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Companies Dedicated To the Cultivation, Preparation and Conservation of Cereals, Vegetables, Legumes and Fruits in Peru

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Abstract: The business concentration related to post-harvest and agro-food processing is scarcely widespread in the scientific literature, especially in emerging countries such as Peru. The objective was: a) to know the territories where the companies dedicated to the cultivation, processing and conservation of cereals, vegetables, legumes and fruits are located in Peru, b) to know the quantity of these companies and c) to identify the size of these agro-food companies. Material and method: This is an observational, descriptive and transversal study. The International Standard Industrial Classification version 3.0 and the classification database of the companies that reported the Ministry of Production from January 1 to December 31, 2015 were used. In Peru there are 7995 companies; 5042 are dedicated to the cultivation of cereals, 908 to vegetables and legumes and 2045 to fruits, nuts and plants for beverages and spices. The territories that host these economic activities are: Ucayali with 848 (16.8%) companies, Lima with 281 (30.9%) and Madre de Dios with 518 (25.3%) companies respectively. For the elaboration and transformation of food products, Lima is the city that houses 4683 companies, more than the rest of the cities. According to the business size there are 7828 (97.9%) and 10720 (98.3%) microenterprises corresponding to the cultivation and processing of these foods. Conclusions: It is important to know the socio-economic and agrifood reality, public-private investment to enhance the human capital and the economy of the Peruvian territories with more sustainable and environmentally friendly activities.
Keywords: Business Management, Product Development, Grain Storage, Legumes, Fruits, Cereals, Peruvian Products, Agrifood Companies.

INTRODUCTION

Economic activity is fundamental for the social, natural and technological system, but it has a better impact on the person, society and nature when it is introduced into the curriculum of the specialty of science and technology or food industries that are taught in universities and technology centers [5].

The exploitation of the habitat for the survival of the human species has been going on for centuries. Women and men on earth had to satisfy primary and secondary needs from products or services that they have obtained from the social environment and nature [9]. Currently, ecosystems continue to be exploited throughout the universe. Investigating economic activities contributes to the scientific literacy of the population, improving the human capital of the territories [8], helps to understand the social and natural environment of the population, contributing in the training of students of food and agrifood industries in Peru.

As a result of globalization and international policies, Peru adopted a series of result management plans and programs, promoting policies of decentralization and state modernization in response to the socioeconomic crisis [12]. These public policies sought the diversification of productive activities in each territory, fostering local potentialities and capacities to make them competitive to the internal and external markets.

The political and territorial organization of Peru is made up of 25 Regional Governments. These territorial governments received new competencies and public budgets to meet annual goals in face of the challenges required by the Sustainable Development Goals 2030 horizon. However, there are budget cuts and limited funding in the agri-food sector despite Peru sustaining its economy in extractive activities. Exports are a determining factor in the Peruvian economy, but this economic dependence is a double-edged sword. The policies of productive development seek to promote

industrial organization and productive diversification, but this entails paying more attention to production and industrialization in the territories and the training of people to improve their competitiveness. In this process there is the intervention of universities, institutes of research and technological development and innovation and higher education centers (public and private) with limited economic resources and funding for scientific research in the territories, usually these investigations are temporary consultancies or external consultancies at the request of companies.

The universities that offer professional careers in the food and agri-food industries understand that the industrial production of food allows to analyze, select, transform through an industrial process food. Involving a series of methods and resources such as facilities and equipment based on technological principles, procedures and previous transformations.

The raw material destined to food production is generally of animal and vegetable origin. Cereals, vegetables, legumes and fruits are also a fundamental part of food technology, especially in Peru. We conducted a review of the scientific literature on the subject and we found no information about it. Therefore, the objectives of this study were: a) to know the territories where the companies dedicated to the cultivation, processing and conservation of cereals, vegetables, legumes and fruits are located in Peru, b) to know the quantity of these companies and c) to identify the size of these agro-food companies.

MATERIALS AND METHODS

It is an observational, descriptive, and transversal study. The International Standard Industrial Classification version 3.0 and the database of the classification of the companies reported by the Peruvian Ministry of Production from January 1 to December 31, 2015 were used. The classification of the size of a company was considered as: microenterprise, small, medium and large respectively.

Statistical method: A descriptive analysis of the data was carried out to evaluate the relationship between qualitative variables. The software SPSS version 20.0 was used.

RESULTS

Companies dedicated to the cultivation of cereals, vegetables, legumes and fruits

It was observed nationwide that 5042 (100%) companies are dedicated to the cultivation of cereals and other crops n.p.c. The territories that concentrated the largest number of companies in these crops were: Ucayali with 848 (16.8%), San Martin with 448 (8.9%), Arequipa with 323 (6.4%) and Ancash with 320 (6.3%) companies respectively.

The companies dedicated to the cultivation of vegetables and legumes, horticultural specialties and products of nursery represented a total of 908 (100%) companies nationwide, 281 (30.9%) were concentrated in the capital Lima, 106 (11.7%) in Arequipa and 89 (9.8%) in Ica.

The companies destined to the cultivation of fruits, nuts and plants whose leaves or fruits have been used to prepare beverages and spices were 2045 (100%) nationwide. 518 (25.3%) were located in Madre de Dios, 390 (19.1%) in Lima, 273 (13.3%) in Junín, 251 (12.3%) in Ucayali respectively (Table 1).

Companies dedicated to the elaboration and conservation of products derived from cereals, vegetables, legumes and fruits

At a national level we observed 5042 (100%) companies dedicated to the elaboration and conservation of fruits and vegetables. 68 (40.0%) companies were in Lima, 28 (16.5%) in Tacna and 12 (7.1%) in Piura.

A total of 253 (100%) companies were engaged in the production of milling products throughout the country, 68 (40%) were concentrated in the territory of Lima, 22 (8.7%) in La Libertad, 20 (7.9 %) in Cusco and Junín, 19 (7.5%) in Arequipa respectively (Table 2).

We observed that 21 (100%) companies were engaged in the preparation of foods for animals nationwide, 10 (47.6%) were located in Lima, 4 (19%) in Cusco and 2 (9.5%) in Tacna.

8233 (100%) companies were engaged in the preparation of bakery products, 3509 (42.6%) concentrated in Lima, 599 (7.3%) in Arequipa, 430 (5.2%) in La Libertad, 422 (5.1%) in Cusco and 363 (4.4%) in Piura respectively.

2226 (100%) companies were engaged in the elaboration of other food products n.p.c, 1049 (47.1%) companies were concentrated in Lima, 194 (8.7%) in Arequipa, 312 (14%) in Piura, 79 (3.5%) in Callao respectively. Only 6 (100%) companies nationwide dedicated to the manufacture of starches and starch products were observed. 2 (33.3%) companies were located in Lima and San Martin, 1 (16.7%) in Amazonas and Huánuco.

Table-1: Territories where companies dedicated to the cultivation of cereals, vegetables, legumes and fruits are concentrated

Territories	Cultivation of cereals and other crops n.p.c.	Cultivation of vegetables and legumes, horticultural specialties and nursery products	Cultivation of fruits, nuts, plants whose leaves or fruits are used to prepare beverages and spices	Overall
Amazonas	47 (0.9%)	0(0.0%)	1 (0.0%)	48 (0.6%)
Ancash	320 (6.3%)	30 (3.3%)	19 (0.9%)	369 (4.6%)
Apurímac	34 (0.7%)	12 (1.3%)	8 (0.4%)	54 (0.7%)
Arequipa	323 (6.4%)	106 (11.7%)	18 (0.9%)	447 (5.6%)
Ayacucho	41(0.8%)	8 (0.9%)	6 (0.3%)	55 (0.7%)
Cajamarca	35 (0.7%)	10 (1.1%)	5 (0.2%)	50 (0.6%)
Callao	1(0.0%)	9 (1.0%)	3 (0.1%)	13 (0.2%)
Cusco	66 (1.3%)	46 (5.1%)	22 (1.1%)	134 (1.7%)
Huancavelica	36 (0.7%)	10 (1.1%)	2 (0.1%)	48 (0.6%)
Huánuco	76 (1.5%)	31 (3.4%)	78 (3.8%)	185 (2.3%)
Ica	134 (2.7%)	89 (9.8%)	57 (2.8%)	280 (3.5%)
Junín	177 (3.5%)	71 (7.8%)	273 (13.3%)	521 (6.5%)
La libertad	770 (15.3%)	68 (7.5%)	40 (2.0%)	878 (11.0%)
Lambayeque	465 (9.2%)	17 (1.9%)	16 (0.8%)	498 (6.2%)
Lima	676 (13.4%)	281 (30.9%)	390 (19.1%)	1347 (16.8%)
Loreto	188 (3.7%)	3 (0.3%)	10 (0.5%)	201 (2.5%)
Madre de dios	34 (0.7%)	5 (0.6%)	518 (25.3%)	557 (7.0%)
Moquegua	4 (0.1%)	2 (0.2%)	3 (0.1%)	9 (0.1%)
Pasco	13(0.3%)	7 (0.8%)	72 (3.5%)	92 (1.2%)
Piura	96 (1.9%)	13 (1.4%)	170 (8.3%)	279 (3.5%)
Puno	33 (0.7%)	10 (1.1%)	7 (0.3%)	50 (0.6%)
San Martín	448 (8.9%)	11 (1.2%)	27 (1.3%)	486 (6.1%)
Tacna	25 (0.5%)	61 (6.7%)	29 (1.4%)	115 (1.4%)
Tumbes	152 (3.0%)	1 (0.1%)	20 (1.0%)	173 (2.2%)
Ucayali	848 (16.8%)	7 (0.8%)	251 (12.3%)	1106 (13.8%)
Overall	5042 (100.0%)	908 (100.0%)	2045 (100.0%)	7995 (100.0%)

n.p.c.: Not Previously Classified, %: percentage

Size of the companies dedicated to the cultivation of cereals, vegetables, legumes and fruits

At national level 7995 (100%) companies were dedicated to the cultivation of cereals, vegetables, legumes and fruits. The companies were categorized according to their size; 18 (0.2%) were considered large companies, 4 (0.1%) medium, 145 (1.8%) small and 7828 (97.9%) microenterprises (Table 2).

Table-2: Size of companies dedicated to the cultivation of cereals, vegetables, legumes and fruits

Business size	Cultivation of cereals and other crops n.p.c.	Cultivation of vegetables and legumes, horticultural specialties and nursery products	Cultivation of fruits, nuts, plants whose leaves or fruits are used to prepare beverages and spices	Overall
Big company	6 (0.1%)	5 (0.6%)	7 (0.3%)	18 (0.2%)
Medium company	0 (0.0%)	0 (0.0%)	4 (0.2%)	4 (0.1%)
Small company	60 (1.2%)	30 (3.3%)	55 (2.7%)	145 (1.8%)
Microenterprise	4976 (98.7%)	873 (96.1%)	1979 (96.8%)	7828 (97.9%)
Overall	5042 (100.0%)	908 (100.0%)	2045 (100.0%)	7995 (100.0%)

n.p.c.: Not Previously Classified, %: percentage

Table-3: Territories where the companies dedicated to the elaboration and conservation of products derived from cereals, vegetables, legumes and fruits are concentrated

Territories	Processing and preservation of fruits, vegetables and vegetables	Manufacture of grain mill products	Preparation of starches and products derived from starch	Preparation of prepared foods for animals	Manufacture of bakery	Preparation of other food products n.p.c.	Overall
Amazonas	0 (0.0%)	5 (2.0%)	1 (16.7%)	0 (0.0%)	50 (0.6%)	6 (0.3%)	62 (0.6%)
Ancash	2 (1.2%)	11 (4.3%)	0 (0.0%)	0 (0.0%)	224 (2.7%)	27 (1.2%)	264 (2.4%)
Apurímac	2 (1.2%)	7 (2.8%)	0 (0.0%)	0 (0.0%)	54 (0.7%)	23 (1.0%)	86 (0.8%)
Arequipa	6 (3.5%)	19 (7.5%)	0 (0.0%)	0 (0.0%)	599 (7.3%)	194 (8.7%)	818 (7.5%)
Ayacucho	5 (2.9%)	5 (2.0%)	0 (0.0%)	0 (0.0%)	95(1.2%)	11 (0.5%)	116 (1.1%)
Cajamarca	2 (1.2%)	3 (1.2%)	0 (0.0%)	0 (0.0%)	220 (2.7%)	14 (.6%)	239 (2.2%)
Callao	3 (1.8%)	4 (1.6%)	0 (0.0%)	0 (0.0%)	363 (4.4%)	79 (3.5%)	449 (4.1%)
Cusco	5 (2.9%)	20 (7.9%)	0 (0.0%)	4 (19.0%)	422 (5.1%)	54 (2.4%)	505 (4.6%)
Huancavelica	0 (0.0%)	3 (1.2%)	0 (0.0%)	0 (0.0%)	30 (0.4%)	1 (.0%)	34 (0.3%)
Huánuco	6 (3.5%)	12 (4.7%)	1 (16.7%)	0 (0.0%)	119 (1.4%)	41 (1.8%)	179 (1.6%)
Ica	1 (0.6%)	5 (2.0%)	0 (0.0%)	1 (4.8%)	222 (2.7%)	37 (1.7%)	266 (2.4%)
Junín	3 9 (1.8%)	20 (7.9%)	0 (0.0%)	1 (4.8%)	311 (3.8%)	45 (2.0%)	380 (3.5%)
La libertad	6 (3.5%)	22 (8.7%)	0 (0.0%)	0 (0.0%)	430 (5.2%)	55 (2.5%)	513 (4.7%)
Lambayeque	4 (2.4%)	12 (4.7%)	0 9 (0.0%)	0 (0.0%)	343 (4.2%)	65 (2.9%)	424 (3.9%)
Lima	68 (40.0%)	45 (17.8%)	2 (33.3%)	10 (47.6%)	3509 (42.6%)	1049 (47.1%)	4683 (42.9%)
Loreto	3 (1.8%)	2 (0.8%)	0 (0.0%)	0 (0.0%)	106 (1.3%)	27 (1.2%)	138 (1.3%)
Madre de dios	3 (1.8%)	3 (1.2%)	0 (0.0%)	0 (0.0%)	30 (0.4%)	5 (0.2%)	41 (0.4%)
Moquegua	1 (0.6%)	0 (0.0%)	0 (0.0%)	1 (4.8%)	73 (0.9%)	19 (0.9%)	94 (0.9%)
Pasco	1 (0.6%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	41 (0.5%)	12 (0.5%)	54 (0.5%)
Piura	12 (7.1%)	15 (5.9%)	0 (0.0%)	0 (0.0%)	363 (4.4%)	312 (14.0%)	702 (6.4%)
Puno	2 (1.2%)	15 (5.9%)	0 (0.0%)	0 (0.0%)	144 (1.7%)	24 (1.1%)	185 (1.7%)
San Martin	5 (2.9%)	12 (4.7%)	2 (33.3%)	1(4.8%)	167 (2.0%)	42 (1.9%)	229 (2.1%)
Tacna	28 (16.5%)	3(1.2%)	0 (0.0%)	2 (9.5%)	164 92.0%)	48 (2.2%)	245 (2.2%)
Tumbes	0 (0.0%)	3 (1.2%)	0 (0.0%)	0 (0.0%)	72 (0.9%)	12 (0.5%)	87 (0.8%)
Ucayali	2 (1.2%)	7 (2.8%)	0 (0.0%)	1 (4.8%)	82 (1.0%)	24 (1.1%)	116 (1.1%)
Overall	170 (100.0%)	253 (100.0%)	6 (100.0%)	21 (100.0%)	8233 (100.0%)	2226 (100.0%)	10909 (100.0%)

n.p.c.: Not Previously Classified, %: percentage

Size of the companies dedicated to the elaboration and conservation of products derived from cereals, vegetables, legumes and fruits

10909 (100%) companies nationwide were engaged in the preparation of products derived from cereals, vegetables, legumes and fruits. 29 (0.3%) were considered as a large company, 8 (0.1%) medium, 152 (1.4%) small and 10720 (98.3%) were microenterprises (Table 4).

DISCUSSION

Peru is a diverse country due to climate, flora, fauna, culture and tourism among other aspects that boost its economy. This study identified a total of 7,995 companies related to the cultivation, processing and conservation of cereals, vegetables, legumes and fruits nationwide. We observed that 7828 (97.9%) microenterprises were dedicated to the cultivation of cereals, vegetables, pulses and fruits and 10720 (98.3%) micro enterprises were dedicated to the transformation of these foods.

Our study shows that, although the policies of economic decentralization and production have been implemented in the territories, Lima is the city that concentrates the largest number of companies dedicated to the preparation and conservation of products derived from cereals, vegetables, legumes and fruits. This may explain the high economically active population presented by the city of Lima in relation to other cities, the greater supply of jobs, the requirement of a specialized qualification, better access to public services, but a higher cost of living in relation to other cities and a series of problems related to citizen security and noise, visual and environmental pollution [11].

In developed countries, agriculture plays a fundamental role in the economy and in health [2,3]. Our study shows that Peru has challenges and opportunities in agri-food production and processing, especially in territories far from the capital of Lima. Industrial processes have not been on the agenda of each territory, possibly due to other problems such as

access to water and public services that the entire population does not have [1]. Water, floods, droughts and climate change have limited the efficiency of irrigation systems, leading to families leaving behind their belongings and their culture or becoming accustomed to living at risk of losing their crops due to floods or droughts [6]. In the Peruvian territories, irrigation and natural disaster prevention plans have also been formulated with the experience of the Niño phenomenon [15], but the limited financing makes it difficult to implement them in all localities.

Table-4: Size of companies dedicated to the elaboration and conservation of products derived from cereals, vegetables, legumes and fruits

Business size	Processing and preservation of fruits, vegetables and vegetables	Manufacture of grain mill products	Preparation of starches and products derived from starch	Preparation of prepared foods for animals	Manufacture of bakery	Preparation of other food products n.p.c.	Overall
Big company	6 (3.5%)	5 (2.0%)	1 (16.7%)	2 (9.5%)	7 (0.1%)	8 (0.4%)	29 (0.3%)
Medium company	1 (0.6%)	1 (0.4%)	0 (0.0%)	0 (0.0%)	4 (0.0%)	2 (0.1%)	8 (0.1%)
Small company	14 (8.2%)	11 (4.3%)	0 (0.0%)	2 (9.5%)	76 (0.9%)	49 (2.2%)	152 (1.4%)
Microenterprise	149 (87.6%)	236 (93.3%)	5 (83.3%)	17 (81.0%)	8146 (98.9%)	2167 (97.3%)	10720 (98.3%)
Overall	170 (100.0%)	253 (100.0%)	6 (100.0%)	21 (100.0%)	8233 (100.0%)	2226 (100.0%)	10909 (100.0%)

n.p.c.: Not Previously Classified, %: percentage

The policies and strategies of the governments argue that the importance and interests of small farmers are high on the national agenda, however, they have insufficient financial support, which suggests that small-scale agriculture could not be considered a potential engine of the economy. The government's approach in the preparation of irrigation infrastructure must be accompanied by the adequate development of capacities, formalization of land tenure and the promotion of alternative crops. Another aspect that should promote agri-food policies are post-harvest losses, assessing the design of industrial processes so as to avoid damage by mechanical compression contact and improve the quality of agro-industrial products [4]. It also involves boosting post-harvest technology by designing different storage processes and operations, milling the value of waste for biomass products [7], considering the variety of residues that trigger the herbicides [13].

The consumption of fruits, cereals and vegetables has been recommended in the diet of people worldwide for their nutritional properties for health [14]. Previous studies suggest that nutrient deficit can lead to premature deaths in non-industrialized countries [10]. However, fruit and vegetable fruit consumption may reduce the risk of chronic pathologies [2].

Although our study sought to identify the territories that concentrate companies dedicated to the cultivation, processing and conservation of products derived from cereals, vegetables, legumes and fruits have various limitations, we demonstrate that there are territories that need to boost their economy with the resources of their area. We do not address the quality of these products, the equipment or technology used in each territory for production, production cost, sales, and qualifications of the sector in each territory, accessibility to public services, internal market opportunities or the external sector. We only focus on observing the relationship of companies specialized in cultivating or making cereal products, vegetables, legumes and fruits located in each territory.

CONCLUSION

Lima is the Peruvian city that concentrates a high number of companies dedicated to the transformation and conservation of cereals, vegetables, legumes and fruits compared to other territories. We believe that our study contributes to public agro-food policies in Peru and that it should improve budgets and cooperation for agricultural and livestock production in the interior of the country.

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