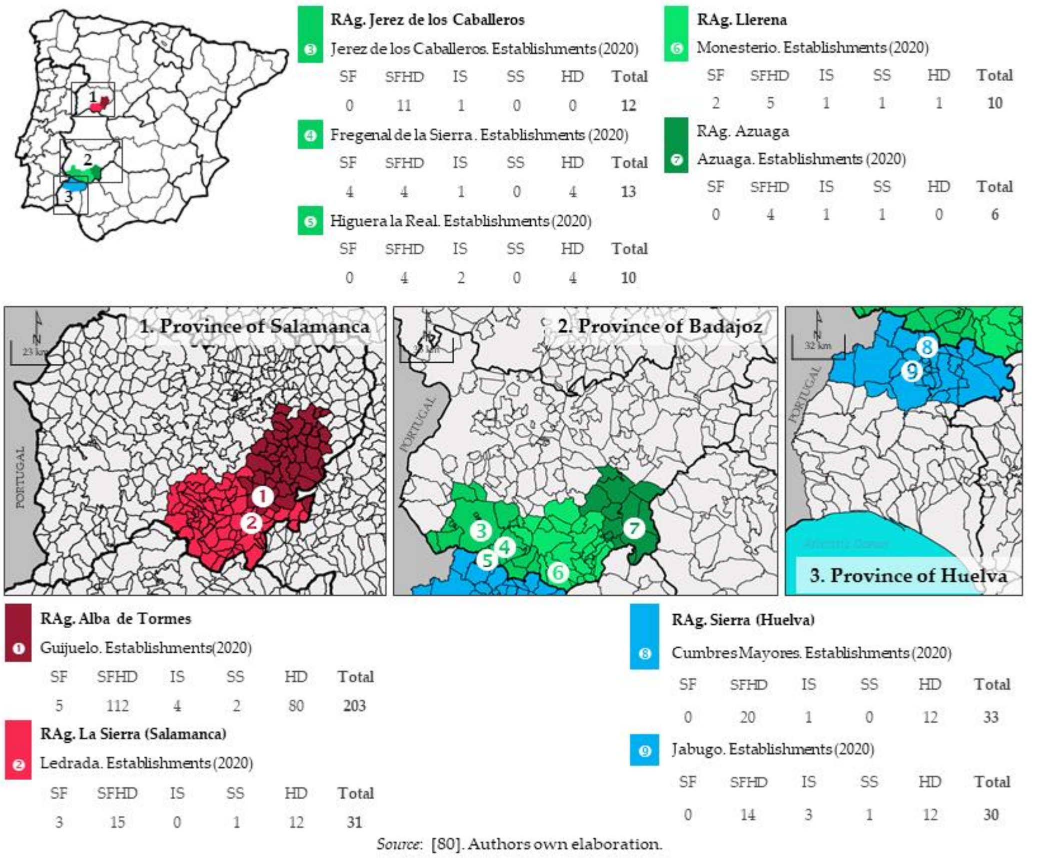

Figure 4. The localisation of LPS-IPTI.

Altogether, among the 9 LPS-IPTI there are 348 industrial establishments [80] and a total of 286 companies [81], standing out the number of which are based in Guijuelo (58.33% of the establishments and 55.59% of the companies), compared to the least of which based in Cumbres Mayores (9.48% and 9.79%, respectively), as shown in Figure 4. Among the nine LPS-IPTIs, 41.24% of the Iberian hams were marketed in 2019 in Spain [82].

In some cases, IPTI agglomerations are identified in poly-specialized LPSs [78]. There is also a recent trend towards agglomeration in regional or functional headquarters, i.e. areas well communicated or close to the LPS-IPTI (Pizarro-Gómez et al., 2021b). IPTIs present specific conditions that characterise the formation and continuity of LPS-IPTI (see Table 1).

Table 1. Specific characteristics of IPTI that determine LPS-IPTI

Type	Factor	Characteristics
Natural	Climate (rain/drought; hot/cold)	Inter-annual fluctuations in the quality of the raw material (abundance or not of acorn). Alternation of scarce or abundant productions and variable quality of the products) Loss of part of production (shrinkage)
	Climate / relief	Non-delocatable transformation
Agrarian	Non-subsidized livestock (outside the Common Agriculture Policy	IPTI demand determines livestock production
	Specific indigenous cattle	Racial purity: 100% Iberian, 75% Iberian, 50% Iberian

		Product shortage (and high price)
	Extensive cattle	Determine the quality (acorn, field, feed)
Industrial	Vertical segregation of the transformation process	The specialisation of the establishments: sausages factory (hereinafter FE) only produces sausages; ham dryer (hereinafter HD) dries so-called noble pieces; sausage factory and ham drying room (hereinafter SFHD) produces sausages and dries noble pieces; industrial slaughterhouse (hereinafter IS) slaughters and integrates all the previous activities; slaughterhouse services (hereinafter SS) only slaughter for other companies
	Low application of advanced technologies and machinery	Limited to cold application, electrification and mechanical machines. Innovation focused on the presentation of products (sliced, boned, etc.) Dependence on climatic factors
	Dedication of industries to the same phase of the process	Little internal specialization in the sector
	Rigid industrial process	Traditional product with a long life cycle (family brand, product quality, etc.) Poor adaptation to changes and market demands
Enterprise	Decapitalization and long payback periods	Impossibility of investing. Indebtedness
	Traditional external relations	Demand for raw materials from livestock companies Establishment of networks for the acquisition of services
	The internal organisation of the company	The predominance of the traditional company, based on personal relationships of those responsible for the company The growing presence of external business groups
Employment	High qualification	Specialization within the industry (master ham maker, butcher, pork meat specialist)
	Existence of Local Employment Systems (LEs)	Movement of workers between nearby municipalities (proximity trips)
	Know-how presence	Slaughter tradition moving to industrial employment
	Segregation by gender	Female employment in the production of cold cuts and fresh meat; male in the field, the slaughter and the production of hams and shoulders
	Seasonality of employment	The temporality of the raw material
Commercialisation	Diversity of Iberian pig products	Noble pieces (hams, shoulders and loins), sausages, salted and fresh Different qualities: with territorial ties (acorn, field) and without them (bait = intensive) Problems were due to ignorance (qualities, names,

		etc.). Market confusion, fraud
	International gourmet product	Noble pieces are known internationally and considered as luxury goods due to high price, very sensitive to fluctuations in demand
	Market segmentation	Based on quality (acorn, shoulders and loins) and counter-brand (PDO)
	Market fluctuations	Dependent on external and internal factors (cyclical crisis)
Institutional	The predominance of competitive relationships	The higher overall cost of the system (e.g. reaching the slaughter of animals at a great distance, for example)
	Generation of innovation networks (top-down approach)	Creation of Protected Denominations of Origin for Iberian Ham / Shoulder

Source: [42,59,60,61,83–89]

The changes that occurred in the agro-food industry in recent decades affect the LPS-IPTI and the IPTI that shape them experience cycles of crisis and expansion [42,60,61,78,90,91]. From each of these crises, the sector emerges restructured, sometimes without having overcome the previous crisis [92]. These processes coincide with the idea of the life cycle of the LPS, developed by Belussi and Sedita [93] and identified in the LPS-IPTI [90,91].

At the end of the 20th century and the beginning of the 21st century, the expansionary cycle motivate the increase in demand for a so-called luxury product that is projected in the sector with a production growth that generates a true “Iberian bubble” [75] in which everything “is for sale”. However, the international economic crisis means the beginning of a deep crisis with important repercussions on the LPS-IPTI [42].

Therefore, this study aims to address the internal and external dynamics and processes that individually influence each IPTI and collectively on the LPS-IPTI, producing adaptive changes, evolution (life cycles) and their transformation in the last twenty years. The research, thus, raises the questions on (1) what are the changes generated in IPTIs?, (2) what are its repercussions on the LPS-IPTI?, (3) What are its consequences on the labour market?

2. Materials and Methods

This research is multidisciplinary and is framed within the Geography of the Company [94–98] to analyse the enterprise-related, territorial and labour changes that occur in four LPS-IPTIs of the Iberian SW, namely Fregenal de la Sierra, Higuera la Real, Cumbres Mayores and Jabugo. The analysis includes the period from 2002 when the full expansion of IPTIs was taking place to 2019-2020 described by post-international economic crisis recovery. The methodology has previously been applied at both local scale [61,89,99] and regional scale [42,60,89].

The sources of data used in the research are secondary and include both official and private databases. The information on the industrial establishments for the transformation of the Iberian pig is obtained from the national state sources, in particular:

- Data in 2002 is obtained from the Registry of Establishments authorized for Intra-Community Exchanges (esp. *Registro de Establecimientos autorizados para Intercambios Intracomunitarios*; REAII, Ministry of Health and Consumption)[100]. Data were retrieved on July 18, 2002. There were 71 establishments among the four LPS-ICTIs studied.

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- Data in 2020 is obtained from the General Health Registry of Food and Food Companies (esp. *Registro General Sanitario de Empresas Alimentarias y Alimentos*; RGSEAA, Spanish Agency for Consumption, Food Safety and Nutrition, Ministry of Health, which replaces the previous one since 2011)[80]. Data were retrieved on March 16, 2020. There were 86 establishments among the four LPS-ICTIs studied.

These records exclusively offer static information at the time of consultation, so that historical data throughout the period and obtaining enterprise-related, economic-patrimonial and employment information are used from the private SABI database [81], as of March 14, 2020. Yet, this database does not offer on social enterprises. For the period, the data from in total 94 companies are handled by counting registrations and terminations of activity. This information is complementary to that from *Alimarket* [101] and *Expansión* [102,103].

The information on products marketed by the municipality (2019) is obtained from the "Informative Registry of Independent Control Organisations of the Iberian Peninsula" [82] (esp. Registro Informativo de Organismos Independientes de Control del Ibérico (hereinafter RIBER), Ministry of Agriculture, Fisheries and Food).

The Andalusian Multi-territorial Information System [104] database of the Andalusian Statistical Institute (hereinafter IECA) is used for territorial data on employment and specialization in Andalusia, and the employment data is also obtained from ARGOS Observatory [105]. The existence of two different Autonomous Communities makes it necessary to process the data to homogenise it. Employment data on the Affiliations to Social Security are retrieved from the Ministry of Employment and Social Economy [106,107]. Unemployment rates in terms of municipal averages are obtained from the *Expansión* database in a continuous series from 2006 to 2020 [108].

To complement these secondary sources with quantitative and qualitative information two questionnaires were used for the IPTIs of Sierra Morena Occidental in 2002 (hereinafter Q1) [60] and Jabugo in 2016 (hereinafter Q2) [61]. Informal interviews with professionals from the Iberian pig sector are further added to these data sets.

Out of the set of 9 LPS-IPTIs identified, four located in Sierra Morena Occidental are studied, namely Fregenal de la Sierra and Higuera la Real in the RAgJC (Province of Badajoz, Autonomous Community of Extremadura) and Cumbres Mayores and Jabugo (RAgSH, Province of Huelva, Autonomous Community of Andalusia) (see Figure 5).

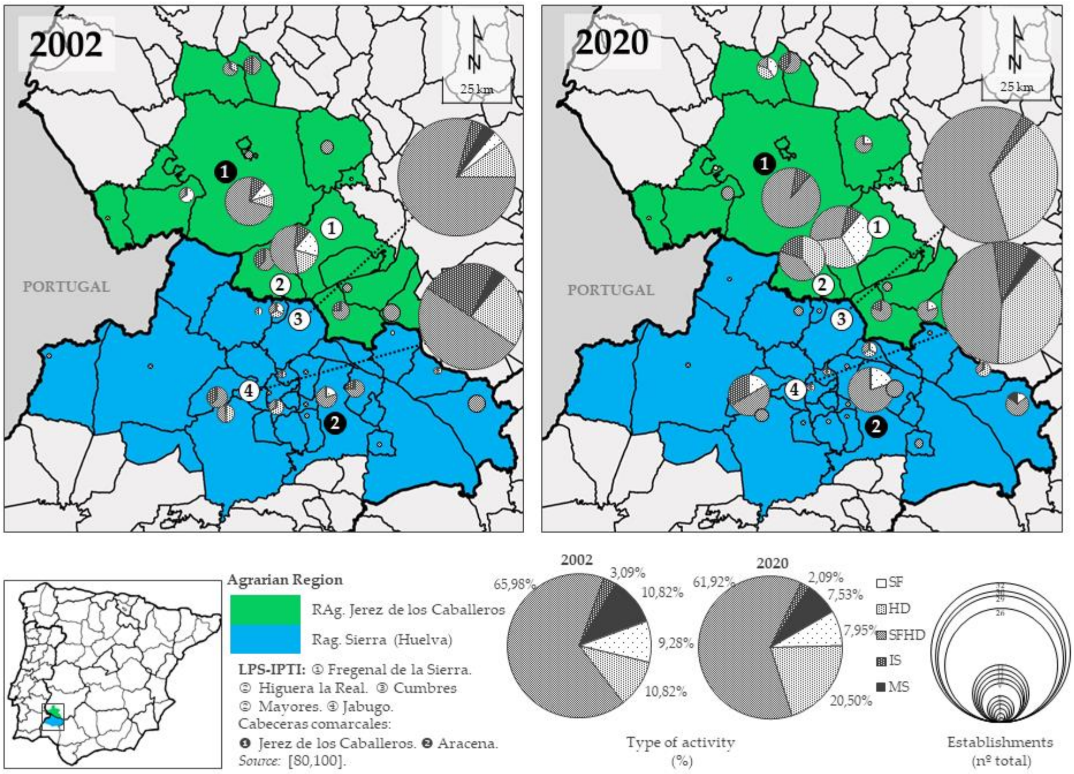

Figure 5. Scope of the study. Agrarian Regions and industries by municipalities (2002 and 2020)

The selection criteria for these four LPS-IPTI are (see Table 2; Figure 5): specialisation; embeddedness of IPTI in the local environment; known an increase between 2002 and 2020; similar natural and socio-demographic characteristics of the regions in which they are located; population (<5,000 inhabitants); proximity and territorial continuity (except for Jabugo); not be regional headquarters; the emergence of from the inauguration of the Zafra-Huelva railway (1889) [60]; and the availability of the data for 2002 (Q1) [60] to ensure the comparisons.

Table 2. LPS-IPTI selection variables

Variable	Fregenal de la Sierra	Higuera la Real	Cumbres Mayores	Jabugo
IPTI in LPS-ICTI (2002/2020) [80,100]	11/13	5/10	29/33	26/30
% IPTI in the Region (2002/2020) [80,100]	20.37/20.00	9.26/15.38	29.90/27.27	26.80/24.79
Population (2019) [109]	4,836	2,253	1,749	2,250
Shorter distance from	5.7	5.7	16.6	28.8

LPS-ICTI (km)				
Longer distance from LPS-ICTI (km)	41.1	35.1	28.8	41.1
Distance from regional headquarters (km)	25.0	27.7	38.6	22.3

3. Results

Compared among the four LPS-IPTIs, Cumbres Mayores and Jabugo are mostly noted for their important industrial activity for both years analysed in this study (see Table 3). Although this concentration does not alter, between 2002 and 2020 the number of industrial establishments and companies increased in the four LSP-IPTIs. The growth of Higuera la Real stands out with 80.00% growth of the number of companies and 100.00% growth of the number of the establishments), while the rest grew moderately (see Table 3). The number of establishments, including secondary establishments, i.e. not headquarter, increased greater compared with the number of the companies.

Table 3. Variation in the industrial and business structure in the 4 LPS-IPTI (2002-2020)

Variable	**Fregenal de la Sierra**			**Higuera la Real**			**Cumbres Mayores**			**Jabugo**			**Total (4 LPS-ICTI)**		
	2002	**2020**	**Δ%**	**2002**	**2020**	**Δ%**	**2002**	**2020**	**Δ%**	**2002**	**2020**	**Δ%**	**2002**	**2020**	**Δ%**
No. of companies	10	12	20,00	5	9	80,00	24	28	16,67	24	26	8,33	63	75	19,05
SF	*2*	*4*	100,00	*0*	*0*	-	*1*	*0*	-100,00	*0*	*0*	-	*3*	*4*	33,33
SFHD	*6*	*4*	-33,33	*3*	*4*	33,33	*23*	*21*	-8,70	*13*	*14*	7,69	*45*	*42*	-6,67
HD	*2*	*4*	100,00	*0*	*4*		*3*	*11*	266,67	*6*	*12*	100,00	*11*	*31*	181,82
SI	*1*	*1*	0,00	*2*	*2*	0,00	*1*	*1*	0,00	*6*	*3*	-50,00	*10*	*7*	-30,00
SS	*0*	*0*	-	*0*	*0*	-	*1*	*0*	-100,00	*1*	*1*	0,00	*2*	*1*	-50,00
No. of establishments	11	13	18,18	5	10	100,00	29	33	13,79	26	30	15,38	71	86	21,13

Source: [80,100]

By type of activity (see Table 3), the highest growth occurred in all LSP-IPTIs in the HD by 181.82%, standing out in Cumbres Mayores and Jabugo in absolute numbers, and in Higuera la Real, where all the existing ones appear. SFs grew moderately by 33.33%, but only in Fregenal de la Sierra. The rest of the activities were reduced as a whole, especially the IS by -30.00% and SS by -50.00%, but the changes were only registered in Cumbres Mayores and Jabugo. The SFHD increased in Higuera la Real and Jabugo, and decreased in Cumbres Mayores and Fregenal de la Sierra, losing a moderate -6.67% overall. All types of activities existed only in Cumbres Mayores in 2002 while the SS changes activity changes in 2020, initially, the least diversified being Higuera la Real, consisting of SFHD and IS initially and HD incorporates only in 2020.

Table 4. Variation in the industrial and business structure in the 4 LPS-IPTI (2002-2020)

	Fregenal de la Sierra				Higuera la Real				Cumbres Mayores				Jabugo				Total (4 LPS-IPTI)			
Variable	Termination of activity	Liquidation Registration	Change of ownership	No change of company	Termination of activity	Registration	Change of ownership	No change of company	Termination of activity	Registration	Change of ownership	No change of company	Termination of activity	Registration	Change of ownership	No change of company	Termination of activity	Registration	Change of ownership	No change of company
No. of SF	0	2	0	2	-	-	-	-	1	0	0	0	-	-	-	-	1	2	0	2
No. of SFHD	1	0	3	2	1	1	1	0	6	4	3	16	6	3	5	6	14	8	12	24
No. of HD	0	1	0	2	0	4	0	0	0	5	0	0	3	5	2	3	3	15	2	5
No. of IS	0	0	1	0	-	-	-	-	0	0	0	1	1	0	2	3	1	0	3	4
No. of SS	-	-	-	-	-	-	-	-	0	0	1	0	1	0	0	0	1	0	1	0
No. of establishments	1	3	4	6	1	5	1	4	7	9	4	20	11	8	9	12	20	25	18	42
No. of companies	1	3	4	5	1	4	1	4	7	9	4	15	11	6	9	10	20	22	18	34
SF, %	0,00	100,00	0,00	100,00	-	-	-	-	100,00	0,00	0,00	0,00	-	-	-	-	33,33	66,67	0,00	66,67
SFHD, %	16,67	0,00	50,00	33,33	33,33	33,33	33,33	0,00	26,09	17,39	13,04	69,57	46,15	23,08	38,46	46,15	31,11	17,78	26,67	57,14
HD, %	0,00	50,00	0,00	100,00	-	-	-	-	0,00	166,67	0,00	0,00	50,00	83,33	33,33	50,00	27,27	136,36	18,18	45,45
IS, %	0,00	0,00	100,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	100,00	16,67	0,00	33,33	50,00	10,00	0,00	30,00	57,14
SS, %	-	-	-	-	-	-	-	-	0,00	0,00	100,00	0,00	100,00	0,00	0,00	0,00	50,00	0,00	50,00	0,00
Establishments, %	9,09	27,27	36,36	-	20,00	100,00	20,00	-	24,14	31,03	13,79	-	45,83	33,33	37,50	-	28,17	35,21	25,35	59,15
Companies, %	10,00	30,00	40,00	50,00	20,00	80,00	20,00	80,00	29,17	37,50	16,67	62,50	42,31	23,08	34,62	38,46	31,75	34,92	28,57	53,96

Source: [80,81,100]

The variations in the industrial and business structure comparing 2002 and 2020 are significant as they affect 40.85% of the establishments and 46.04% of the companies (see Table 4). Termination of activities of establishments accounted for 28.17%, standing out in the activities of SF and SS. The registration of new establishments stands out among the HD and SF, while there are no registrations observed in the IS and SS activities. Changes of ownership, including companies acquired after the termination of the activity, in particular, affect IS and SS compared with the SFHD and HD, and are not observed in SF activities.

In terms of LPS-ICTI, the variations affect 61.54% of the companies in Jabugo and 50.00% in Fregenal de la Sierra, and only 20.00% of companies in Higuera la Real, while in Cumbres Mayores this variation is intermediate and impacts 36.50% of the companies (Table 4). The layoffs particularly affect Jabugo in 45.83% of the establishments, with 50.00% of layoffs being in the HD and 46.15% in SFHD compared with only 24.14% of

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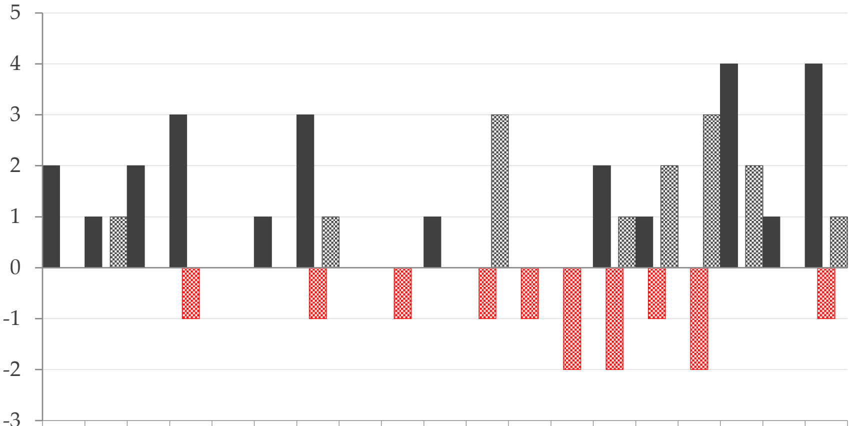
dismissals in Cumbres Mayores at SFHD and SF. The registration of new activities is especially observed in Higuera la Real where the number of SFHD doubled, compared with approximately 30.00% increase of new establishment, mainly concentrated in HD. The changes in ownership mostly occurred in Jabugo (37.50%) and Fregenal de la Sierra (36.36%), and are considerably above Higuera la Real (20.00%) and Cumbres Mayores (13.79%).

Although the terminations of activity are concentrated between 2014 and 2017 (see Figure 6), particularly in Jabugo, they are frequent throughout the entire period of the research. In the case of new registrations, they are concentrated between 2002 and 2005 and, especially, between 2005 and 2020. Changes in ownership begin to be frequent as of 2012 due to the construction and reopening of closed companies.



	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
Registration	2	1	2	3	0	1	3	0	0	1	0	0	0	2	1	0	4	1	4
Terminations of activity	0	0	0	-1	0	0	-1	0	-1	0	-1	-1	-2	-2	-1	-2	0	0	-1
Changes of ownership		1					1				3			1	2	3	2		1

Source: [80,81,100]

Figure 6. Registrations, terminations of activity, and changes of ownership per year (2002-2020)

Overall, 11 establishments, or 21.57% of the establishments that continue, changed their activity between 2002 and 2020 (see Table 5). The change from SFHD to HD stands out and consist of 45.45% of all the changes. The latter affects 6 establishments, or 27.27% of the establishments that continue, in Cumbres Mayores, and 5 establishments, or 21.74% of the establishments that continue, in Jabugo, in both cases, there are 3 changes in activity after a change in ownership. However, in the LPS-IPTIs of Fregenal de la Sierra and Higuera La Real, there were no changes of activity, even when the change of ownership took place.

Table 5. Activity changes in IPTI in the 4 LPS-IPTI (2002-2020)

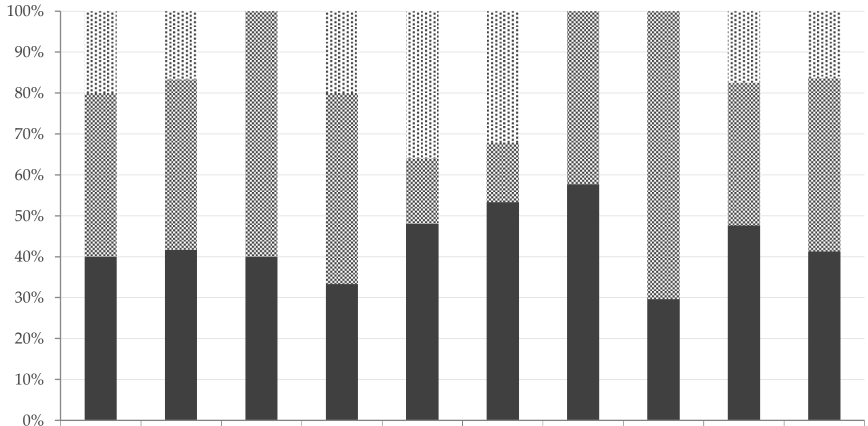
Activ.	Activity in 2020				
	Fregenal de la Sierra	**Higuera la Real**	**Cumbres Mayores**	**Jabugo**	**Total (4 SPLICTI)**

	SF	HD	SFHD	IS	SS	SF	HD	SFHD	IS	SS	SF	HD	SFHD	IS	SS	SF	HD	SFHD	IS	SS	SF	HD	SFHD	IS	SS
SF		0	0	0	-		-	-	-	-		1	0	0	0		-	-	-	-		1	0	0	0
HD	0		0	0	-	-		-	-	-	0		0	0	0	0		1	0	0	0		1	0	0
SFHD	0	0		0	-	0	0		0	-	0	3		0	0	0	2		0	0	0	5		0	0
IS	0	0	0		-	0	0	0		-	0	0	1		0	0	1	1		0	0	1	2		0
SS	-	-	-	-		-	-	-	-		0	0	0	1		0	0	0	0		0	0	0	1	

Source: [80,81,100]

In 2002, a total of 6 companies had 2 establishments, or 11.27% of the total, where 5 of them (17.24%) are in Cumbres Mayores and one (9.09%) in Fregenal de la Sierra. In 2020 there were 11 (12.79% of the total) were present in all LPS-IPTIs, with a single change in the previous ones where 1 SFHD turned into HD in Cumbres Mayores. Also, there were an increase of HDs in Jabugo and Higuera la Real by 13.33% and 10.00% of all establishments respectively.

The predominant type of companies in 2002 (see Figure 7) were family-owned businesses, followed by business groups, with shareholders that participate in more than one company, and social enterprises with predominant self-employment which is observed at 81.82% of the total in social enterprise. In all cases, SFHD is the most prominent activity in all types of companies, including in 72.72% of social enterprises, 66.66% of family-owned companies and 54.54% in business groups. Family-owned businesses predominated in Jabugo and Cumbres Mayores, lower than the average in Fregenal de la Sierra and Higuera la Real. In Higuera la Real business groups are predominant, being important in Jabugo and Fregenal de la Sierra. Social enterprises appear only in Cumbres Mayores and Fregenal de la Sierra.



	Fregenal S. (2002)	Fregenal S. (2020)	Higuera R. (2002)	Higuera R. (2020)	Cumbres M. (2002)	Cumbres M. (2020)	Jabugo (2002)	Jabugo (2020)	Total SPLICTI (2002)	Total SPLICTI (2020)
Social enterprises	20.00	16.68	0.00	20.00	36.00	32.14	0.00	0.00	17.46	16.41
Business groups	40.00	41.66	60.00	46.67	16.00	14.49	42.31	70.37	34.92	42.26
Family-owned business	40.00	41.66	40.00	33.33	48.00	53.37	57.69	29.63	47.62	41.33

Source: [80,81,100]

Figure 7. Type of companies (2002 and 2020)

Family-owned businesses decreased as a whole in 2020 where 38.71% were newly created and 6.45% were social enterprises. Business groups become the most important group, particularly given the changes in the ownership of family businesses (50.00%) and

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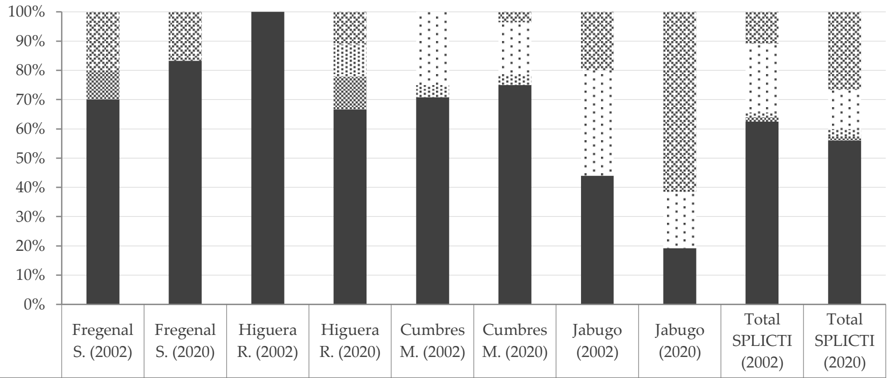
the creation of new companies (16.13%). The social enterprises are maintained at the same level in terms of percentage. In terms of activity, SFHD dominates among social enterprises (61.54%), business groups (53.12%) and family-owned businesses (48.39%), however, the number of HDs grew between the latter two types of companies by 21.87% and 38.71% respectively. Family-owned businesses dominate in Cumbres Mayores and Fregenal de la Sierra, where their weight increased, even though it declined in Higuera la Real and, especially, in Jabugo. Business groups dominate in Jabugo and Higuera la Real, while they equal with the number of a family-owned business in Fregenal de la Sierra, and remains at low levels in Cumbres Mayores. Social enterprises are only significant in Cumbres Mayores, whereas they are particularly scarce in Higuera la Real and Fregenal de la Sierra, and non-existent in Jabugo.

In 2002, 63.49% of the companies had their headquarters in the municipality of the establishment. All the companies in Higuera la Real were based in the municipality and some cases had regional ties. Companies also play an important role in Fregenal de la Sierra (70.00%) and Cumbres Mayores (68.00%), with the falling number in Jabugo to 42.31%. In 2020, the number of companies based in the LPS-IPTI drops to 56.00%. The number of companies with the local headquarters increased in Fregenal de la Sierra (91.66%) and Cumbres Mayores (75.00%), while it decreased in Higuera la Real to 60.00% and, above all, in Jabugo to 19.23 %. By type of activity, the SFHD stood out in 2002 with 47.83%, remaining at 48.48% in 2020, while the number of HD increased to 33.33% in 2020 compared to 28.57% in 2002.



	Fregenal S. (2002)	Fregenal S. (2020)	Higuera R. (2002)	Higuera R. (2020)	Cumbres M. (2002)	Cumbres M. (2020)	Jabugo (2002)	Jabugo (2020)	Total SPLICTI (2002)	Total SPLICTI (2020)
National	2	2	0	1	0	1	5	16	7	20
Autonomous Regions	0	0	0	0	6	5	9	5	15	10
Provincial	0	0	0	1	1	1	0	0	1	2
Regional	1	0	0	1	0	0	0	0	1	1
Local	7	10	5	6	17	21	11	5	40	42

Source: [80,81,100,101]

Figure 8. Company headquarters (2002 and 2020).

The size of the company can be established from the total production (volume), its economic information (total assets[7]) (see Table 6) and employment (see Table 7).

Table 6. Classification of LPS-IPTIs companies in terms of production-related and economic criteria (2002-2019) (*)

Variable	Range	Fregenal de la Sierra 2002	Fregenal de la Sierra 2019	Higuera la Real 2002	Higuera la Real 2019	Cumbres Mayores 2002	Cumbres Mayores 2019	Jabugo 2002	Jabugo 2019
me of pro	<500 pigs' sacrifices, <2.000 pieces,	1				1			

[7] The fixed assets of production due to the curing time of noble pieces [84] advises against using operating income which is why this indicator is not being considered.

	<50.000 kg (micro)								
	501-3.000 pigs' sacrifices, 2.001-12.000 pieces, <300.000 kg (small-size company)	1				4		4	
	3.001-10.000 pigs' sacrifices, 12.001-40.000 pieces (medium-size company)					1		8	
	10.001-50.000 pigs' sacrifices, 40.001-200.000 pieces (large size company)			3		2		6	
	>50.001 pigs' sacrificed, >200.001 pieces (macro-size company)	1						2	
	Total number of companies with available data	**3**		**3**		**8**		**20**	
Economic criteria: total assets (2)	<2 million € (micro)	4	5	1	2	8	11	7	6
	2 a <10 million € (small-size company)	1	3	4	3	6	5	12	8
	10 a <43 million € (medium-size company)	1	1		2		1	5	7
	<43 million € (large-size comany)	1	1						4
	Total number of companies with available data	**7**	**10**	**5**	**7**	**14**	**17**	**24**	**25**

(1) Data of 2002 corresponds to the 2000-2001 season. Data for 2002 were taken from Q1. *Source:* [81,100,101].

According to the total assets (see Table 6), out of the 58 companies with data available for 2019 (77.33% of the total) are dominated by micro-companies (39.66% of those analysed), with the main group being (≤50.00%) in Cumbres Mayores and Fregenal de la Sierra; while the small size companies account for 32.76% of those studied, being the most important group in Jabugo (33.33%) and Higuera la Real (42.86%). The medians (18.97%) appear in all the SPLICTI, but they are only important in Jabugo (29.17%), while the large-des (8.62%) only appear in Jabugo (16.67%) and Fregenal de la Sierra (10.00%).

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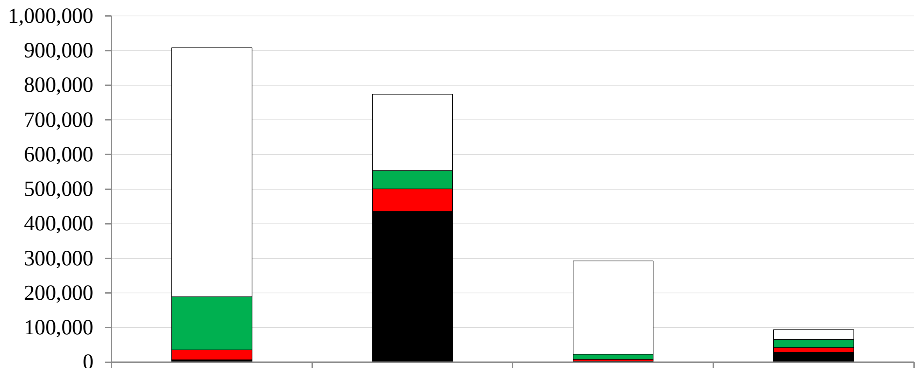
According to production (see Table 6), in the 2000-2001 season out of the 34 companies with data available (53.96% of the total in 2002) where the large companies (32.35%) which prevailed over the medium-size and small-size companies (both with 26,47%) and macro-size companies (8.82%), while micro-sized companies being the least frequent (5.88%). The average size of companies is greater in Fregenal de la Sierra and Jabugo, compared to other municipalities. These two are the only municipalities where macro-sized enterprises exist, while the tendency that micro-enterprises (non-existent in Jabugo) and small enterprises (45.45% of liquidations) tend to terminate their activity is observed. Q2 provided data from 13 companies in Jabugo for the 2014-2015 season that indicates that micro-companies did not appear and did not exist in 2002 either, and small companies have disappeared (2 terminations of activities in 2002), the number of medium-sized companies reduced from 4 to 3, the number of large companies increased from 3 to 8, whereas the number of macro-sized companies remained the same.

Through the RIBER, the marketed production of Iberian hams and shoulders is obtained in each of the LPS-IPTI (2019). In total, 2,068,347 pieces of Iberian ham and shoulders were sold consisting of 16.30% of the total Spanish production (see Figure 9). Fregenal de la Sierra is the LPS-IPTI that sells the most, i.e. 43.91% of the total produced by the 4 analysed in this study, followed by Jabugo (37.43%), and a significantly lower level of sales is observed at Higuera la Real (14.27%) and Cumbres Mayores (4.39%). When analysing the qualities of the products marketed, the results change substantially. Fregenal de la Sierra provides 79.21% (or 8.26% of the Spanish national market share) to the market mainly commercialised hams and baits shoulders of lower quality, whereas Higuera la Real caters 91.92% (or 0.76% and 1.02% hams and shoulders respectively) of 100% Iberian acorn-fed of the maximum quality. On the contrary, Jabugo sells 56.28% of 100% Iberian acorn-fed hams and shoulders (45.90% of the Spanish national market share), with bait hams and shoulders falling to 28.51%. The most balanced sales in terms of quality are shown by Cumbres Mayores that sells the highest volume of 29.89% of acorn-fed hams and shoulders being 100% Iberian.



	Fregenal de la Sierra	Jabugo	Higuera la Real	Cumbres Mayores
JyP de cebo ibérico	719,340	220,707	268,524	27,730
JyP de cebo de campo	153,318	53,308	14,742	23,813
JyP de bellota ibérico	28,557	64,533	5,897	14,207
JyP Bellota 100% ibérico	6,935	435,726	2,973	28,037

Source: [82]

Figure 9. Hams and shoulders market in the 4 LPS-IPTIs in 2019

Following the organizational criterion (employment) (see Table 7), of 31 companies in 2002 (49.21% of the total), small companies (67.74%) and micro (22.58%) predominate, while they are few medium-sized (6.45%) and large (3.23%), only 1 of this type being located in Jabugo. In 2020, micro-enterprises predominate (66.66%), which are the most important in all the SPLICTI, except in Jabugo (36.00%); the small ones represent 26.66% of the total, being the most important in Jabugo (52.00%). Medium-sized companies only

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appear in Jabugo (8.00%) and Fregenal de la Sierra (8.33%). The largest companies are located in Jabugo (4.00%), where currently (2021) 3 operate.

Tabla 7. Range-size classification of companies in the LPS-IPTIPLICTI according to organisational criteria (labour) (2002-2019) [(1)]

Variable	Range	Fregenal de la Sierra 2002	Fregenal de la Sierra 2019	Higuera la Real 2002	Higuera la Real 2019	Cumbres Mayores 2002	Cumbres Mayores 2019	Jabugo 2002	Jabugo 2019
Organizational criterion: employment	<10 employees (micro)	1	10	0	7	5	24	1	9
	10-49 employees (small)	1	1	4	2	3	4	13	13
	50-249 employees (medium)	1	1	0	0	0	0	1	2
	≥250 employees (large)	0	0	0	0	0	0	1	1
	Total number of companies with data available	**3**	**12**	**4**	**9**	**8**	**28**	**16**	**25**

[(1)] Data for 2002 were taken from Q1 and *Alimarket*, and data for 2019 is retrieved from SABI, and estimates from the 2002-2019 series, since data for 2020 was still unavailable during the preparation of this article. *Source:* [81,100,101].

Taking as a reference the average employment by size and type of activity (2002 and 2019) (see Table 8), among micro-enterprises, IS are the ones that generate the most employment, although they are exceptional and even did not exist in 2002. However, the average employment rose in SFHD and HD between 2002 and 2019. IS are also the ones that generate the most employment among small companies, significantly above SFHD and SS. Among medium-sized companies, IS are also the ones that employ the most, yet they as well as SFHD declined in terms of average employment between 2002 and 2019. There is only one large IS, where also the average employment declined in 2019 compared to 2002.

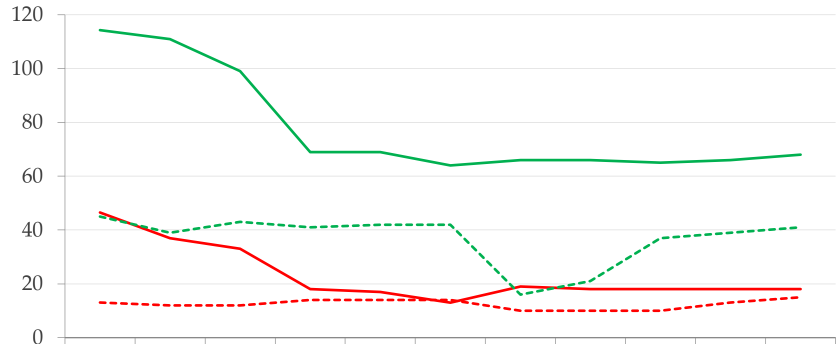
Table 8. Average employment by size and type of activity and % of female employment (2002 and 2019)

Activity	Range	2002	2019	% of female employment 2002	% of female employment 2019
SF	Micro	4	3	33,33	33,33
	Small				
	Medium				
	Large				
SFHD	Micro	3	5	33,33	23,07
	Small	23	27	33,96	12,87
	Medium	86	52	33,00	21,73
	Large				
HD	Micro	2	3	20,00	0,00

	Small				
	Medium				
	Large				
	Micro		7		14,29
IS	Small	26	33	31,68	26,79
	Medium	111	86	29,19	20,93
	Large	334	289	29,91	27,77
	Micro				
SS	Small	21	26	35,29	35,29
	Medium				
	Large				

Source: [81,100,101].

The female employment (see Table 8) in 2002 in all range of companies and types of activity stands at approximately 30.00% except in the HD, where it falls to 20%. Except in the micro SF and small SS, in the rest of the ranges and types of activity, an average fall in female employment occurred in 2019, which remained over 25.00% in IS SMEs.



	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
IS Medium (M)	114	111	99	69	69	64	66	66	65	66	68
IS Medium (F)	47	37	33	18	17	13	19	18	18	18	18
SFHD Medium (M)	45	39	43	41	42	42	16	21	37	39	41
SFHD Medium (F)	13	12	12	14	14	14	10	10	10	13	15

Source: [81]

Figure 10. The evolution of male and female employment between 2009 and 2019

Taking the variation of employment in two types of companies, namely small-size SFHD and medium-size IS, between 2009[8] and 2019 (see Figure 10), it is observed how the international economic crisis provoked a generalised fall in employment in large companies, with a similar trend both in terms of male and female employment. However, while the latter stagnated, male employment tended to grow. In 2019, male employment declined by -40.35%, whereas female one declined by a significant -61.70%. Overall, it can be observed that the medium-sized companies are more stable initially, which resulted in the decline of male employment only at the end of the crisis when male unemployment declined by 61.90% between 2014 and 2015, with a fluctuation between 2009 and 2019 of -8.88%, whereas female experienced somewhat greater stability (28.57% between 2014 and 2015), with a fluctuation of 15.38%.

Moreover, there are differences in industrial employment between the municipalities (see Table 9), registering labour specialisation only Jabugo (70.35% of employment in

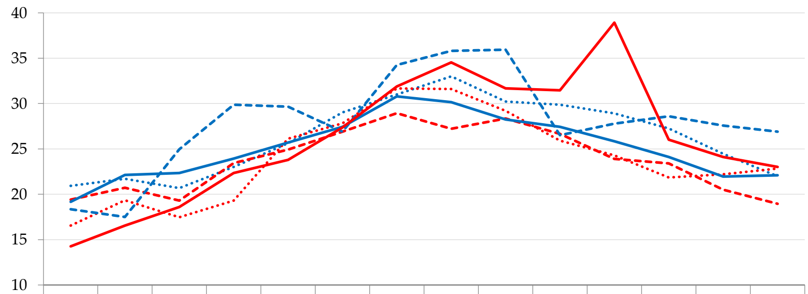
[8] 2009 is taken as the reference year in this case due to inexistent continuous series of date of the previous years.

December 2019), which is also important (≤20.00%) in Cumbres Mayores and Higuera la Real. When analysing the weight of employment in IPTI over total industrial employment, this is higher than 100% in Jabugo and approximately the same in Cumbres Mayores, given the development of LPS). The employment significance at LPS-IPTI stood at 49.20% in Fregenal de la Sierra, and at 36.73% in Higuera la Real.

Table 9. Employment specialisation in the LPS-IPTI (December 2019)

LPS-IPTI	No. of companies, total	Industrial companies, total	% of industrial companies	% of IPTI over total No. of industrial companies	% of industrial employment over the total	% of employment in IPTI over the total industrial employment	Coeficiente de especialización empresarial Coefficient of business specialization	Coefficient of job specialization
Cumbres Mayores	156	28	17,95	100,00	33,61	97,56	48,07 services	35,08 services
Fregenal de la Sierra	164	24	14,63	50,00	17,45	49,20	62,80 services	68,01 services
Higuera la Real	71	17	23,94	52,94	29,87	36,73	45,07 services	51,44 services
Jabugo	151	32	21,19	81,25	70,35	107,71	58,94 services	70,35 industry

The evolution of the unemployment rate between 2006 and 2019 (see Figure 11) shows the consequences of the international economic crisis as of 2008, affecting Jabugo above the rest, which went from an unemployment rate of 17.50% in 2007 to 29.89% in 2009 and reached 35.94% in 2014, while the rest LPS-IPTIs follow the same trend. Jabugo also registers the latest recovery, remains unstable, without reaching the pre-crisis values.



	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
Cumbres Mayores	20.92	21.71	20.68	23	25.64	29.04	31.01	33	30.23	29.88	28.91	27.27	24.45	22
Fregenal de la Sierra	19.4	20.73	19.31	23.43	24.91	26.91	28.94	27.22	28.34	26.67	23.89	23.4	20.51	18.95
Higuera la Real	16.55	19.35	17.45	19.31	26.11	27.84	31.67	31.62	29.2	25.92	24.28	21.86	22.19	22.83
Jabugo	18.35	17.5	24.96	29.89	29.66	26.9	34.25	35.82	35.94	26.53	27.78	28.59	27.57	26.91
RAgJC	19.17	22.14	22.36	23.92	25.69	27.45	30.79	30.17	28.23	27.43	25.86	24.12	21.95	22.08
RAgSH	14.26	16.56	18.61	22.36	23.81	27.38	31.87	34.54	31.69	31.48	38.92	26.01	24.11	23.03

Source: [108]

Figure 11. The evolution of unemployment rate of the LPS-IPTIs (2006-2019)

It is necessary to take into consideration the unemployment rate in the LPS-IPTI regions (see Figures 11, 12 and 13) to comprehend its dimension as a whole and due to the

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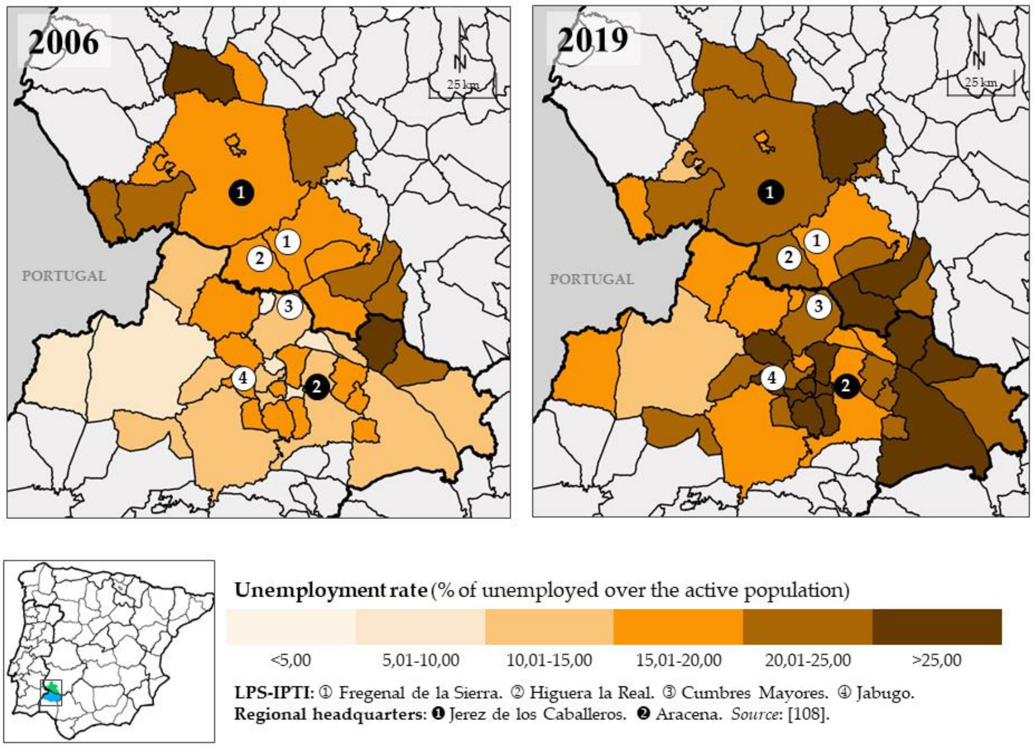
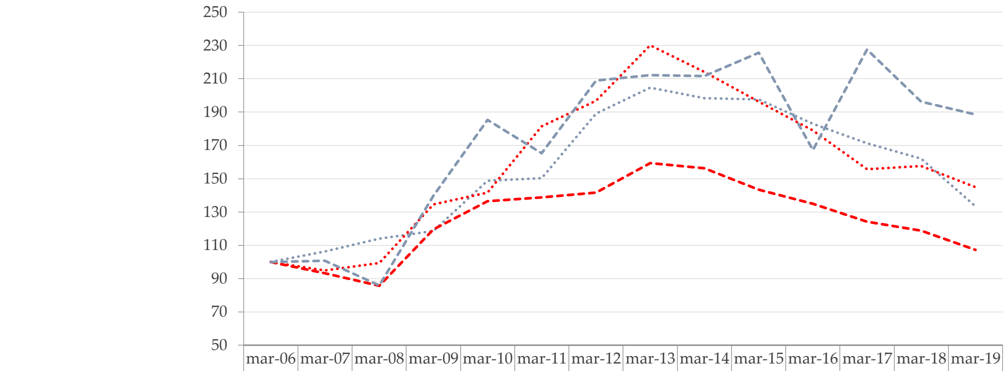
generation of SLE). In 2006, the unemployment rate was higher than its regional average in Cumbres Mayores and Jabugo, while in Fregenal de la Sierra and Higuera la Real the unemployment rate was below regional average. The municipalities that are close by to the LPS-IPTI had similar unemployment rates. In 2019, unemployment exceeds the regional averages in Jabugo and Higuera la Real. Although unemployment rates remained high in all the municipalities of the region, Fregenal de la Sierra presents the best results in its region and the unemployment tended to decline in Cumbres Mayores.



Figures 12 and 13. Unemployment rate by municipalities (2006 and 2019)

Employment is seasonal as the slaughter campaign takes place from December to March, thus, it is possible to analyse the evolution of employment taking the last month of the campaign, i.e. March (see Figure 14). The evolution of unemployment from 2006 to 2019 [107] can be analysed through indices to establish the influence of the crisis and its effects on the companies. None of the LPS-IPTI has shown the same results as before the crisis, maintaining the highest unemployment level in Jabugo, while it showed more balanced fluctuation in other municipalities (2011 and 2016).

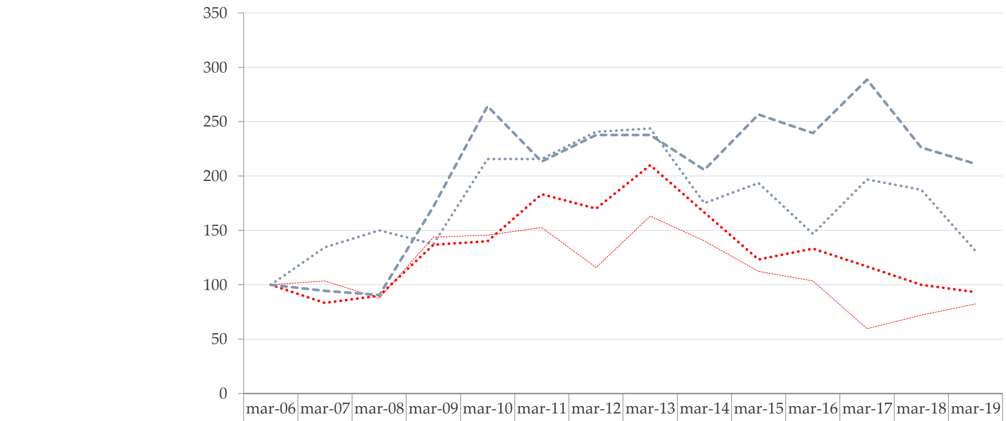


	mar-06	mar-07	mar-08	mar-09	mar-10	mar-11	mar-12	mar-13	mar-14	mar-15	mar-16	mar-17	mar-18	mar-19
Cumbres Mayores	100	106.2	113.95	118.6	148.84	150.39	189.15	204.65	198.45	197.67	182.95	171.32	162.02	133.33
Fregenal de la Sierra	100	93.3	85.68	119.63	136.49	138.8	141.57	159.35	156.35	143.42	134.87	124.25	118.71	107.16
Higuera la Real	100	94.87	99.36	134.62	141.67	181.41	196.79	230.13	214.1	196.15	178.85	155.77	157.69	144.87
Jabugo	100	100.64	85.9	139.74	185.26	165.38	208.97	212.18	211.54	225.64	167.31	227.56	196.15	188.46

Source: [107]

Figure 14. Industrial unemployment registered in the LPS-IPTI (index 100 = March 2006)

Considering the evolution of female unemployment between 2006 and 2019 (see Figure 15), focused on the slaughter campaign since the sausages are made while pigs are being sacrificed, it is higher in Jabugo and Cumbres Mayores, showing greater inter-annual variations, yet in none of the two, data before the crisis are obtained. Nonetheless, female employment somewhat improved Higuera la Real and Fregenal de la Sierra during the same period.



	mar-06	mar-07	mar-08	mar-09	mar-10	mar-11	mar-12	mar-13	mar-14	mar-15	mar-16	mar-17	mar-18	mar-19
Cumbres Mayores	100	134.38	150	137.5	215.63	215.63	240.63	243.75	175	193.75	146.88	196.88	187.5	131.25
Fregenal de la Sierra	100	103.51	87.72	143.86	145.61	152.63	115.79	163.16	140.35	112.28	103.51	59.65	71.93	82.46
Higuera la Real	100	83.33	90	136.67	140	183.33	170	210	166.67	123.33	133.33	116.67	100	93.33
Jabugo	100	94.34	90.57	171.7	264.15	213.21	237.74	237.74	205.66	256.6	239.62	288.68	226.42	211.32

Source: [107]

Figure 15. Female unemployment registered in the LPS-IPTI (index 100 = March 2006)

4. Discussion

This research shows that the LPS-IPTI has transformed in the last two decades and is reflected by a polarization of the IPTI and loss of employment in the LPS-IPTI, which both negatively affected demographics.

The agro-food sector is characterised by its traditional atomisation [41] that is manifested in the LPS-IPTI. In 2002, the Iberian pig sector went through an expansive cycle [110], also known as the "Iberian bubble" [75] and resulting in a growth in both the number of industrial establishments and companies [73]. In the studied period, companies and establishments increased. A priori, this is due to the natural dynamics of activity in a specialised territory with the importance of primary factors and non-relocatable activities, as well as a tendency to agglomerations [66,67]. However, this expansion happens also because of the search for a recognisable brand as competitive, e.g. as in the case of Jabugo, and comparative, such accessibility, advantages [61]. Nonetheless, these changes would only explain the layoffs, yet not the termination of activity due to the considerable transformation that is, for instance, observed in Guijuelo [75].

On the other hand, the registrations of new establishments and companies are concentrated in the expansive period from 1997 to 2007 (56.00%), while the decreases coincide with the international crisis from 2008 to 2014 (50.00%), as witnessed in Guijuelo and the Sierra de Huelva [42,75]. These transformations are more important in the LPS-IPTIs with the highest industrial concentration, Jabugo and Cumbres Mayores, yet the percentage is higher in Higuera la Real and Fregenal de la Sierra. The greater the dimension, there is greater the attraction and dynamism, since concentration will improve performance [66].

The vertical segregation, common to other ham productions [111], undergoes a specialisation. Both in 2002 and 2020, SFHD dominated, although it lost its significance in Fregenal de la Sierra and Cumbres Mayores and increased in Higuera la Real and Jabugo, being affected by layoffs and loss of functions, e.g. changing their activities solely to HD. The HDs are the ones that grow the most in the group and are identified with the specialisation due to the increase in the demand for noble pieces, the relocation of the supply due to the changes of sacrificing taking place in a different place, and the increase in the retail demand and for the fresh product (without transformation) through the HORECA[9] channel which is already present in 2002 and requires comparably low-cost infrastructure [42,60].

The number of activities per LPS-IPTI tends to decrease (Cumbres Mayores), being the one with the least diversity Higuera la Real. Overall, the specialisation of production is appreciated at the end of the process, e.g. of HD, and business strategies are recorded with a progressive purchase of IS by companies with HD, also observed in the CB Prosciutto di Parma (hereinafter PdP) [111].

In this manner, business transformations will continue playing a significant role in the LPS-IPTIs, although qualitative changes are more important than quantitative ones [42]. It has been identified four causes of business termination [42] that equally affect all LPS-IPTIs as follows:

- Natural business mortality due to lack of generational change and retirement [112] is frequent among SFHD, family-owned and social enterprises, especially in micro and small size companies of local capital. This internal cause is widespread in the sector [84] reflected by the termination of activities of longer-standing companies that disappear throughout the period, with the international economic crisis not having a special impact.
- Business mortality is due to low competitiveness as a result of their size, especially in the case of micro and small size enterprises, low level of innovation and simple organisational structure [49]. Local companies are unable to adapt to market changes due to the increased cost of premium materials and competition through automatised production [84]. It is the least common process and it occurs before the international economic crisis.
- Business mortality due to indebtedness and economic unfeasibility that results from oversizing of the decapitalized company because of long amortisation periods and significant capital immobilisation [59,84]. A significant decline in an expanded period leads to seeking foreign investment or loans that despite low-interest rates, required short amortization periods and strong guarantees due to the difficulties of investing in specific assets [83,84]. While dominated by small ones, these are companies of all sizes and seniority, mostly of local capital and a simple organisational structure which invest to grow, e.g. slaughter lines,

[9] HORECA stands for hotels, restaurants and coffee places, and is standardised in Spanish (esp. *hoteles, restaurantes, cafeterias*).

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processing and storage capacity, rather than to increase their efficiency [42]. Activity will cease as a direct consequence of the international financial crisis, as of 2008, when the drop in sales directly affects the cash flow that produces liquidity tensions and makes it difficult to pay creditors [84]. These companies were also affected by external decisions, such as imposing prices by distributors, the irruption in the market of distributor brands and unfair competition [42].

- Business mortality in business groups, as a result of the merger strategy, thus, resulting elimination of brands. Before the crisis, it affected only one local family business [42], yet it began to be a common practice in corporate networks in the post-crisis scenario due to the opening of legal actions that eliminated the brands and the companies involved.

The "localized and specialized production processes" [45] in the LPS-IPTIs lead to the relocation and purchase of companies, which coincides with the crisis of the companies and the termination of activities, resulting in diverse circumstances [42] that are following:

- Acquisition by foreign business groups, most common in medium and large size companies, takes place to establish themselves in the LPS-IPTIs that originate (1) from the Iberian pig sector with horizontal integration with the expansion of the range within the Iberian, (2) from the white pig sector with diagonal integration, diversifying the range with Iberian products, and (3) investment companies outside the sector through venture capital, pirate expression of international capital [47] and have links with large retail linear distribution, acting as agents of the globalizing process [47, 113]. This process occurs in the four LPS-IPTIs, but especially in Jabugo.
- Acquisition by foreign business groups already present in the LPS-IPTIs as it corresponds to business strategies of expansion, concentration or absorption of competitors to control the production process, later releasing part of the assets which they sell to other foreign companies). Acquisitions affect medium and large companies in Jabugo and Cumbres Mayores, and are related to divestments in the banking sector.
- Local companies with internal changes that affect ownership are mostly common in micro and small-size family-owned companies that change ownership, name and legal status due to generational change, sometimes due to re-founding. They are present in all LPS-IPTIs.
- Newly created local companies acquire facilities from other companies due to their termination of activity. They are more common in Cumbres Mayores than in other municipalities.

Company registrations characterize the Spanish agro-food sector [49] and were very frequent in IPTIs [75]. There will be two types of layoffs [42] as follows:

- Medium and large foreign companies that come mostly outside the Iberian pig sector, e.g. white pig sectors or investors, and are linked to retail distribution [39] that build big HDs, sometimes SFHD. This process, present in all SPLICTIs, particularly in Jabugo, and responds to a generalized process in processes of relocation or relocation of non-relocatable industries such as wine [114] or PdP [111]. Foreign companies nearly always act in the same manner [113], namely they create links with internal companies, rely on automatised production, purchase a product with own or distributor brand and, finally, control of the means of production. While the mass production will be of standard, cheap and poor quality products, this approach also allows them to create segmented gourmet products.
- Local micro-size companies that emerged from livestock diversification, responding to an upward vertical integration, which seeks to create value and productive efficiency [84,115]. They are family-owned and social enterprises,

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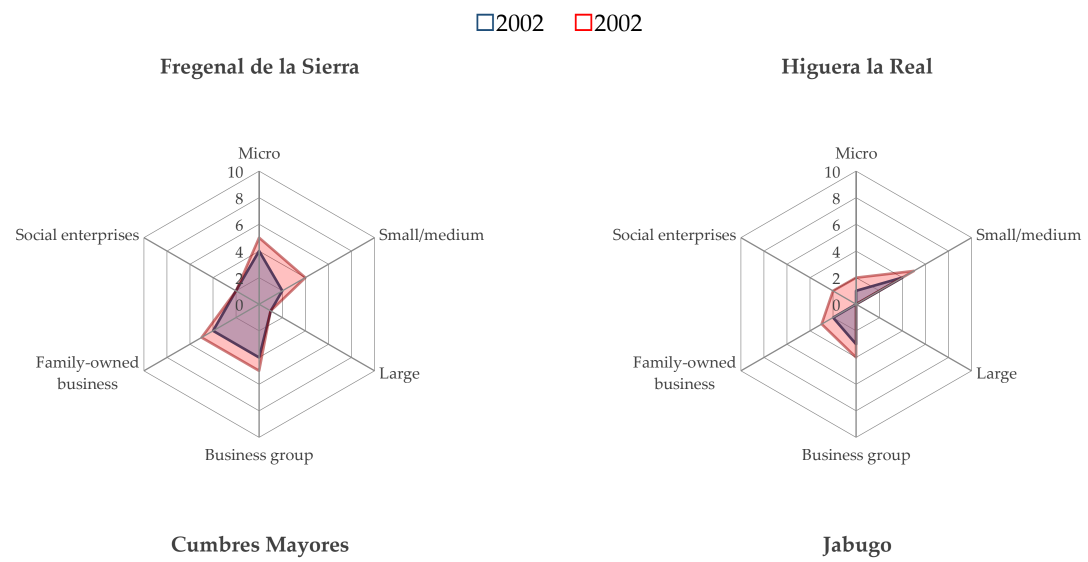
characterized by their low capitalisation (HD, SFHD, and SF) which results from the natural dynamics of the sector and is present in all LPS-IPTIs.

The increase in the number of establishments per company responds to the construction of new HD or its expansion due to the tendency to store stocking during the crisis and provide service to other companies by the use of available machinery, however, it only occurs in SFHD when new industrial facilities are created. The analysis is complex if the link between companies and the existence of corporate networks is considered.

The growing importance of business groups produces two effects present in the four LPS-IPTIs, especially in Jabugo, namely:

- The loss of significance of family-owned and social enterprises in the LPS-IPTIs presents a lack of efficient organization of the company in favour of companies with efficient functional structures [89]. The efficient organisational structure is particularly difficult to reach the traditional companies since there is a link between the choice of advisers and the hostility of the local industry [116].
- The displacement of the decision-making and strategy design centres [117] due to the location of the headquarters outside or due to subordination within complex organizations generates a sector with little autonomy. Although the companies retain their character, their brands are preserved due to the effect of the family signature on consumer preferences [118] in the standardization processes.

The LPS are constituted, with exceptions, around SMEs [15] that dominates among the LPS-IPTIs, although due to the regulatory restrictions in the 80s the least competitive terminated their activities [49,60]. These continue to prevail in the LPS-IPTIs, however with a tendency to concentrate production in medium and large companies, especially in Jabugo and Fregenal de la Sierra (see Figure 16).



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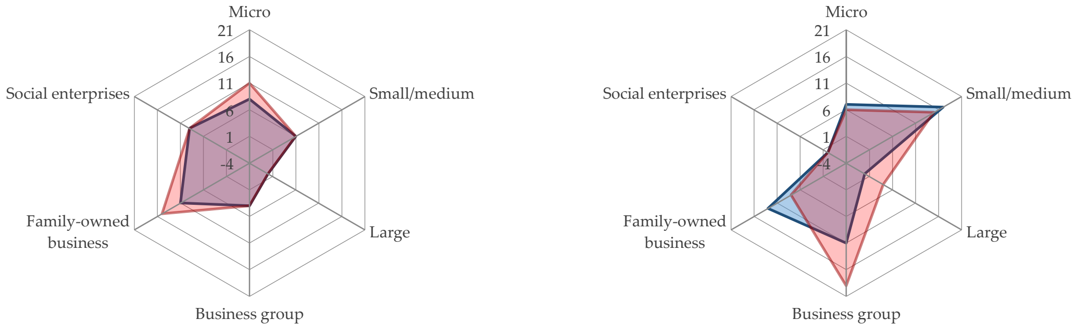

Source: Q1 [81,101]

Figure 16. Changes in the size and type of companies (2002 and 2020)

The entry of large companies has led, in general, to an increase in production without a quality brand, which has become a weak point for the traditional industry, as it has also been observed in PdP [113,119], generating changes in production [42,45,52]:

- Standardisation: to deal with retail distribution, with a low-priced [44] and massive products, and asymmetric relationships, generalized by loss of added value in favour of retail distribution that concentrates most of the sales [120]. Therefore, it becomes a model of dependence on production processes by large transnational food corporations [46,47], especially from the white pigs' sector and investors, that seek to compete in prices by increasing the standard product of noble pieces (Iberian 50% bait), sausages and fresh meats. This process dominates in Fregenal de la Sierra and Higuera la Real and is increasing in Jabugo. Standardisation leads to livestock intensification that produces changes in livestock production areas outside the SW [65].
- Differentiation: specialisation focused on premium quality, i.e. 100% acorn-fed Iberian, subject to production fluctuations due to natural conditioning factors. Differentiation, importantly, generates a context of "food chains based on notions of quality, territory and social integration (…) combining the attributes of product, process and place [3P]" [15](p. 116) that links with the LPS-IPTIs and the search for endogenous local development and the development of CB. This process has also been witnessed for wines [121] and PdP that weakens traditional industry [119]. This process is noted in the production of some companies in Jabugo and Cumbres Mayores, however, it not only characterised small local companies, yet also large ones with territorial roots, and allowed them to be more resistant to the crisis.

Traditional IPTIs have demanded a high workforce due to the scarce use of machinery focused on the incorporation of cold and mechanical processes, mainly aimed at improving working conditions than substitution, which means that micro and small size companies generate little, yet more stable, employment around SF, SFHD and IS. Traditionally, productivity has been linked to the hiring of additional seasonal personnel or paying overtime. However, the multiplication of establishments, changes in activity, specialisation and the entry of foreign companies do not increase employment. The influx of new companies in the sector has led to the recruitment of labour from traditional companies, registering some mobility that is almost absent in the traditional company and there is a tendency to retain more qualified workers [60].

Employment is higher in IS and SFHD where family-owned businesses prevail. However, the growth of HD reduces direct employment, regardless of its size. Employment is concentrated in the companies' places of origin where the slaughter takes place. Thus, there is a progressive regression of stable employment given the specialization and

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elimination of functions. On the other hand, the LPS-IPTIs that produce the most are not the ones that generate the most employment, since this depends on the type of company and activities, condemning the subsidy to the more specialized LPS-IPTIs, e.g. in Jabugo and Cumbres Mayores, which were the ones with the lowest unemployment rates noted in 2002. Furthermore, the effect is not limited to LPS-IPTIs as it also affects the regions where they are founded with traditional LES [70,72,73] where a high degree of commuter travel is generated [122], principally in Jabugo, which employs more industrial workers than there are in the municipality.

Traditionally, employment was conditioned by a marked seasonality linked to the season by the climate and the raw material (the higher the quality, the greater the seasonality) that led to the proliferation of fixed-discontinuous and temporary contractual employment, above the standard. Stable treatment, generating complex labour processes, namely combination of agricultural activities that are in decline, staff rotation, recruitment of crews, among others. The new companies have seasonally adjusted by betting on a product available all year round, resorting to freezing noble pieces or the production of white pork products, yet none of them generates more local employment.

In a labour market with exclusivity [123] such as that seen in the LPS-IPTIs, mainly in Jabugo, the workforce is specialized and is mono-sectoral, which produces dependence on IPTIs and is sensitive to crises. Between 2006 and 2020, Fregenal de la Sierra, Higuera la Real and Cumbres Mayores show high initial unemployment rates that continue to increase until 2012-2013 and then fall. In Jabugo, the progressive termination of activities of IPTI, diversification of activities towards commercial and hospitality activities, the divestment of public and private companies, and the conversion of IS and SFHD into HD, commences the loss of employment, maintaining higher unemployment rates at approximately 30% between 2012 and 2014, and higher than 25% from 2009 to 2019, with greatly marked ups and downs (2011 and 2015). Only the creation of new industries such as construction and services becomes a factor for increasing employment.

The loss of employment led to the feminisation of unemployment, as has been observed in Guijuelo [85]. The men in the IPTIs carried out the slaughter, cutting and salting of hams, while the women, dedicated themselves to the section of fresh meat and the manufacture of sausages [85] that became irrelevant with activity transformation to HD.

On the other hand, the rigidity of the mono-specialised labour market expels labour since it is unable to integrate local professionals, especially those trained abroad and thus they do not return to their place of origin into the labour market system. This generates migratory processes, apart from a perverse development process characterised by the extraction of rural income for the training of young people in the cities that will not return to their areas of origin [60].

Most of these transformations occurred are due to processes initiated during the growth phase until 2007 [42], namely (1) indebtedness in secondary capital circuits [124] that advocates for the closing when advanced payments cannot be made; (2) alliances with the retail distribution that demand standardised [39], low-priced products of the distributor's brand [46] with a product that was difficult to sell during the crisis; (3) search for foreign investors as business participations and the entry of capital from outside the territory and the sector that took over the productive system when companies enter into crisis; and (4) private and public divestments amid the crisis that sold establishments at bargain prices.

As the result, a process of business concentration begins in a deprived sector [49] where large foreign companies come into play that uses economies of scale [42] to (1) absorb competitors and control the production chain; (2) group into larger productive units, as has been seen in PdP [119]; (3) expand its range of products by incorporating the Iberian pig with white pig industries or another LPS-IPTI of Iberian pig industries; (4) invest in a projected sector in a relocation process [39], which began in 1976 in Jabugo and became much more common as of 1995 (Fregenal de la Sierra, Cumbres Mayores) [64]; and (5) access international markets.

As a consequence, these processes result in (1) territorial uprooting and loss of the local productive ties of the activity [18], very noticeable in Jabugo, SPLICTI due to the consolidation of global chains [125]; (2) social capital decline with the loss of employment and the value of know-how, as has also been observed in the PdP, as local skills lose importance [51]; (3) de-differentiation of the standardised product and prevalence of low-quality production of little added value (Fregenal de la Sierra, Higuera la Real, Jabugo), as well as loss of the own brand in favour of the brand of the distributor; (4) appearance of fraud in Iberian products, especially affecting Jabugo and Fregenal de la Sierra; and (5) increase in external hierarchy due to increased competitiveness of large companies and worsening of small ones.

These processes have encouraged local companies to position themselves in front of external companies [126] as they have been gaining importance in the sector while local actors were losing their active presence [25]. Traditional, family-owned and smaller local businesses can only guarantee their survival with a commitment to quality, since there is no direct size-quality relationship, as has been pointed out for the PdP [119]. The LPS-IPTIs are learning about the generation of "production worlds" [127], also identified for wine productions [128] when some compete for prices and others for quality, passing the productions through various phases from the local to the international markets [129]. This supposes a polarization between small-internal and large-external companies, which generate loss of ownership of the LPS-IPTIs.

5. Conclusions

The formation of LPS-IPTI was an alternative development in peripheral rural spaces, however, internal and external factors led to transformations of business, organisational as well as productive structure. The territorial base of the activity does not allow industrial relocation; therefore, the business structures do not undergo quantitative changes and focus on qualitative ones.

Whereas the financial and economic crisis has influenced these changes in the LPS-IPTIs, some of the causes were already present. Part of the traditional sector did not know how to modernize, improve its production structure and take advantage of synergies to preserve its territorial base, betting on growth based on indebtedness. Only those who bet on tradition and quality overcame the crisis. There is still a concentration in the analysed LPS-IPTIs, yet capital changes, decision-making is outsourced and activity is concentrated at the end of the process. The capacity to generate employment is lost and unemployment affects especially rural women.

The local development model in non-globalised areas is damaged with capitalist appropriation processes that terminate alternative models in favour of globalisation [39], although situations differentiate in the LPS-IPTIs. External actors are empowered as they are the ones that control production processes. There is a risk of reinventing the territory as a name and not as a value, the territory has remained, although companies have changed its headquarters, assuming a loss of ownership of the LPS-IPTIs, mainly noted in Jabugo.

The main limitation of this study is the necessary more in-depth research on the political-institutional dimension and the cooperation-collaboration relations around CBs, which consequently proposes potential new research works that touch upon the role of stakeholders in the explored processes. On the other hand, the findings concerning the feminisation of unemployment also open a line of research on gender.

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