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Alternative Energy and the Development of Local Rural Contexts: An Approach to Improve the Degree of Smart Cities in the Central-Southern Italy

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Abstract

Italy presents a continuous and clear division between North and South, also in terms of smart cities. According to the recent Smart Cities Index, the real smart cities correspond to the northern Italian ones. These cities have a robust economy and society, showing a high employment rate and a consistent mobility through public transport. These elements therefore help to consider them as efficient cities. Through an analysis of the intrinsic characteristics of the 116 Italian cities covered by the reports, there is a positive correlation between smart cities and greater energy consumption, such as of gas and for street lighting. On the other hand, Central - Southern cities are less smart, however attesting a strong relationship with the rural context. In fact, the predominance of employees in the primary sector and of arable land used is crucial, which is also further enhanced by the strong presence of renewable energy plants, such as solar and wind, that are concentrated in these contexts. This data reveals a reflection, outlining the opportunity to actually make smarter these territories, enhancing its agricultural vocation. The setting up of agro-energy districts results a potential opportunity for increasing employment, enable greater energy self-sufficiency, additional protection of traditional rural landscapes, the rise of a circular economy which aims to re-use agricultural waste.

Thus these cities could earn places in the ranking of smart cities through targeted policies and actions designated to the agricultural context.

Keywords: smart cities, renewable energy, agro-energy districts

1 Introduction

Smart cities mean a conceptual urban development model in which the integrated use of human, technological and collective capitals enable to improve urban agglomerations. According Angelidou (2014), the abuse and the distortion of the concept 'smart', which labels everything that appears original and innovative, are amplified by the conflicting interests between various stakeholders (such as local governments, citizens and research institutes). For this reason, it is difficult to recognize a universal definition of "smart city" among all those that have been given until today (Allwinkle & Cruickshank, 2011; Chourabi et al., 2012; Lombardi, Giordano, Farouh, & Yousef, 2012; Nam & Pardo, 2011a; Papa, Garguilo, & Galderisi, 2013; Wolfram, 2012). Strategic planning for the development of smart cities is still limited due to the existence of a strong interdisciplinary (Angelidou, 2014). While the 'smart' term is used interchangeably in the literature (Hollands, 2008; Pardo, Nam, & Burke, 2012; Wolfram, 2012), the strategic planning for the development of smart cities remains unknown and shortly discussed (ABB, 2012; Chourabi et al., 2012; Nam & Pardo, 2011a).

Cities consume 75% of worldwide energy production, generating the 80% of CO_2 emissions (Lazaroiu and Roscia, 2012). Smart Cities Initiative aims to go towards local sustainable energy systems (Meeus et al., 2011). For example, urban mobility causes several problems (e.g. traffic congestion, energy consumption), that can be resolved with original solutions (e.g. adoption of vehicle-to-vehicle and vehicle-to-infrastructure communication networks and Intelligent Transportation Systems). Smart energy grids represent the main requirement in order to leverage energy consumption between the numerous stakeholders. Energy efficiency and savings can be achieved by the combination of intelligent and technologies in both residential and commercial markets processes (Correia and Wünstel, 2011). According to Neirotti et al. (2014), the required optimisation during the use and the exploitation of tangible and intangible goods can be reached following various approaches, that are mainly related to: the way in which cities can orient themselves to achieve this objective; and the domains that are critical for a more intelligent use of urban resources. Cities seek to offer innovative services (e.g. for the smart energy management, intelligent lighting/electricity control and monitoring) (Palmieri et al., 2016). However, energy grids, natural resources, energy and water management, waste management, environment, transport, mobility and logistics are considered as the hard domains (Neirotti et al., 2014). Policies are sensible to the interacting factors that should be mapped in order to have a clear vision of strategic decisions (Angelidou, 2014). Traditional urban landscape is influenced by local characteristics, priorities and needs; but in smart cities, technology and global market forces affected it (Angelidou, 2014). The implementation of smart technologies offers the greatest challenge of the city governments (Tolga Akçura and Burcu Avci, 2014). Compared to traditional cities, smart cities enjoy new favourable network infrastructure allowing socio-economic, environmental and cultural improvement with a proactive government approach, generating various values added as such as well-organized meeting and sustainable partnerships (Santinha and de Castro, 2010; Allwinkle, and Cruickshank, 2011; Deakin and Allwinkle, 2007). The European Union has already set goals, elaborating a wide range of technologies and methods available (European Union, 2012). For energetic issues, methods focus on the improvement in terms of efficiency, cleanness and safeness, using sustainable renewable sources and reducing pollutant emissions (Lazaroiu and Roscia, 2012). In recent years Italy has progressed by increasing the renewable energy plants. In 2011, about 30% of the national electricity production was obtained from renewable energy sources (AEEG, 2012). In biennium 2010-2011, a remarkable increment of 466% from photovoltaic technologies and the 14% and 8% increases from biomass and wind, respectively, show a progressive incentive for renewable energy sources (Crispim et al., 2014). This data also emerged from the implementation of the actions from the Covenant of Mayors, that different contexts, such as smart cities candidates, have elaborated to achieve the EU target 20-20-20. For the development of "smart cities", action plans for sustainable energy (or Covenant of Mayors) offer themselves also as instruments for the development of a sustainable strategy. All sectors are considering in the smart cities concept, like agro-alimentary and food safety (Di Giacinto et al 2012).

The best performing cities, in the themes of smart sustainability, are concentrated in the northern Italy (report EY; 2016; report Between, 2014, 2013), highlighting the perpetual bipolarity that has always characterized the peninsula. Northern cities have a solid social and economic structure that allow a greater system efficiency. Such energy-consuming contexts are opposite to the more Central - Southern areas, where the rural connation reigns in their territory. However, in the latter where the primary sector is the lion's share, renewable energy plants, such as solar and wind, are intensely concentrated.

Based on the score obtained in the recent reports for smart cities, the paper aims to analyze Italian contexts in order to reflect renewable energy and to offer concrete strategies that can make more sustainable those less virtuous situations. Starting from their local intrinsic characteristics, potential opportunities and useful actions are suggested to increase their smart degree, without focusing only to urban areas but also enhancing their agricultural vocation and the total aspects considering like safety and health on the workplace (Deboli et al 2014, Boubaker et al 2014, Marucci et al. 2013, Pascuzzi et al. 2015). The setting up of agro-energy districts can be a reliable solution for increasing employment, enabling greater energy self-sufficiency, additional protection of traditional rural landscapes and the rise of a circular economy which aims to re-use agricultural waste. Cities can make more innovative, self-reliant and sustainable their economies and territories, in addition to earning places in the ranking of smart cities through targeted policies and actions.

2 Methods

2.1 Study area

Italy is a Mediterranean geographical region, composed by mainland and several islands. Inhabited by 60 million people, it covers an area of approximately 300000 km², with an average density of 200 km². Italy is surrounded by the Mediterranean Sea and the Ionian Sea to the south, the Adriatic Sea to the east and the Tyrrhenian Sea to the west. Italian coasts are developed on approximately 7500 km. Many islands, mostly grouped in archipelagos, characterize Italy, where the largest ones are Sicily and Sardinia.

Despite its territory is strongly anthropogenic, Italian soil presents various features, such as that of volcanic origin. Mountain ranges extend in a large part of Italy. The Alps are situated in the north, from west to east; while the chain of the Apennines runs down the Peninsula, from Liguria to Sicily. Only a quarter of its territory consists of plains: the major one is the Po Plain, an alluvial expanse formed by the Po River and its affluent rivers. Hilly areas are prevalent compared to mountain areas and those plains, where its average altitude is about 337 m s.l.m..

2.1 Statistical analysis

Italian authorities identify 20 regions, which are divided in a total of 116 provinces. Provinces are considered as the main territorial unit. The unit of analysis has gone down to the level of the 116 cities considered by the report of smart cities, in order to analyze and compare their intrinsic characteristics and to perform statistical analysis and GIS processing.

The study has examined three recent reports of smart cities in Italy (for the years 2013 and 2014 elaborated by Between and for the year 2016 by the research team of EY), which identify the most virtuous contexts in terms of smart cities (fig. 1). The score obtained by each city is considered as a key indicator for the investigation. Furthermore, other 81 indicators were processed (table 1), which have been collected from the database available into the web site of the National Statistical Office (Istat). Most of them refer to the last census (regarding the population, agriculture, industry etc.), carried out in 2011. The indicators developed usually define the standardization of the selected variables compared to its provincial area surface, identifying where the most interesting contexts are located. In this way, Italy is described at the province level, following various themes (agriculture, economy, society and mobility). The survey was continued analyzing and zooming the energetic, mobility and environmental characteristics of the 116 cities, correlating them to the scores obtained during the reports. With the intention of quantitatively expressing the intensity of the relationship between two variables, a correlation is necessary to be calculated. A simple correlation both for the provincial level and for that based on provincial capitals verified whether there is a relationship between indicators, demonstrating their inclination to change together. In this way, indicators allow to investigate the Italian country through an exhaustive socio-economic, environmental and energetic description, providing an extensive clarification on their sustainable development and performance in recent years.

Table 1. List of the context variables elaborated in the present study

Description		**Scale level**	**Theme**
Position 2016	P16	City	Smart Cities
Index Score 2016	IS16	City	Smart Cities
Position 2014	P14	City	Smart Cities
Index Score 2014	IS14	City	Smart Cities
Position 2013	P13	City	Smart Cities
Index Score 2013	IS13	City	Smart Cities
Average Position	AP	City	Smart Cities
Average Score	ASI	City	Smart Cities
Position Change (13-14)	PC13-14	City	Smart Cities
Score Change (13-14)	SC13-14	City	Smart Cities
Position Change (14-16)	PC14-16	City	Smart Cities
Score Change (14-16)	SC14-16	City	Smart Cities
Utilized Agricultural Area / Employed in Agriculture	SAU/OCC AGR	Province	Agriculture
Utilized Agricultural Area / Population	SAU/POP	Province	Agriculture
Territorial Agricultural Area / Population	SAT/POP	Province	Agriculture
Utilized Agricultural Area / Territorial Agricultural Area	SAU/SAT	Province	Agriculture
Industrial Plants / Arable Land	CROP/ARLAND	Province	Agriculture
Fallow Land / Arable Land	FALL/ARLAND	Province	Agriculture
Vineyards / Woody Agricultural Crops	VINEY/PCROPS	Province	Agriculture
Olives For The Production Of Table Olives And Oil / Woody Agricultural Crops	OLIV/PCROPS	Province	Agriculture
Family Gardens / Population	KITGAR/ POP	Province	Agriculture
Family Gardens / Surface Area	KITGAR/SUP	Province	Agriculture
Unutilized Agricultural Land / Utilized Agricultural Area	UNLAND/SAU	Province	Agriculture
Energy Crops / Population	ENCRO/POP	Province	Agriculture
Energy Crops / Surface Area	ENCRO/SUP	Province	Agriculture
Rate of Youth Employment (15-29years)	RYE	Province	Economy
Employment incidence in Agriculture	EIAGR	Province	Economy
Employment incidence in the Industrial Sector	EIIND	Province	Economy
Employment incidence in the Tertiary Sector	EITER	Province	Economy
Employment incidence in the Trade Sector	EITRA	Province	Economy
Employment incidence in High-Media Specialist Professions	EIHM	Province	Economy
Employment incidence in Craft Occupations And Agricultural Workers	EICO	Province	Economy
Employment Index for occupations with low skill level occupations	EIOL	Province	Economy

Table 1. (Continued): List of the context variables elaborated in the present study

Illiterate Incidence	II	Province	Society
Early Exit from the Education and Training System	EEXIT	Province	Society
Incidence of Adults with Higher Educational Qualifications	IAHE	Province	Society
Incidence of Young People with University Education	IYUE	Province	Society
Level of Education of Young People (15-19 Years)	EYP	Province	Society
Incidence of Adults With Middle School	IAMS	Province	Society
Average Income / declarants	INC/D	Province	Society
Average INCOME / population	INC/POP	Province	Society
Incidence of foreign residents	IFR	Province	Society
Incidence of foreign children	IFC	Province	Society
Incidence of mixed couples	IMC	Province	Society
Rate of foreign occupation	RFO	Province	Society
Daily mobility for study or work	DM	Province	Mobility
Mobility out of town for work or study	MO	Province	Mobility
Short-Term Mobility	STM	Province	Mobility
Long Mobility	LTM	Province	Mobility
Energy Crops	ECROP	Province	Agriculture
Municipal Waste Collected (Kg) / Population (2001)	W/POP01	Chief town	Environment
Municipal Waste Collected (Kg) / Population (2011)	W/POP11	Chief town	Environment
Municipal Waste Collected Change (Kg) / Population (2001-11)	CW/POP	Chief town	Environment
Differentiated Collection Of Municipal Waste (Kg) / Population	DCW	Chief town	Environment
Noise Monitoring Campaigns / 100.000 inhab. (2011)	NMC	Chief town	Environment
Private Transport /1000 inhab. (2001)	PT/POP01	Chief town	Mobility
Private Transport /1000 inhab. (2011)	PT/POP11	Chief town	Mobility
Change in Private Transport / 1000 inhab. (2001-11)	CPT/POP	Chief town	Mobility
Demand for Public Transport per capita (2001)	DPT01	Chief town	Mobility
Demand for Public Transport per capita (2011)	DTP11	Chief town	Mobility
Change in Demand For Public Transport per capita (2001-11)	CDTP	Chief town	Mobility
Green urban density / surface (%) 2001	GUD01	Chief town	Environment
Green urban density / surface (%) 2009	GUD11	Chief town	Environment
Change in Green urban density / surface (%)(2009-01)	CGUD	Chief town	Environment
Historic Green (%)	HG	Chief town	Environment
Largest Urban Parks (%)	LUP	Chief town	Environment
Green Equipped (%)	GE	Chief town	Environment
Street Furniture Areas (%)	SFA	Chief town	Environment
Urban Forestry (%)	UF	Chief town	Environment
School Gardens (%)	SG	Chief town	Environment
Urban Gardens (%)	UG	Chief town	Environment
Outdoor Sports Areas (%)	OSA	Chief town	Environment
Woodlands (%)	WOO	Chief town	Environment
Green Uncultivated (%)	GUNC	Chief town	Environment
Another Green (%)	ANG	Chief town	Environment

Table 1. (Continued): List of the context variables elaborated in the present study

Per capita kWh electricity for domestic use (2001)	ELE01	Chief town	Energy
Per capita kWh electricity for domestic use (2011)	ELE11	Chief town	Energy
Change in per capita kWh electricity for domestic use (2001-11)	CELE	Chief town	Energy
Power of Photovoltaic Solar Panels Installed on municipal buildings /1.000 Inhab. (2011)	PSP11	Chief town	Energy
Consumption of Natural Gas for domestic use and heating. per capita - mc (2001)	CNG01	Chief town	Energy
Consumption of Natural Gas for domestic use and heating. per capita - mc (2011)	CNG11	Chief town	Energy
Change in Consumption of Natural Gas for domestic use and heating. per capita - mc (2001-01)	CCNG	Chief town	Energy
Total Vehicles	TV	Chief town	Mobility
Natural Gas Vehicles (%)	NGV	Chief town	Mobility
GPL Vehicles %	GPLV	Chief town	Mobility
Electric and / or Hybrid Vehicles (%)	EHV	Chief town	Mobility
Petrol and / or Diesel Vehicles (%)	PDV	Chief town	Mobility
Light Spots for Public Lighting	LPL	Chief town	Energy
Photovoltaic for 100 Points of Light (%)	PPL	Chief town	Energy
Light Spots with Directed Light Downwards and 100 Points For Light Screen (%)	LSLS	Chief town	Energy
Light Spots With Lamps with Mercury Vapor or Incandescent Light Points for 100 (%)	LSMV	Chief town	Energy
Wind Power Installed (%)	WPI	Chief town	Energy
Wind Production Installed (%)	WPRO	Chief town	Energy

3 Results

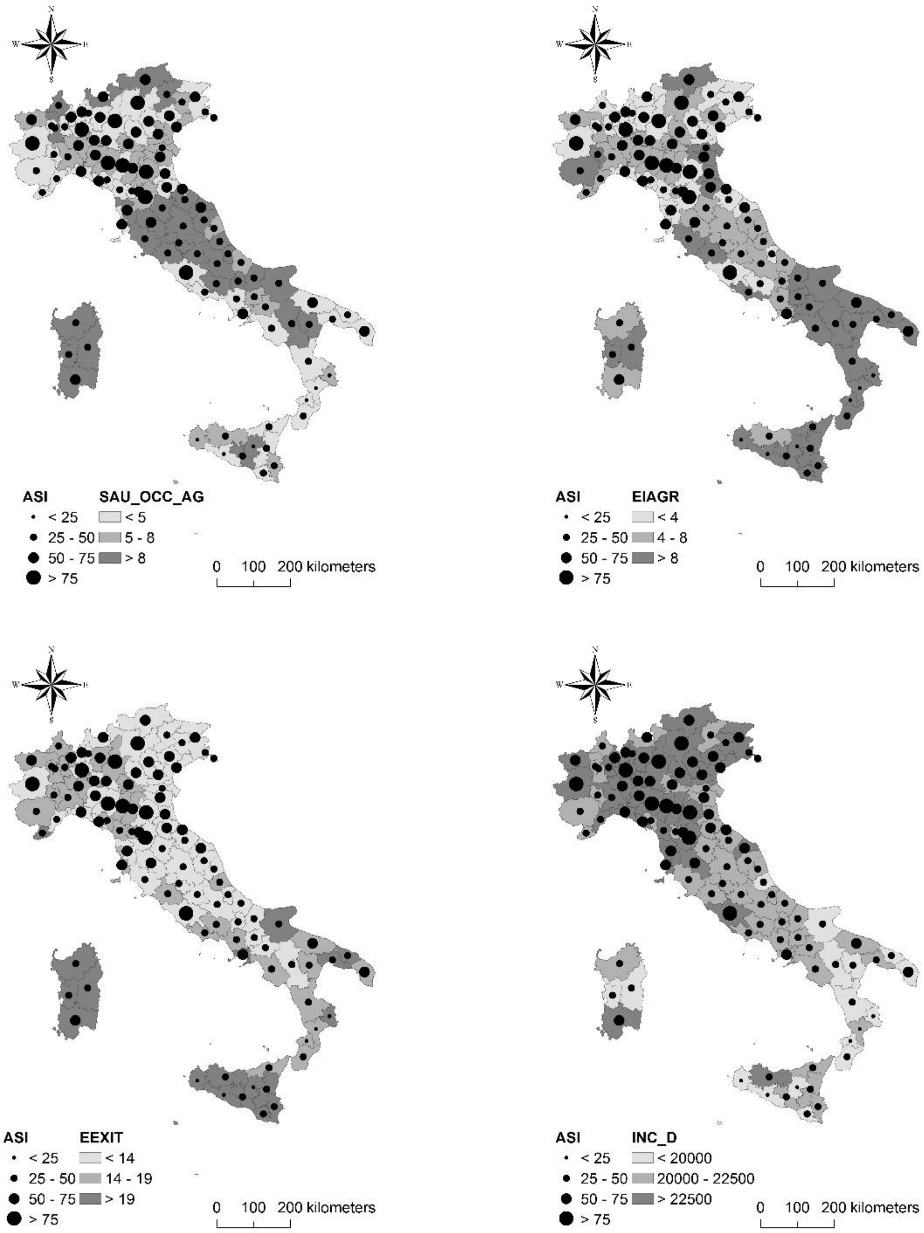
The economic and social spheres are essential for an innovative territorial context. Results demonstrated that the smartest contexts are those that are positively correlated with the youth employment rate, people with high professionalism and with advanced educational qualifications, income per capita, heterogeneous society (foreigners, mixed couples) and high mobility, at the provincial level (table 2). While the lack of interest in the formation and education, high scores of employment in occupations with low skill levels and spatial immobility do not emerge in the virtuous contexts. Furthermore, results demonstrated that the indicators of "Olives for the Production of table Olives and Oil / Woody Agricultural Crops" and "Family Gardens / Population" highlight a land-use that is not present in the smartest territorial contexts.

Table 2. Correlation between the index scores and the medium scores with the province data selected, highlighting values higher than |0.4|.

	IS16	IS14	IS13	ASI		IS16	IS14	IS13	ASI
SAU/OCC AGR					**II**	-0,6	-0,5		-0,5
SAU/POP					**EEXIT**	-0,5	-0,4		-0,4
SAT/POP					**IAHE**	0,5	0,4		0,4
SAU/SAT					**IYUE**				
CROP/ARLAND					**EYP**				
FALL/ARLAND					**IAMS**				
VINEY/PCROPS					**INC/D**	0,8	0,7	0,7	0,8
OLIV/PCROPS	-0,5	-0,4		-0,5	**INC/POP**	0,8	0,7	0,6	0,7
KITGAR/ POP	-0,5	-0,4		-0,5	**IFR**	0,7	0,6	0,5	0,6
KITGAR/SUP					**IFC**	0,5	0,5	0,4	0,5
UNLAND/SAU					**IMC**	0,6	0,5		0,5
ENCRO/POP					**RFO**	0,7	0,6	0,6	0,7
ENCRO/SUP					**DM**	0,7	0,7	0,6	0,7
RYE	0,7	0,6	0,5	0,6	**MO**	0,5			0,5
EIAGR	-0,5	-0,5		-0,5	**STM**	-0,4		-0,5	-0,4
EIIND					**LTM**				
EITER					**ECROP**	0,4			0,4
EITRA									
EIHM	0,6	0,6	0,5	0,6					
EICO									
EIOL	-0,5	-0,5		-0,5					

Figure 1 shows, with dots, the average values obtained from reports by Italian cities, in terms of smart cities. Larger dots are concentrated in the north Italy, in addition to other major cities such as Florence and Rome. “SAU/OCC AGR” indicator assumes higher scores in the central areas and on the major islands, where the rural landscape and the relative agricultural employment are significant. The second map (for EIAGR) confirms this assumption, giving relief to the southern and central contexts. As already mentioned, the early exit from the education system is a worrying phenomenon especially in the south, despite assumes average values also in other areas of Italy. Higher incomes are concentrated in the northern areas, decreasing towards the south and accentuating only in the most important cities. This finding allows to reflect on the role of the socio-economic sphere that influences directly the classification concerning smart cities.

Figure 1. The average score of smart cities (ASI, expressed in dots) and relevant indicators, that are "Utilized Agricultural Area / Employed in Agriculture" (SAU/OCC AGR), "Employment incidence in Agriculture" (EIAGR), "Early Exit from the Education and Training System" (EEXIT) and "Average Income / declarants" (INC/D).



The correlation also considered indicators at the provincial capital scale for investigating on environmental, mobility and energetic characters (table 3). Such analysis reveals other considerations. Smarter cities are double-edged realities. Although they produce a high rate of waste (compared to the population), separate collection of municipal waste is more consistent. The demand for public transport is high, representing a necessary requirement for starting smart contexts. Yet these contexts are the most consumers and energy-intensive. First, especially in the domestic environment, the electric and gas consumption per capita is the highest. Second, despite a high number of vehicles, there is an evident presence of natural gas vehicles and the strong demand for public mobility (in which, in time, there has been a decrease in the choice of private vehicles and vehicles with higher emissions as gasoline). Third, they are more lighted areas (that refer to possible security reasons).

Table 3. Correlation between the index scores and the data refereed to the main cities selected, highlighting values higher than |0.4|.

	IS16	IS14	IS13		IS16	IS14	IS13
W/POP01	0,4	0,4		**ELE01**	0,5	0,4	
W/POP11				**ELE11**			
CW/POP				**CELE**			
DCW	0,4	0,4		**PSP11**			
NMC				**CNG01**	0,6	0,5	0,5
PT/POP01				**CNG11**	0,6	0,5	0,5
PT/POP11				**CCNG**			
CPT/POP	-0,7	-0,6	-0,5	**TV**	0,4	0,5	0,5
DPT01	0,6	0,5	0,5	**NGV**	0,6	0,6	0,6
DTP11	0,6	0,6	0,5	**GPLV**			
CDTP				**EHV**			
GUD01				**PDV**	-0,5	-0,5	-0,6
GUD11				**LPL**	0,5	0,6	0,5
CGUD				**PPL**			
HG				**LSLS**			
LUP				**LSMV**			
GE				**WPI**			
SFA				**WPRO**			
UF							
SG							
UG							
OSA							
WOO							
GUNC							
ANG							

4 Discussion

The establishment of smart cities depends strongly on the local configuration. Technological innovation, active society and dynamic economy, synergies that increase progress, citizens adapting sustainable behaviours (e.g. as a high amount of natural gas cars or separate collection of waste) are all prerequisites that increase the ‘smart’ degree. Excluding large cities such as Rome, central and southern contexts, given their agricultural tradition, occupy the last positions of the report rankings. The inertia of inhabitants in mobility or training / education weighs on the degree of innovation of these areas. The need to define strategies and policies is essential. Agro-energetic districts represent a real opportunity for southern and central realities, with the purpose of strengthening and improving their socio-economic structures linked to technological innovation, sustainability and environmental - landscape quality, reducing waste. Biomass utilization is considered as a support for enhancing the development of rural areas (FAO (2000) Bioenergy. Committee on Agricolture, Rome, 13-16 April). Even if the degree of sustainability of the agro-energy supply chains has to be evaluated, their analysis is interesting as they can be considered networks of production processes, such as cultivation, biomass production and energy conversion, which transform inputs into outputs (Albino et al., 2007). Biomass have various origins (obtained from natural, forestry or agricultural sources), for e.g. thermal power stations (greenhouse crops), photovoltaic equipment in farms and production of biodiesel and biogas (Frayssignes, 2011). Despite certain issues, the perspectives offered by the agro-energy sector could become an additional factor for the improvement of the competitiveness and sustainability of agricultural areas, as a possible institutional construct of the Mediterranean governance of rural development (Frayssignes, 2011). According to the local environmental sources, agro-energy supply chains permit to gain motivated goals of energy production, even in those countries that do not use enough renewable sources (Albino et al., 2007). Hosting agro-energy activities can provide local solutions in terms of technology, organization, economy and sustainability (rural development, sustainable agricultural management, conservation and climate change mitigation) customized for the production and use of energy from agriculture (Best, 2003; Manos et al., 2014). Such districts assign also an energetic role to agriculture, contributing to the socio-economic and environmental sustainability at the different scale (from global to local level) (Rosillo-Calle, 2003). In fact, from the economic point of view, agro-energy districts can give benefits to the development dynamics in rural areas (Frayssignes, 2011). Job opportunities are one of the main advantages, due to the many multiplying effects which help to activate and strengthen local economy (Rosillo-Calle, 2003). Given the dependence of modern societies on fossil fuel sources and the emergence of sustainable attitudes, agro-energy sector permits to interact and develop synergies lowering production costs, enhancing and improving the quality (both ecological and of life of the relative inhabitants) in rural areas (Manos et al., 2014; Frayssignes, 2011; Best, 2003). According to Frayssignes (2011), agro-energy districts intended for urban areas satisfies a desire for social cohesion between territories (balance between towns and countryside). The transformations of society (e.g mobility of the population, modern economic activities) have questioned the relationship between town and country, (Perrier-Cornet, Aznar, Jeanneaux, 2010). Envisaging rural developing through agro-energy activities means analysing agriculture as a fully-independent renewable energy supply sector. A consequential socio-economic development of rural areas incentives a significant positive contribution to the environment and sustainability (Rosillo-Calle, 2003; Albino et al., 2007). According Tenerelli and Monteleone (2008), the crop classification approach underlines the potential effects that the choice of the energy crops mix may have on the environment in terms of land conservation and management of the natural resources. Energy crops contribute to obtain positive effects on the environmental in terms of land conservation and management of the natural recourses. Spatial analysis is necessary to assess the environmental and natural system.

Agro-energy supply chain bases its relations with the territory through the circularity of the production process (Albino et al., 2007). Wastes of agriculture, forest and their relative transformation industries (or plants completely dedicated to energy production) compose the raw materials. In this way, the majority of output return to the territory (Itabia, 2003). The development of agro-energy activities generates a socio-economic cycle, in terms of attraction of financial flows, development of local skills and introduction of new business activities, that allow innovation and virtuosity. Furthermore, intensive farming activities are less required thank to the presence of energy plants, consenting to maintain organic substances in the soil without increase CO_2 release in the atmosphere (Gallia and Pampana, 2004). The respect, protection and conservation of the territorial connotations should not be seen as a weakness, but it must be considered as an opportunity. Adapting new models, such as circular economy and agro-energy districts, new micro-economies allow an increase of innovation, employment, stimulus, sustainable development and environmental quality. Proposing a reading approach of the reports of smart cities towards the identification of chances designated for the most disadvantaged backgrounds, latent solutions emerge that allows to strengthen the economic system, embracing an idea of respect for the natural- rural environment.

5 Conclusion

Based on the concept of smart cities and considering the relative recent reports, the analysis has revealed that the less virtuous cities are those of central and southern Italy. However, the latter are characterized by a high agricultural- natural value, which can enable them to achieve sustainable development and technological innovation. The agro-energetic districts represent a solution for these areas, that can be considered as marginal lands (Colantoni et al., 2016), for: (i) maintaining the natural and rural landscape; (ii) establishing new economies and encourage entrepreneurial mechanisms for networking between the various stakeholders; (iii) providing an alternative job offer especially to the weakest sections of residents, such as young people; (iv) energy self-subsistence destined to businesses but also to domestic consumption; (v) beginning of a circular economy, in which the rural waste become input for new processes; (vii) re-using of soil for energy purposes, other than photovoltaic power plants, which increases the degree of soil sealing (Delfanti et al., 2016); (viii) new professional occupations and innovative educational opportunities that enable citizens to learn how to use the land in sustainable terms (Frayssignes, 2011; Manos et al., 2014).

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