WP3 Agriculture and territorial development

Resumed content

4 pages TASTE

Smart Agriculture

Mixed methods

Multiscale

Smart Agriculture Index

Smart Agriculture Projects

Smart Agriculture (SA) has been included in the EU growth strategy Horizon 2020, related to the goals of smart, sustainable and inclusive growth. However there is not a unique definition of SA and the analysis are fragmented in different thematic and different territorial scales.

The purpose of WP3 was to define, characterize and evaluate SA through quantitative and qualitative analysis at different territorial scales.

Results show that SA is a new term indicating an holistic vision of agricultural potentialities, for raising collective behavior.

Main topics

- To define and characterise SA through the analysis of how the main SA issues are analysed in literature. The SA thematic issues are: Technological issues and agricultural engineering (Opara 2004; Aqeel and Shaik, 2009, Hwang et al., 2012); Environment and climate change (Bogdanski, 2012, Neufeldt et al. 2013); Landscape and land use (Scherr et al., 2012; Beuchelt and Badstue, 2013); Social inclusion (Sullivan and al., 2012, Saquet et al., 2013, Psarikidou and Swerszynski, 2012); Economy, Supply and demand, (Ilbery et al., 2005; Pearson et al., 2011; Sage, 2003; Renting et al., 2003); Multifunctional Agriculture (Wilson, 2008); Public policies (Jänicke, 2008; Lo Schiavo et al., 2013).
- To develop a methodology to quantify and evaluate the agricultural smartness through the design of a composite index, which combine together the seven SA features.
- To understand how the seven SA features are declined in different metropolitan regions and which dimension does prevail at local level in local actions (Fig. 1).

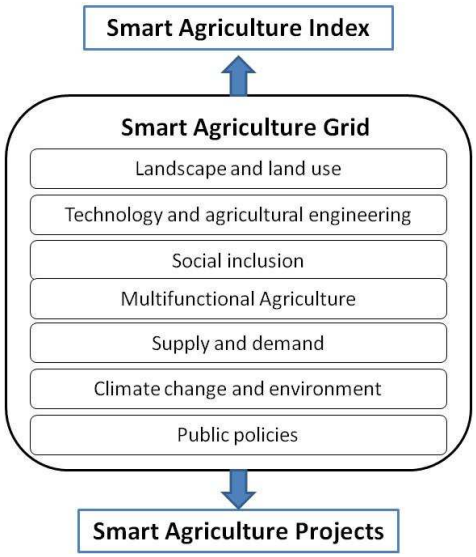

Figure n°1. Methodological pathway for the analysis of SA

Contribution to smart development

The WP3 has developed a methodological framework to characterise the main thematic linked to Smart Agriculture and evaluate and quantify Smart Agriculture at different territorial scale, with quantitative and case study analysis.

The results of the different analysis suggest that there is not only one way to be smart. On the ground different pathways of SA are possible depending on the specific characters of areas. At the same time the are complementarities around Europe, suggesting the possibility of actions of cooperation between regions. The work package thus provides policy makers and researchers with data to understand regional dynamics and compare different territorial scales and different regions.

In this way it provides information about the impact of policies and funds to the regional and local dynamic, reinforcing the link between top down policies and bottom up actions. At the same time it provides a base on which future policies can be drawn. The purpose thus could be to go deeper in the existing SA regional trends or to compensate with policies SA regional gaps.

Team leader

Stefano CORSI,
University of Milan
stefano.corsi@unimi.it

Teams

- Rosalia FILIPPINI
- Sylvie LARDON
- Isabelle DUVERNOY
- Christophe SOULARD
- Segolène DARLY
- Jean-Baptiste TRAVERSAC
- Elise MAIGNE
- Eric CAHUZAC
- Romain MELOT

TASTE Project

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Methods

1. Bibliographic analysis

On the seven thematic, a bibliometric and bibliographic review was conducted by the WP3 team. Each research group has chosen a thematic on the base of its competences and previous research activity. The analysis consisted in a quick quantitative assessment of the relevance of the terms and in a more comprehensive analysis of the dimensions, relations and theories involved in each thematic.

For each thematic, different databases (Web of Science, SCOPUS and CAB ABSTRACTS) and key-words were chosen.

2. Smart Agriculture Index

Spatial scale

The spatial scale of analysis is the farm, the agricultural management unit, while the NUT3 level represents our working/territorial unit and the data used are farm-based (number of farms for a given feature). The data came from the national agricultural census, more precisely the "VI Censimento dell'Agricoltura 2010" (ISTAT) for Italy and the "Recensement Agricole du 2010" (INSEE) for France.

Composite Indicator

The method has fellow three steps:

- first, relevant and comparable variables were selected from national census data to cover the seven themes related to SA;
- then, the data were normalized in order to enable the comparison between regions;
- finally, five sub-indicators have been synthesized: "SAI-technology", "SAI-landscape", "SAI-environment", "SAI-social", "SAI-economic"; two total indicators have been created "Smart Agriculture Index" (SAI) and "Kiviat area".

CATEGORY	VARIABLE
STRUCTURAL	Number of farms
	Total UAA (ha)
	Average UAA (ha/farm)
TECHNOLOGY	Farms using internet
	Farms producing energy from renewables
LANDSCAPE	Maintenance or new construction of trees rows
	Maintenance or new construction of walls
ENVIRONMENT	Farms on conservation tillage
	Organic farms
	Biodiversity of crops
SOCIAL	Farm manager under 40
	Women farm manager
	Farm manager education level
ECONOMIC	Economic specialization
	European economic size of farms
	Rate of non-family workers
MULTI-FUNCTIONALITY	Farms doing direct sale
	PDO/PGI farms
	Farms diversificating their activity
	Farms transforming their products

Table n° 1. Smart agriculture: definition and description of indicators

3. Case Study Analysis

The case study analysis is based on qualitative approach. In each metropolitan region researchers have collected, described and analyzed a huge number of local projects concerning projects connected to the seven dimensions of SA involved.

Selection of the projects

The lists of the projects are based on previous researches conducted by the research groups, and it has been updated through internet search, local newspapers browsing and complementary interviews.

We defined a "project" as an actual or a projected realization concerning agriculture or agricultural land, putt in place inside the borders of the case study.

Grid of analysis

The projects have thus been classified and included in an analytical grid of SA (Table 2), in order to provide a common framework of analysis among the case studies. The grid includes the seven dimensions of SA and the projects are classified considering the main purpose expressed by the actors involved. Thus, the specific projects, or a selection of them, put in place in the area are detailed for each category of project.

SMART Thematic	Category of project
LAND USE AND LANDSCAPE	Urban Gardens
	Agricultural Park
ICT TECHNOLOGY	Supply collecting
	Online sale
SOCIAL INCLUSION	Social farming
	Cultural Event
SUPPLY AND DEMAND	Gruppi d'Acquisto Solidale
	Farmers market
	Catering
	Food chain projects
MULTIFUNCTIONALITY	Direct Sale
	Didactic farms
	Agriturismo
ENVIRONMENT	Agricultural Park
	Water and soil management
PUBLIC POLICY	Agenda 21
	Food policy
	Intermunicipality

Table n° 2. Smart Agriculture Grid applied on case studies

Results

1. Bibliographyc analysis

In general, the thematic have different frequencies in literature: “SA and technology”, as well as “Smart Agriculture and land use and landscape” are more frequent in literature than “SA and social inclusion”. The same thematic is also differently interpreted by different authors. Related to **technological issues and agricultural engineering**, literature refers SA to the combination of emerging technologies (Aqeel and Shaik, 2009), a technology triad combining biotechnology, information and communication technology/ICT, nanotechnology (Opara, 2004). On a wider perspective, Beuchelt and Badstue (2013) proposes technology-focused solutions to food security goal threatened by climate change. According to Scherr et al. (2012), **landscape** is related to agriculture and climate change because of the synergies that can be seen between agricultural production, climate adaptation and mitigation actions. So, landscape based analysis can offer a strategy to achieve SA objectives in all its dimensions. By analyzing **public policies** SA is seen as smart regulation in environmental management, with focus on “ecological modernization” (Jänicke, 2008) and how policies can favour innovation (Lo Schiavo et al., 2013). On the **economic – supply and demand**, alternative food networks are seen as innovation in agriculture, due to the regained relationship between consumers and producers/farmers which can contribute to the development of rural areas (Renting et al.2003). **Social inclusion** is seen as a way to enable climate adaptation and mitigation, reinforcing inclusive development. It is so important that some authors noted that technological innovations without social inclusion are not enough to achieve a smart development. In conclusion, while the discussion on SA have started to study a technological and managerial issues to improve technical performances, more recently the literature on alternative food chains and social inclusion have added complementary elements of social sciences to the debate.

2. Smart Agriculture Index

The quantitative analysis done at regional scale has revealed that, while smartness index in France seems to be more polarized around social inclusion and technology, in Italy there is a more dispersed dynamic. Moreover, while in France it is the centre which seems less smart, in Italy there’s a polarization between the North and the South of Italy, where the North seems to be smarter than the South (Fig.2 and Fig.3).
French indicators indicate predominantly remote rural region as smartest (highest values detected for 4 sub-indexes: technology, landscape, environment and multifunctionality).
In Italy urban areas are the smartest ones for all the thematic with the exception of environment and social inclusion.

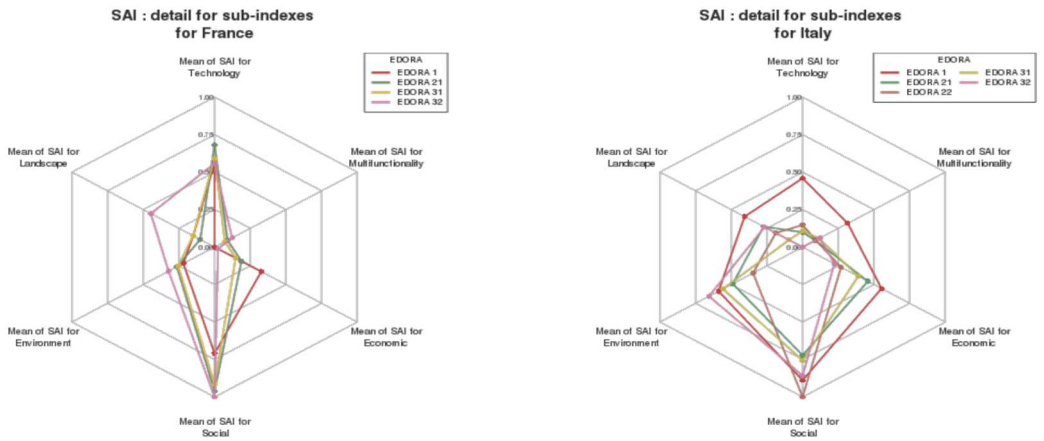


Figure n° 2.
Smart Agriculture Index[1]
Detail for sub-indicators

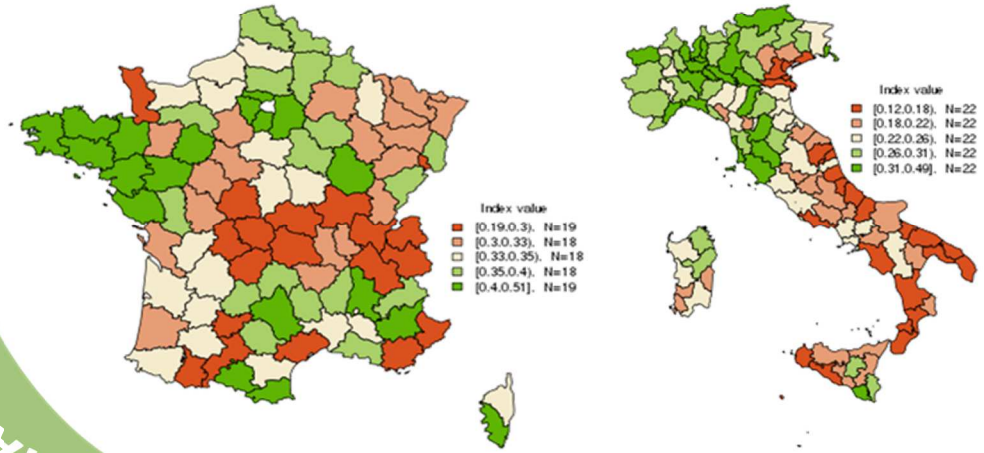


Figure n° 3
Smart Agriculture Index
Means of all index

[1]EDORA classification: 1 = Predominantly urban region; 21 = Intermediate region, close to a city; 22 = Intermediate region, remote; 31 = Predominantly rural region, close to a city; 32 = Predominantly rural region, remote.

Results

3.Case study

Most of the IT initiatives identified in Italy are actually related to the sale and the buy of food. In France we found IT initiatives devoted to offer pedagogic resources and tools to connect people to local projects (Toulouse), and to the management of waste (Montpellier).

Considering the territorial management, in France many actions are somehow related to the preservation of agricultural soil: while some actions are related to the protection of agricultural land, other actions aim first to protect the agricultural activities, and thus farmers work.

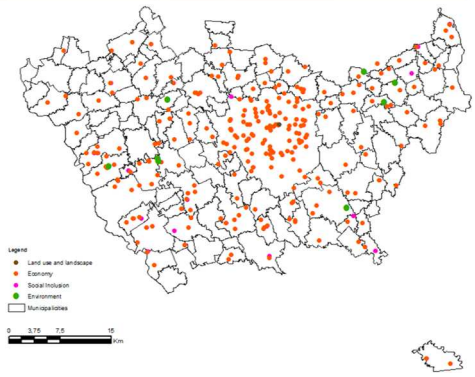
In Milan (Italy) the agriculture land and its activity is the subject of the creation of an agricultural park and rural districts. However, these actions seems to have more the purpose to valorise the food function of agriculture in order to have a food supply basin, than an active action of preserving farming activity per se (Fig. 4 and Fig. 5).

This reflects the different stakes and the different perceptions of the agriculture for local development and the importance to study their construction at local level, considering local agricultural and food policies.

Figure n° 4 SA Milan Grid

SMART Thematic	Category of project	Projects
LAND USE AND LANDSCAPE	Urban Gardens	AGRICITY
		Fondazione Catella
	Agricultural Park	Parco Agricolo Sud Milano
ICT TECHNOLOGY	Supply collecting	Cortilia
SOCIAL INCLUSION	Social farming	Cascina Bollate Coop. Soc. ONLUS
		CONTINA Coop. Soc. ONLUS
		Coop. Soc.EUREKA - CASCINA CAPPUCCINA
		CO.A.FRA. Coop. Agricola Fraternità
	Cultural Event	Food Film Festival
SUPPLY AND DEMAND	Gruppi d'Acquisto Solidale	Gas di Milano
		AEQUOS
		Binario giusto
	Farmers market	Mercato della terra Milano
		Campagna Amica
	Catering	Parc- Prodotti Agricoli in Catering
	Food chain projects	Riso&Rane in Esselunga supermarket
MULTIFUNCTIONALITY	Direct Sale	projects of farms
	Didactic farms	projects of farms
	Agriturismo	projects of farms
ENVIRONMENT	Agricultural Park	Parco Agricolo Sud Milano
	Water and soil management	Protection of Razza Varzese
PUBLIC POLICY	Agenda 21	Agenda 21 est Ticino
	Food policy	Milano Urban Food Policy
	District	Rural and Agricultural districts

Figure n° 5 Localisation of the projects



To go further …

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- CORSI S., LARDON S., MARRACCINI E., MAZZOCCHI C. (2015) *Territory game for a smart development of local policies for agriculture. A comparison between French and Italian case studies*, 55th ERSA Congress "World Renaissance: Changing roles for people and places", 25-28 August 2015 - Lisbon, Portugal
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- FILIPPINI R., CORSI S., LARDON S. *Multi-level modeling of smart development, from rural territories to regional level: a common framework for local and global stakeholders*. AgriMed - International workshop on farm and land system dynamics in the Mediterranean basin: integrating spatial scales, from the local to the global one. 1/12/2016. INRA – Avignone (France).

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For further information about the TASTE Project : taste-smarteurope.eu

TASTE Author(s): Stefano CORSI (Universiy of Milan) stefano.corsi@unimi.it; Rosalia FILIPPINI(University of Milan) rosalia.filippini@unimi.it; Sylvie LARDON (AgroParisTeche/INRA) sylvie.larsdon@agroparistech.fr; Isabelle DUVERNOY(INRA) duvernoy@toulouse.inra.fr; Christophe SOULARD (INRA) soulard@supagro.inra.fr; Segolene DARLY (Universitè Paris8) segolene.darly@univ-paris8.fr; Jean-Baptiste TRAVERSAC(INRA/AgroParistech) jean-baptiste.traversac@agroparistech.fr; Elise MAIGNE (INRA) elise.Maigne@toulouse.inra.fr; Eric CAHUZAC (INRA) eric.cahuzac@toulouse.inra.fr

Scientific Coordinator : André TORRE (INRA)- torre@agroparistech.fr

Projetct Manager : Frédéric WALLET (INRA)- wallet@agroparistech.fr

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