

2nd International Symposium "NEW METROPOLITAN PERSPECTIVES" - Strategic planning, spatial planning, economic programs and decision support tools, through the implementation of Horizon/Europe2020. ISTH2020, Reggio Calabria (Italy), 18-20 May 2016

Innovation in the rural areas and the linkage with the Quintuple Helix Model

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Abstract

In this paper we analyze some specific conditions for local development. Our interest is oriented towards a multidimensional aspect of peripheral and rural areas. The rural areas considered as a productive system reflects a strong relationship between the agriculture and the other economic activities, In addition eco-systems must be protected and enhanced to develop innovation models that propose new roles and responsibilities for a new development vision. Following the implementation of the Smart Specialization Strategy and the Quintuple Helix Model this paper underlines the importance of connecting the innovation process with rural territories. We have considered some environmental and sectorial indicators for Sicily compared with the rest of Italy, to underline the role of peripheral areas for a new style of competitiveness based on the principles of sustainable development.

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Peer-review under responsibility of the organizing committee of ISTH2020

Keywords: Rural Areas; Innovation; Quintuple Helix Model; Smart Specialization Strategy.

1. Introduction

The Smart Specialisation Strategy -S3- (Foray, David, & Hall, 2009) promotes the activation of flexible and dynamic strategies of innovation – to make easier a multilevel and place-based approach of the local development.

The main features of this new approach are:

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- the identification and enhancement of the competitive potential of areas, identification of the characteristic assets of each region (place-based strategy);
- the concentration of knowledge resources and linking them to a limited number of priority economic activities (principle of concentration);
- shared participation to innovation management, with the involvement of local stakeholders;
- lifelong learning based on the ex- ante and ex-post evaluation processes of the strategy.

The S3 tries to avoid fragmentation of interventions and put to system the politics of research and innovation, developing regional strategies of innovation that valorize the productive areas of excellence taking into account the territorial strategic positioning and development prospects in a global economic context. The application of the Smart Specialisation Strategy has involved the European regions in the formulation of a strategy to regional level. The regions should be discovery of what makes a local knowledge base original and somewhat unique (Foray, David, & Hall, 2011).

In the section 2 we analyze the linkage between the Quintuple Helix Model and the Rural Areas as well as the importance of the natural environment as an asset for the production of knowledge and innovation.

In the last section we propose some indicators to underline the potential of peripheral areas as key factors to reduce the gap of development in European Region. In particular we propose some sectorial and environmental indicators of Sicily compared with the rest of national data.

2. The Quintuple Helix Model and the Rural Areas.

The official document of the European Union Regional Policy “*Contributing to Smart Growth in Europe*”(EC, 2010b), which introduces the Smart Specialization Strategy, points out that the innovation process is increasingly understood as an open system where different actors collaborate and interact. According to the guide for the elaboration of Research and Innovation Strategies for Smart Specializations (RIS3), the European Commission makes explicit reference to the model of innovation of the "fourth helix" (Carayannis & Campbell, 2009), which is based on openness of innovation processes to civil society.

Under the hypothesis of this model, drawing up a strategy of innovation requires the participation of civil society in the planning process. In the Quadruple Helix Model, the users orientation, is considered a crucial element so that the innovation points out a change that accelerates and improves the way to conceive, to develop, to produce and to access to new products, processes and industrial services, changes toward wider social objectives for example best quality of the life. A change of paradigm that directly involves in the formulation of the strategies the end user of the innovation, and that it changes the role of the players in the innovation processes.

A further step should be done towards the Quadruple Helix Model proposed by Carayannis and Campbell (2010), especially in reference to models of innovation to be implemented in rural areas. The additional step to the model stresses the importance of the natural environment as an asset for the production of knowledge and innovation. The Quintuple Helix Model draws attention to the need for a socio-ecological transition of society and economy in the twenty-first century.

The natural environment is considered a central element for the production of knowledge and innovation because irreplaceable source for the same survival of the man. The realization of new green technologies and innovative processes in the direction of a sustainable development become fundamental to promote long term innovative strategies. The environmental and biodiversity protection pushes the knowledge and the innovation in the direction of a sustainable and social economy where all the actors are part and responsible in the formulation of the strategies of local development.

The European Commission, in the document “*The World in 2025. Rising Asia and partner-ecological transition*” (2009), has identified the social and ecological transition as one of the principal challenge for the societies and the actual and future economies. The rural areas, at the margins of the core-economies, preserve biodiversity and healthy environment should experiment and implement innovative models that cover the Quintuple Helix Model of innovation and that could make a great contribution towards the socio-ecological transition.

The following figure (Carayannis & Campbell, 2010), illustrates the evolution of the innovation model of the triple helix of Etzkowitz and Leydesdorff (1997) highlighting the additional helixes to the basic model.

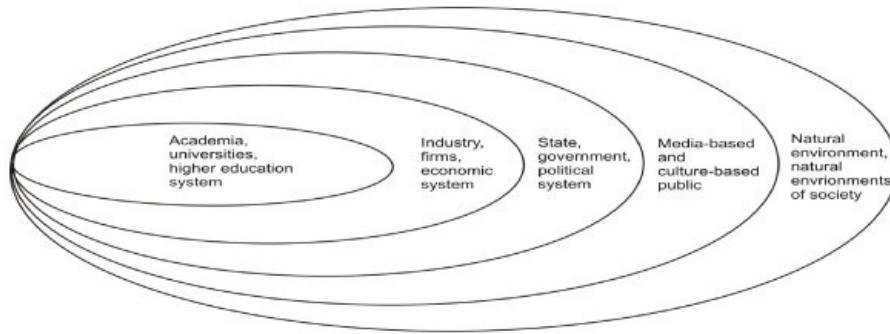


Fig. 1. The subsystems of the Quintuple Helix model. (Carayannis & Campbell, 2010)

The rural areas appear to be the result of composite processes, where in addition to the dynamics arising from the primary sector, other territorial components are relevant. The presence of biodiversity, landscape, human and socio-cultural capital in rural territories allows to overcome a dichotomous approach between cities and peripheral areas promoting a multidimensional approach that consider the different characteristics of the territories. The innovative capacity of rural areas could make easier the achievement of sustainable and inclusive growth, as well as the development of long-term competitiveness, thanks to a good planning of a RIS3 strategy.

In the context of rural economies, new opportunities can be identified in the poorly explored links between agriculture and the wider rural economy. The linkage can be considered strategic guidelines for rural development, towards trajectories that lead to a diversification of activities and not only to a modernization of agriculture (Saraceno, 2010).

The S3 strategy places particular emphasis on a broad concept of innovation as an important pillar of rural development (Pires et al., 2014). In fact, recent experiences of innovative economic development policy in rural areas are based on the concepts of social and cultural innovation. This widening of the scope of innovation becomes a major challenge for traditional regional stakeholders, that too often to focus solely on industrial innovation (Morgan, 2013).

The rural change is extremely complex and range of nuances, but the perception of such change is dominated by a lot of generalizations, often not representative or inaccurate, with consequent anachronistic stereotypes, for instance, as the lack of initiative, or of creativeness (Copus & Hörnström, 2011). On the contrary, the rural territories can introduce the abilities to use the natural resources in integrated way combining the local identity with new technologies to satisfy the new and emergent needs of the society.

An innovative approach to the territory obtained through a combination of tangible and intangible conditions, as the reassessment of the local natural resources, combining the new opportunities provided by access to information technologies, can provide trajectories for sustainable growth in the peripheral areas.

The adoption of policies with a place-based approach (Barca, 2009) for the rural development, taking into consideration the real problems of territories, such as the physical and productive depopulation of inland areas, waste disposal, as well as the loss of typical and traditional products, allows to distribute the financial resources in sectors that produce innovation in the peripheral areas. This new approach can strengthen European competitiveness in the international arena. Therefore, the place-based approach considers crucial the fifth helix, i.e. the environment as a key asset for the development of rural areas.

3. The potential of rural areas in Sicily

A objective set by RIS3 in Sicily is the following: “To enhance the orientation towards innovation of the regional production system by enhancing the supervision of the technological areas in which the region has distinctive

competencies and promote technological upgrading and entrepreneurial discovery in traditional productive sectors”. This section proposes some sectorial and environmental indicators (Tables 1,2), to underline the peculiarities of the rural areas in Sicily in comparison to the rest of Italy. Such specificities could play a crucial role to promote a long-term development of marginal areas in Sicily reducing the gaps between urban areas and rural territories.

Table 1: Sectorial Indicators: Sicily versus Italy

Cod.	Sectorial Indicators	Meaning	Sicily	Italy	Sicily /Italy
CI 14	Productivity of the agriculture sector (average 2009-2011, Mil. Of Euro)	Ratio between the added value per unit of labor. The added value is calculated at basic prices i.e. net of taxes on manufactured products and gross subsidies on products	23477,4 EUR	20897,7 EUR	112,34
CI 19	Organic agricultural area (UAA) (2010, UAA)	Land used for biological growing	164.440 ha UAA	781.490 ha UAA	21,04%
CI 22	Farm Labour Force (2010)	Number of employees in the agricultural firms	429.770	3.392.700	12,67%
CI 23(a)	Farmers for classes of age <35 years (2010, in percentage)	Percentage of farmers aged under 35 years compared to the overall number of farmers	6,6%	5,1%	129,41
CI 23(b)	Farmers for classes of age > 35anni and < 54 years (2010, in percentage)	Percentage of farmers with age between 35 and 55 years compared to the overall number of farmers	32,2%	33,4%	96,41
CI 23(c)	Farmers for classes of age. ≥ 55 years (2010, in percentage)	Percentage of farmers with age over 55 years compared to the overall number of farmers	61,2%	61,5%	99,51

Source: Own data of MIPAAF and National Rural Network 2014-2020

Table 2: Environmental indicators Rural Areas: Sicily versus Italy

Cod.	Environmental indicators	Meaning	Sicily	Italy	Sicily /Italy
CI 34	Areas Natura 2000 (2011)	Percentage share of land area (UAA) and forestry area subjected to the instrument of European Union policy for the conservation of biodiversity “Natura 2000 Network”.	10,82%	13,30%	81,31%
CI 37	High Nature-Value Agricultural areas (2011, percentage of UAA managed so as to generate a high natural value)	Percentage Share of land area (UAA) used to produce high nature value. They are areas where agriculture provides services for the protection of biodiversity and habitats and species of high ecological value	56,72%	51,29%	110,59

Source: Own data of MIPAAF and National Rural Network 2014-2020

The Sicily region is characterized by higher level of productivity of the labour force in agricultural sector in comparison to the rest of Italy. The indicator CI 14 *-Productivity of the agriculture sector-* (Table 1) allows to observe the first interesting result inside the comparative analysis between Sicily and Italy. The elevated productivity of the labour force (112,34) in the agriculture is reached thanks to the presence of leader agricultural firms localized primarily in the Province of Ragusa in eastern Sicily.

The Province of Ragusa holds the national record in terms of gross salable agricultural production, with 47% of the fruit and vegetable and floriculture production, in fact, just 6% of the Sicilian population produces more than 20% of the regional agricultural income. Therefore, the agriculture is one of the driving forces of the entire Ragusa area, fully integrated with the economic and industrial context. Ragusa is also the first in Italy for exports of goods

resulting from organic farming. In this regard the indicator CI 19 -*Organic agricultural area*- denotes that Sicily there is the 21,04% of Italian land used for organic production.

The indicator CI 22 -*Farm Labour Force*- shows that in Sicily is located about 13% of the total number of employees working in farms nationwide. The last indicator together with the distribution of the agricultural entrepreneurs for classes of age (CI 23a) underlines a peculiar behavior of Sicilian agriculture firms, it follows a higher percentage (6,6%) than the national average (5,1%) of farms driven by entrepreneurs younger than 35. With reference to the two other age groups (between 35 and 55 years and over 55 years) Sicily does not differ significantly from the rest of the Country. According to this metrics for the youth unemployment gap South-North can be reduce via the start-ups in the agricultural sector. In addition, the investment in higher education of young people is crucial because they could give stimulus to new products and / or services. The European Union has codified a special instrument denominated “Natura 2000” that intends to protect the following typologies of territories:

- special protection areas;
- Sites of Community Interest (SCIs);
- “Natura 2000 network's” territories.

We analyze two indicators of “Natura 2000” to underline the high environmental value in Sicily.

The first indicator CI 34 -*Areas Natura 2000*- shows that in Sicily is located 81,3% of Italian land and forest area subjected to European policy funds for the conservation of biodiversity. This result underlines the importance of peripheral territories in favor of the direction of sustainable development. This very significant indicator allows its exploitation through the smart specialisation policy in Sicily.

The next indicator CI 37 - *High Nature-Value Agricultural areas* - denotes that in Sicily a higher percentage of agricultural areas is used to produce high nature value compared to the national datum. The value of these areas is well evidenced by the definition developed by Andersen (2003): "...those areas in Europe where agriculture is a major (usually the dominant) land use and where that agriculture supports or is associated with either a high species and habitat diversity or the presence of species of European conservations concern or both”.

The RIS3 should identify the production areas in which Sicily has a consolidated economic and entrepreneurial framework in terms of number of firms and employees, together with the presence of endogenous factors. In this regard, a key role is played by Key Enabling Technologies (Kets) that develop technological solutions or improvements that can revitalize the productive system in all economic sectors of human activity, increasing the commercial and social value of goods or services.

The sectoral and environmental indicators show that organic agriculture is a productive sector that possess these characteristics. The RIS3 should invest on this sector in order to reduce the development gap among urban and rural areas. The process of entrepreneurial discovery is favored of the presence of young agricultural entrepreneurs more prone to the invest in innovation, even though the Kets.

The action of the public and private stakeholders, specifically in the agricultural sector, must be therefore framed within the macro problem of the environmental sustainability. The data demonstrate the existence on specific rural areas that can use the environment as a development variable. In this sense, the S3 and the quintuple helix are fundamental pillars for the underdeveloped regions.

4. Conclusions

The European Regions have identified the strengths of their territories to implement the S3 Strategy. However, the formulation of the RIS3 Sicilian Strategy doesn't fully consider the environmental context as highlighted in the Quintuple Helix. This work has underlined how much peripheral areas became important for the planning and supporting of competitiveness of European territories.

The use of the sectoral and environmental indicators has underlined the potential of these areas: biodiversity, landscape, socio-economic context. The implementation of Smart Specialization Strategy in Sicily neglected the broader concept of environmental innovation identifying only a few trajectories of change focused on technological

and social innovation. The RIS3, especially in Sicily, should focus on innovation in the regional production system considering the organic farming upgrading, supporting element towards a sustainable development perspective that values biodiversity. The proposed indicators show the potential in this field of rural areas; the increase of young farmers demonstrates the attention of local actors to local identity and enhancement of the typical resources of the territories.

This ample vision of the innovation could facilitate the recognition and the exploitation of the intrinsic potentialities of the rural zones. In this way the lack of a full spatial vision of the Smart Specialization Strategy is addressed, including some of the possible reasons for its slow progress in Sicily.

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