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### THE SUSTAINABILITY GOAL

Sustainability of agriculture is a key goal worldwide, that can guarantee both the survival of smaller farms and the competitiveness of agricultural holdings. It is a complex multidimensional concept. Its evaluation is based on statistical data at the single farm level. The 7<sup>th</sup> agricultural census, referred to 2020, provided information on the development of Italian farms. Based on the census, we propose a **methodology for estimating the degree of sustainability of the Italian agricultural holdings**. The methodology uses 5 indicators referable to specific strategic farm features connected to sustainability.

### METHODOLOGY

- The classification methodology is based on **5 binary indicators attributed to each farm**. Each indicator is equal to one if the farms owns a particular feature and is equal to zero otherwise. The 5 features are:
- Crops diversification.** According to the CAP 2023-2027, crop diversification is one of the good practices for the climate and the environment to be respected by farmers in order to receive the ecological payment, or *greening*. The census data were used to evaluate which farms would have met the requirements in 2020 (diversification binary variable = 1).
  - Organic farming.** It indicates the propensity of farmers to change their production techniques in order to guarantee sustainable agriculture and to preserve food safety. The second indicator is expressed through the binary variable, equal to 1 (Yes) if the farm is organic (crops and/or livestock, organic or in conversion to) and equal to 0 (No) otherwise.
  - Other Gainful Activities.** OGAs (agritourisms, care farming, educational farming, etc.) guarantee additional income sources, respond to new demand needs and allow valorization of territory’s characteristics and traditions. The third dimension is expressed through the binary variable, equal to 1 (Yes) if the farm had at least one OGA in 2020 and equal to 0 (No) otherwise.
  - Innovation.** The census asked: “In the years 2018-2020, has the farm made investments aimed at innovating the production management?” The fourth indicator is given by the binary variable, equal to 1 (Yes) if the farm answered “Yes”, and/or if the farm received at least one EU subsidy concerned with innovation, and to 0 (No) otherwise.
  - Economic size.** Each modern farm must have net incomes larger than a certain threshold, given by the ISTAT poverty threshold. On average, the poverty threshold was found to be 17,562 euro. We used the Standard Output (SO) as proxy of net incomes. The fifth indicator is given by the binary variable, equal to 1 (Yes) if the farm had SO≥17,562 euro and equal to 0 (No) otherwise.

We indicate as **n** the number of agricultural holdings, **n(i)** the number of agricultural holdings which have **i** sustainability dimensions (i=0,1,2,3,4,5). For instance, n(3) = number of farms with 3 sustainability dimensions. Therefore, we define:


**n(0) = number of not sustainable farms**      and      **n-n(0) = number of sustainable farms**

### MAIN RESULTS

**Table 1** summarizes the **n(i)** frequencies and the ratios **n(i)/n**, in order to classify the Italian farms based on the number of sustainability dimensions they possess (**sustainability score**). In 2020, **45 farms on 100 were sustainable** (more than **508 thousand**). On the other hand, **55 farms on 100 were not sustainable** at all (more than **622 thousand**).

Table 1. Degree of sustainability of Italian farms and some average levels per farm – 2020

Number of "Yes"	Classification	Number of farms	Number of farms %	Average per farm			
				Standard output (1)	Utilized agricultural area (2)	Adult livestock units (3)	Full time equivalents
Total	Whole population	1,130,513	100.0	49,740	10.6	8.3	0.67
>0	Sustainable	508,303	45.0	105,474	20.6	18.2	1.23
4 or 5	High sustainability	23,862	2.1	253,617	52.6	44.3	2.71
2 or 3	Medium sustainability	233,905	20.7	147,928	28.9	27.0	1.58
1	Low sustainability	250,536	22.2	51,729	9.8	7.5	0.76
0	Not sustainable	622,210	55.0	4,209	2.5	0.1	0.22



For each highly sustainable farm (23,862), there are **10,5** lowly sustainable farms (250,536)

Elaboration on ISTAT data. (1) Euro. (2) Hectares. (3) This indicator synthesizes the various animal species. Common lands are not included.

Table 2. % ratio between sustainable and total farms in some sub-populations – 2020

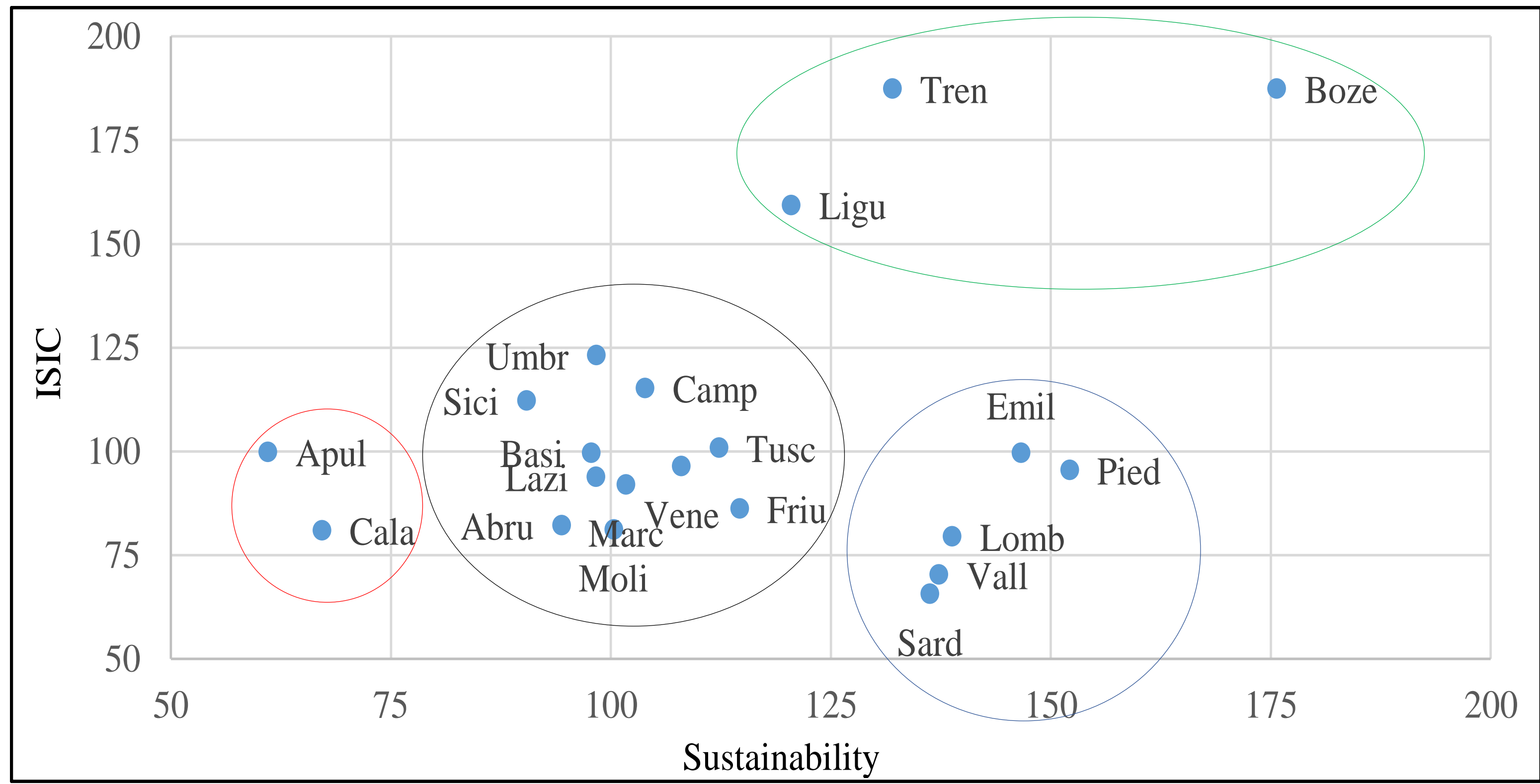
Farm manager’s profile		Farm’s features		Geographic area	
Management < 3 years	54.9	Crops and livestock	73.4	ITALY	45.0
Management ≥ 3 years	44.5	Only cultivations	39.4	North-West	64.2
Young (< 40 years)	71.8	Only livestock	34.5	North-East	57.8
Not young (≥ 40 years)	42.5	Plains	44.0	Centre	46.4
Male	48.2	Hills	43.5	South	34.6
Female	37.8	Mountain	51.0	Islands	45.7
Basic education	40.4	Disadvantaged	39.2		
Diploma/degree	53.8	Not disadvantaged	46.7		

**Farming is more sustainable if:**

- The farm is young
- The manager is young
- The manager is a male
- The manager has high education
- The farm has crops and livestock
- The farm is on mountains
- The municipality is not disadvantaged
- The farm is in the North

Elaboration on ISTAT data.

Figure 1. Agriculture competitiveness (ISIC) and sustainability by regions



Elaboration on ISTAT and ISMEA data. Italian average = 100.

### Competitiveness vs sustainability

- **ISIC** is a synthetic indicator of agro-food competitiveness in Italian regions, which summarizes the four dimensions of competitiveness: cost competitiveness, gross profitability, foreign markets and innovation
- Italian regions can be grouped into **4 clusters**:

Color	ISIC	Sustainability
Green	High	High
Blue	Medium-low	High
Black	Medium	Medium
Red	Low	Low

References: Lampridi M.G., Sørensen C.G., Bochtis D. (2019). Agricultural Sustainability: A Review of Concepts and Methods. Sustainability. 11: 1-27. <https://doi.org/10.3390/su11185120>