

# INFORMATION AND COMMUNICATION INFRASTRUCTURES AND NEW BUSINESS MODELS IN RURAL AREAS: THE CASE OF MOLISE REGION IN ITALY

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**Abstract:** The paper deals with the role of ICT and the related infrastructures to induce innovations for sustainable rural development. In particular, it focuses on the innovations induced by ICT in farms and in new rural firms, and on how digital infrastructures support and generate social innovation mechanisms, leading to the consolidation of entrepreneurship and dissemination of ICT-based innovation in rural areas. The hypothesis is that the presence of digital infrastructures generates a double effect: overcoming the concept of geographical proximity (relevant for remote rural areas) and promoting social innovation. In particular, this paper examines the role of social innovation to create a new demand for products, services and organisational models for farms and rural enterprises, promoting further innovation. To target the objectives, the work analyses three case studies of new business models (BMs) based on ICT innovation. The analysis focuses on the most important interactions, learning and organisational processes within the new enterprises and among the new farms/enterprises and the other economic and institutional actors, and on how they were shaped and changed by the use of ICT, relating them to a conceptual model. These three cases, although pioneering, are important since they give an original response to some of the main problems and needs of remote and inner rural areas, as for the access to high value segment of food market, the information deliveries about attractiveness of landscape and countryside for foreigners, investors and tourists and the creation of new stable relation with consumers/citizens in the urban areas. The three cases have been analysed with the aim to identify how the ICT, and the related innovations, create an interconnection between four characteristic elements of the BMs (value creation, supply chain, customer interfaces, financial model) and the restructuring of proximity dimensions (cognitive, institutional, social, geographical, organizational). The work shows how these three cases have several communalities, but also different aspects with respect to our objective of analysis: there are different ways in which the four characteristic elements of the BM are constructed and also different in the role that the different dimensions of proximity play in structuring the innovation process in each one of them. More generally, the results of the work also lead to consider a new role for public investments in ICT infrastructures: public administrations should intervene in order to create a coherence within projects of public and private initiatives.

**Key words:** Rural development and Digital divide", "Entrepreneurship and ICT", "Business models and Proximity

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## 1. Introduction

At the present time, the on-going debate sees Information and Communication Technologies (ICT) as a driver of business and social innovation for rural areas. In particular, the UE Smart Villages Action<sup>2</sup> focuses on how to improve rural services – such as health, social services, education, energy, transport, retail – making them more sustainable through the deployment of (ICT) tools and through community-led and entrepreneurial actions and projects.

This programme is part of the European programme to reduce the digital divide between rural and urban areas, which has its main tools in the creation of digital infrastructure – broadband in rural areas. One of the main issues concerns the influence of ICT on the development of these areas and in particular on the development of innovations.

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<sup>2</sup> The emerging concept of Smart Villages refers to rural areas and communities which are built on their existing strengths and assets as well as on developing new opportunities. In Smart Villages traditional or new networks and services are enhanced by means of digital, telecommunication technologies, innovations and the better use of knowledge, for the benefit of inhabitants and businesses. [...]. The concept of Smart Villages does not propose a one-size-fits-all solution. It is territorially sensitive, based on the needs and potentials of the respective territory and strategy-led, supported by new or existing territorial strategies (EU, 2017).

Through this work, we want to present the role of ICT and the related infrastructures to induce innovations for sustainable rural development. In our prospective we consider the broad definition for innovation: *changes made to current patterns which generate improvements – such as increasing the productivity and competitiveness, the quality of life, sustainability and equity* (FAO, 2016; European Union, 2014; CELAC, 2017).

In particular, the analysis focuses on the innovations induced by ICT in farms and in new rural firms and on how this digital infrastructure supports and generates a social innovation mechanism that leads to the consolidation of entrepreneurship and dissemination of ICT-based innovation in rural areas.

Our work is based on the hypothesis that the presence of digital infrastructures generates a double impact:

1. It allows entrepreneurs to start up new learning and innovation processes by overcoming the concept of geographical proximity, intended as an element of competitive advantage deriving from the local externalities and agglomeration economies (see e.g. Becattini, 1989);
2. It allows the spread of social innovations linked to ICT to change the behaviours and relationships between consumers and producers and between citizens and institutions. As social innovations are intended, “new ideas, products, services and models developed and implemented to meet social needs and create new social relationships or collaborations. In other words, social innovations are both good for society and enhance society’s capacity to act (Murray et al., 2010)”.

However, this paper examines the role of social innovation to create a new demand of products, services and organisational models for farms and rural enterprises inducing innovation. In other words, it studies how innovations induce/support the creation of new business models intended as “...*the content, structure, and governance of transactions designed so as to create value through the exploitation of business opportunities.*” (Amit and Zott, 2001, p. 511).

In this perspective, digital infrastructures become a two-way tool because ICT enable innovations with a positive effect in construction of new Business Model (BMs) providing products and services responding to social needs, but at the same time, ICT enable consumers and citizens to create new relations and easier access to the services they need (Shaw et al., 2009; White et al., 2010; DIT, 2011). The double nature of digital infrastructure (encountering firms and citizens interest), justifies the public financial support of their implementation in rural areas especially in the remote ones<sup>3</sup>, where low density population and economy cause the market failure.

The relation between ICT and new Business Models (BMs) in agriculture is still not strongly investigated. Many researches focused, instead on the use of variable-rate technologies, to vehicle guidance systems, to product quality and environmental management, starting the research line on precision agriculture, aiming to increase the efficiency of resource use and to reduce the uncertainty of decisions required to control variation on farms (Schellberg, et al., 2008).

The article starts with the analysis of the organizational innovations that arise from the use of ICT as they allow new relations among farmers and other economic and institutional agents. These new relations are changing the governance of transactions among actors and the way to create value. In other words, they result in new BMs. These innovative business models are strongly emerging even in the “remote rural areas”, as our area of investigation, Molise Region, where digital technologies and infrastructures, even when present, are poorly used by both farms/firms and consumers/citizens, and by the public administration itself.

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<sup>3</sup> Remote rural areas are defined by OECD as areas of “low-density economies” where the local economy depends to a great extent on exporting the output of primary activities. Growth comes from building upon areas of absolute and comparative advantage, improving connectivity to export markets, matching skills to areas of comparative advantage and improving the provision of essential services (OECD, 2016).

## 2. The context, objectives and approach of the work

The research objectives of our empirical study were:

1. Identify which elements and which dynamics led the use of ICT as a tool for the competitiveness of the farm in Molise region;
2. What are the characteristics of BMs generated by the use of ICT;
3. What demand they express with respect to digital infrastructure;
4. How digital infrastructure, and therefore the easy access to ICT tools, can develop and multiply these new firms and their BMs and how this can justify public investments in the Molise region.

Molise region was chosen because it is an Italian region where the public administration is investing a relevant share of Rural Development Funds, to ensure ultrafast broadband infrastructures, with speeds over 100 Mbit/s., for all the rural population. The goal sees by the end of 2020, the 100% of rural housing units will be served by broadband infrastructures, of which 68.3% with speeds exceeding 100 Mbit/s. and the remainder with speeds above 30 Mbit/s. overcoming the problem of the digital divide (See figure 1). These infrastructures will affect more than 225.000 rural housing units and more than 310.000 inhabitants.

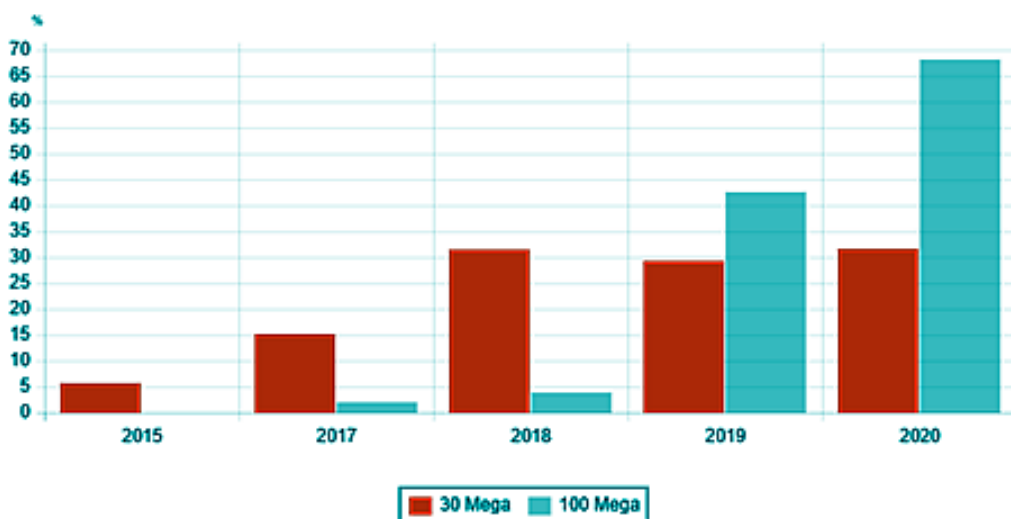


Fig 1. High-speed broadband in Molise (evolution and forecast). Source: Italian Ministry of Economic Development – 2019

At the same time, the Rural Development programme of Molise region provided in many measures selection criteria to promote investments in ICT tools or projects based on the use of ICT infrastructures and tools in their business activities. However, the use of this infrastructure is still limited despite the incentives in the Regional Rural Development Program for both businesses and local public bodies as the following table shows (see table 1). Only 5% of all applicants in the first calls for proposals for investment measures of the Molise RDP 2014–2020 presented investments on ICT tools or project that are based on the use of ICT tools and infrastructures.

Tab 1. Measures of RDP of Molise: applications with ICT. Source: RDP of Molise monitoring

	Measures			
	4.1	4.2	6.1	6.4.1
	Support for investment in agricultural holdings	Support for investments in processing / marketing and/or development of agricultural products	Business start-up aid for young farmers	Support for investments in the creation and development of non-agricultural activities in agricultural holdings
Total number of applications for funding	619	69	475	27
Number applications with ICT solutions	24	5	30	3
%	3.9	7.2	6.3	11.1
Total number of applications	1,190			
Number of applications with ICT solutions	62			
%	5.2			

The actual lack of interest of the entrepreneurs, particularly farmers, in the use of ICT, can be explained by the fact that these new technologies represent a “major” innovation (Amendola e Bruno, 1990). The ICT completely changes the possibility of relations between the enterprise and the external context and within the enterprise itself. The ICT completely reshapes the physical and geographical dimensions of the firms/farms, i.e., internal control on the processes and labour would be carried on without the physical presence of the entrepreneurs and the boundaries of the firm would be geographically shifted in terms of suppliers and customers. This remodelling leads to radical changes in cognitive, social and cultural farm/firm proximity. In other words, ICT involves a radical change of the cognitive, organizational and even social nature of the firm/farm. These changes are not easy, especially for the traditional farm, where farming practices are based on a routine built on years of experiences, and neither in areas where natural resources seem to offer few economic opportunities (remote and mountain areas). In these areas, as the Molise region, it happens to be a distrust attitude regarding all those innovations of which it is not natural for them to predict a positive result. The people of these areas are deeply embedded in social, and institutional local context where they developed their own reputation. They worry about a failure in the implementation of the innovation that might affect their reputation. Their “institutionalization”, intended as the embeddedness of their activities in formal and informal norms, decreased their interpretation of new market scenarios and it acts as an inertia and lock-in factor (Benvenuti, 1980; Saccomandi, 1991). On the contrary, these changes seem to be present, above all, in young entrepreneurs of farmers where new cognitive proximity with the external context, using new technologies, is not an element of lock-in. In addition, in rural areas, young people live their entrepreneurship as a real challenge (Milone and Ventura, 2019) to achieve a good quality of life, connecting rural and urban areas and they do not worry so much about failure or reputation.

As the dynamic nature of ICT development could not be depicted in the static BMs, new models had to be designed adopting new technologies (Sakellaridis and Stiakakis, 2011). For farmers, the challenges of the new BMs is to maintain the characteristic of agriculture as a “co-production” process between man and nature (Ploeg, van der, 2003; Gerritsen, 2002; Roep, 2001; Renting and van der Ploeg, 2001) and to extend this co-production process to the consumers (Ploeg, et al., 2004; Rossi and Brunori, 2010; Humphreys and Grayson, 2008). In particular, young or “new” farmers<sup>4</sup> play a key role in assembling innovative BMs based on networks that involve actors that are external to the local context using the new ICT (Milone and Ventura, 2019). Therefore, even

<sup>4</sup> The new farmers are young entrepreneurs who do not have previous experience in agriculture and do not belong to a farm family.

in remote areas of a small region as Molise, there are seeds of radical change induced and based on ICT promoted by the new generation of farmers and entrepreneurs (Milone e Ventura, 2019).

This paper analyses three case studies of a new business model based on ICT enable innovation. The analysis focus on the most important interactions, learning and organisational processes within the new enterprises and among the new farms/enterprises and the others economic and institutional actors, and on how they were shaped and changed by the use of ICT, relating them to a conceptual model described below. The model is based on the hypothesis that in rural areas, agriculture is the ground for business creation processes and firm evolution (also in non-agricultural sectors).

These cases, although pioneering, are extremely important because they give an original response to some of the main problems and needs of remote and inner rural areas, as for the access to high value segment of food market, the information deliveries about attractiveness of landscape and countryside for foreigners, investors and tourists and the creation of new stable relation with consumers/citizens in the urban areas. Our analyses focus on the elements driving the start-up of the three entrepreneurial activities, the role of ICT, the current and potential contribution of regional policy for digital infrastructure. Their diffusion may represent a development strategy for these areas where firms are few and their development is linked with the capacity of the firms to connect with those areas where the consumption levels are higher. A diffusion strictly linked to the availability and use of the ICT infrastructure which, in these areas, can be achieved only through a public intervention.

In this view, one of the main objectives of this paper is to understand if the public investments in ICT infrastructures play a key role in the development of these new BMs or if these models are seeking other technical solutions available on the market. However, it should be considered that regional investments in ultrafast broadband are necessary and justified whenever there is market failure as in most Italian rural areas. A second issue regards the process through which these new business models are built, the different ways to involve other actors, in particular consumers, in order to reach a real co-production mechanisms of value generation. A third aspect is the characteristic of entrepreneurial capital (of rural or extra-rural origin, education, ethical views, etc.). The fourth area of investigation is connected to the critical issues that influence the survival of these projects, in particular regarding settlement and permanence of young farmers. The fifth question deals with the capability of digital closeness, for it to be a key factor to enhance trust. The last question concerns the (potential) impact of these experiences on the rural areas and the policies to support them.

In conclusion, this paper tries to identify the tools to fill the knowledge gap described above, by considering a specific rural area where investments in ICT infrastructure (ultrafast Broadband) take place. It also wants to identify the young farmers, who based their Business Model on the networking strategy presented above which implies the use of ICT, analysing their characteristics, what they have in common in their development paths and in their future expectations, but also in the way they use ICT.

### 3. Theoretical background

In the paper, we use the conceptual model based on the hypothesis that, in rural areas, agriculture is generally a dynamic driver of rural economy contributing to the construction of the *local rural web* (Ploeg et al., 2008; Milone and Ventura, 2010)<sup>5</sup>. This web is embedded into the fabric of regional systems of production and consumption and it provides a key driver for both rural development, in a general way, and eco-economic development, in a more specific one. Agro-food networks are playing an integrating key role in mobilizing the web and the regional eco-economy (Marsden, 2010).

This hypothesis relies on the idea of the evolution of agriculture in rural development along with the paths of *broadening* (diversification, nature and landscape management, etc.), *deepening* (quality production, short supply chains, etc.) and *regrounding* (off-farm income, new cost reductions, etc.) (Ploeg et al. 2002). In other words, through these processes, agriculture becomes the factory of creation and differentiation of firms linked to local assets (natural and cultural), continuing to evolve as agricultural firms (e.g., through broadening) but also as non-agricultural firms through spin-off processes.

The conceptual framework is shortly illustrated in Figure 2, where the triangle represents the agriculture and the agro-food system and their dynamic paths (Broadening, Regrounding and Deepening). The new ideas supported by ICT enable innovations to create new BM, both in the agro-system and rural economy as a whole, by connecting local and regional areas with the external context. Digital infrastructures are acting as a facilitator of these new connections.

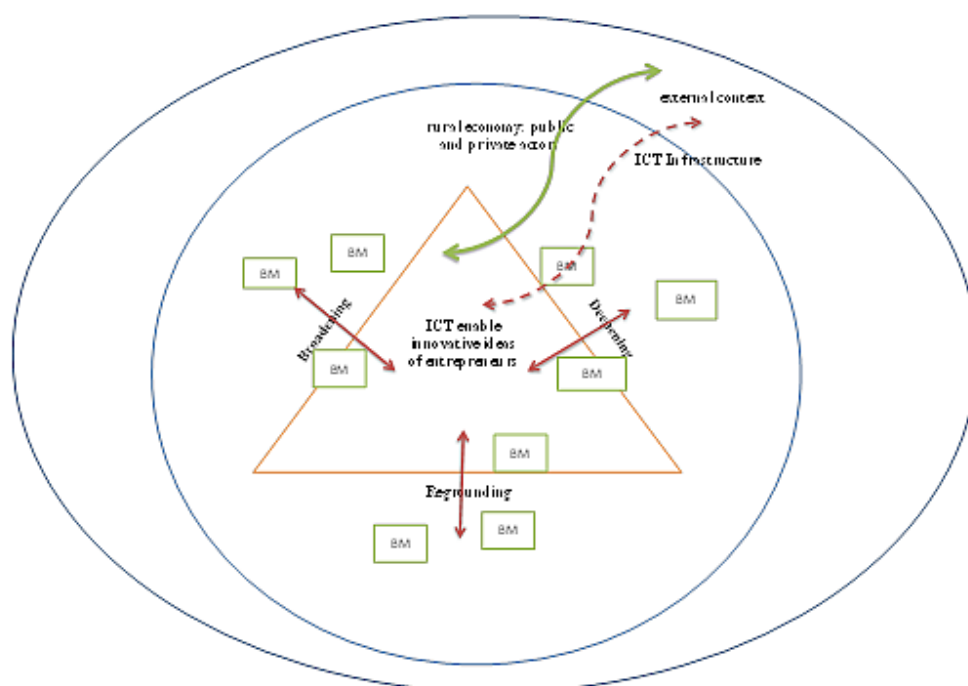


Fig 2. The Interpretive framework. Source: our elaboration from Van der Ploeg et al. (2002)

<sup>5</sup> The rural web "...is composed by the interrelations, interactions, encounters and mutualities that exist between actors, resources, activities (be they social, economic, political or cultural), sectors and places within rural areas. The more interrelations, connections, encounters and combinations there are, the higher the density of the web. The rural web is, to echo a well-known concept in social sciences, the more or less coherent whole of the actor-networks that exist within the rural." (Ploeg et al. 2008, p. 7). To synthesize, the rural web derives from the development process that gives rise to a new consistency among the economic, social and natural dimensions of the territory, which creates a tight network of multilevel and multidimensional relations that connect the resources and the territory to economic, social, and institutional players. The rural web is formed by the consistent connections of six dimensions – Endogeneity, Novelty production, Governance of market, Sustainability, Social capital and Institutional arrangements – and it is established through a process that involves several players and structures in the development of integration, experimentation and learning activities. The rural web takes on a double interpretation. On one hand, it is a tool for analysing the rural development process and procedures, obstacles and potentials created by the relations that characterise it. On the other, it becomes the object and place of policies that support rural development (Milone e Ventura, 2010).

From this point of view, the most important factors influencing the creation and evolution of this firms, are the quality of human capital, the quality of the relations and the dimension of proximity (Boschma, 2005) that allows farmers/entrepreneurs (i.e., the “new” farmers) to be at the same time embedded in the local system of production and consumption, to relate with new markets and to respond to the needs of civil society as a whole. The process of business creation deriving from the differentiation of agriculture can be pursued by investing in human capital, infrastructure, innovation, which are enabling factors for growth, rather than short-term responses that seek to protect existing economic activities. In other words, the conceptual model of rural web becomes the framework, or better the “protected space”, within which new BMs are flourishing and connecting remote rural areas with the global market.

We assume here that BM is the *strategic and organisational way through which the value is created* (Zott et al., 2011). In other words, the core of BM is the way in which the networks, represented by suppliers and customers, is orchestrated by the firms in a collaborative environment (Berglund and Sandstrom, 2013). They are networks characterized by elements that create new forms of proximity and that can be summarized in the following categories:

1. Shared attribution of value to the resources and objects of the exchange among the actors. The value of creation is mainly based on social and psychological motivations rather than on maximizing their own profit. The network can have local or even global dimensions, since the proximity that generates is no longer just geographical, but mainly cultural and social;
2. Presence of a process of “institutionalization” characterised by the definition of conduct rules, often informal, which go beyond the economic rationale of trading;
3. Possibility of exchanging knowledge and experiences within a new learning and cooperation modality leading to co-production between network participants. In these networks, knowledge is a consequence of the encounter of multiple horizons. It is the result of the incorporation of new information with cultural and technological approaches into the existing knowledge, redefined through the relational process to restructure it (Milone and Ventura, 2018).

These categories that characterise the networks refer to the five dimensions of proximity theorised by Boschma (2005)<sup>6</sup>. According to this author, learning knowledge creation and innovations can be explained by the existence of different level of proximity dimensions. In the new BMs, induced by the use of ICT, the dimensions of proximity are reshaped and have very different relevance in the design and development of the models and they are related to the innovations. Following this approach, the relevance of ICT in BM is not just linked to support the developing and managing business processes (Veit et al. 2014), but it is also linked to the creation and animation of the network itself (Navarro et al., 2018, Labianca et al. 2016) and the new proximity. ICT reshapes the geographical proximity completely. Through ICT, people who are geographically far from each other, by using the same tools, they can interconnect, learning from each other and sharing information and progresses. It is possible to obtain the same competitive advantages, coming from geographical proximity, from belonging to the network. In fact, these advantages are amplified by the fact that through the new “network proximity”, very different agents with different knowledge and expertise, are interacting to generate a “hybridization” effect, which is the source for new ideas and creativity (Cohendet and Llerena, 1997).

The ICT shape the development of cognitive, organizational, social and institutional proximity, by which, at the same time, supports it. “*With the notion of cognitive proximity, it is meant that people sharing the same knowledge base and expertise may learn from each other*”. (Boschma, 2005, p. 63). Thus, as cognitive proximity facilitates effective and rapid communication between suppliers and customers, it also facilitates the co-production process and innovation (Chesbrough, 2010). These latter relations bring to a BM based on the engagement of consumers in production: the so-called *co-production* (Etgar 2008). Co-production models promote the value of creation together with a new social and institutional proximity between farmers and consumers. Following Boschma, social proximity should be intended as the existence of socially embedded

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<sup>6</sup> Boschma identifies five dimension of proximity: cognitive, organizational, social, institutional and geographical (Boschma, 2005, p. 63).



relations between agents at micro level based on trust and friendship, shared knowledge and experience. Institutional proximity is intended as enabling or constraining mechanisms that affect the level of knowledge transfer, interactive learning and (thus) innovation. It refers to the macro level and it is strongly interconnected with social and organizational proximity associated to the micro level (Boschma, 2005, pp. 66). Boons and Lüdeke-Freund (2013), in their critical revision on BMs for sustainable innovation, focused on how business models and innovation interrelate. They distinguish the following elements of a generic business model concept:

1. *Value proposition: what is the embedded value in the product/service offered by the firm.*
2. *Supply chain: how upstream relations between suppliers are structured and managed.*
3. *Customer interface: how downstream relations with customers are structured and managed.*
4. *Financial model: costs and benefits from 1, 2 and 3, and their distribution across the business model stakeholders.*

*For existing firms, it is possible to specify these elements. For new ventures, this may be unclear. In this context, a Business Model is used as a plan which specifies how a new venture can become profitable.*" (Boons and Lüdeke-Freund, 2013, p. 13).

Using these two theoretical approaches, the analysis of the case studies was carried out trying to understand the interrelations between the four dimensions described by the BM and the re-elaboration and/or new construction of Boschma's proximity dimensions.

This allows us to highlight the interrelations between innovation and proximity, and how the key elements of the new BMs are structured and evolve. Moreover, it allows us to assess the importance of these interrelations for the valorisation of local resources in new markets, the needs of new policies, rules and incentives to reshape the institutional arrangements in which firms and consumers operate.

The growing development of BMs, based on the links between producers and consumers, i.e., on "Prosumption" (Ziembra and Eisemhardt 2015), in particular in food industry, seems to be moving on both parts, in order to overcome the power relations in food systems (Holloway et al. 2007) and to rebuild the trust of consumers (Meyer et al. 2012). Organizational proximity has to be intended as "...the set of interdependencies within as well as between organisations connected by relationship of either economic or financial dependence/interdependence (...within a network)" (Boschma, 2005; p. 65). Every time that within a network there are new relations based on trust, the organisational proximity dimension is reshaped.

These "new" BMs have often been found while exploring the so-called "new generation of farmers", who often come from outside the agricultural sphere, with non-agrarian degrees (Milone and Ventura 2019). The BMs are frequently based on new farming styles (Ploeg, 2008; 2003) that match the demands emerging from the society, also concerning social values (see e.g., Brunori et al. 2010). They are based on the creation of new specific markets (Ploeg 2014, Milone and Ventura 2014) and they allow a farm to create and exploit new opportunities in the existing markets (Amit and Zott, 2015). What moves the new models seems to be the aspiration of autonomy, expressed by the new peasantries (Ploeg, 2008), capable of redesigning and materially rebuild agriculture on a multifunctional basis (Milone and Ventura 2015). This evolution seems to lead to a new model of a continuous and complex interaction between consumers and producers through direct forms of distribution, thanks to the diffusion of ICT (Ventura et al. 2016).

#### **4. Methodology**

The methodology adopted refers to the multiple case studies methodology (Tellis, 1994, Saccani et al., 2007, Ferrie et al. 2008), particularly suited to the exploratory purpose of the research (Yin, 1994). An in-deep analysis was conducted for each case study using a semi structured questionnaire. The analysis aimed to collect the information to characterize the three farmers' business model and to assess how the new ICT influence them.

At the same time, the in-deep analysis of these BMs was also addressed to highlight the differences, but also the common aspects, especially on market relations, on the way

the resources are mobilized and the alliances created with other actors to generate the value. The semi-structured questionnaire consists of 6 sections aimed at exploring different topics of the three identified case studies. These topics are:

1. The profile of the farmers (rural or extra rural origin, level of education, age, etc.), the business idea and the value creation process;
2. How the availability/unavailability of high-speed broadband infrastructures influenced their business model, or if public investments in such infrastructures contributed or not to the generation of these BMs (finding the appropriate technical solution independently);
3. Constraints or obstacles encountered in the implementation of the idea. Which are the critical aspects that threaten the survival of such projects, the success of the farm and business development measures, with particular reference to the support of young farmers;
4. How public policies facilitated/hindered the idea or the impact of these experiences on rural areas and which policies is more appropriate to support them;
5. The proposal of a political agenda following the farm's priorities;
6. Which are the growth and development trajectories to strengthen the farm in the future.

The three case studies were identified by using the heuristic method based on interviews to the local stakeholders (Farmers' associations, environmental groups etc.). The three cases emerged from the converging opinions of the interviewed stakeholders.

## **5. Analysis of the three case studies**

### ***Case study 1: Web Farming "Natura Vicina" farm***

The farm is located on a mountainous area in the center of Molise region, in the municipality of Macchiagodena (1,811 inhabitants, 52.72 inhabitants/km<sup>2</sup>), which is affected by the well-known depopulation phenomenon, as all the other internal areas of the Region. The farm was established in 2016 by three young entrepreneurs, all three of them graduated – respectively in Communications Engineering, Economics and in Industrial Technology. All three farmers have common peasants' roots and share common values as ethic, reciprocity and nature conservation. Their leading idea was an active involvement of the customers in farming, using advanced ICT technology and traditional farming practices.

The "Natura Vicina" farm offers to customers an intriguing new service: the possibility of having your own organic vegetable garden to grow your vegetables from home, using a remote control, receiving them throughout the year. The customers have the possibility to control, monitor and interact with their vegetables' growth. They have full traceability and eat organic products of their garden, even when there is not a plot of land in their home. ICT creates a new proximity overwhelming the geographical one. The three main dimension of this new proximity are the institutional (production based on organic schemes and reproduction on natural resources), social (awareness of the peasants' knowledge and work) and cognitive (sharing knowledge on the use of the web). Here, the co-production between man and nature is elaborated inside the new relations of co-production between producers and consumers.

In the beginning, the main customers of the farm were families from big cities in Center and North of Italy, as Rome and Milan. The possibility to have a live connection now sees an increasing number of restaurants that want to show their customers where and how the food they offer is produced. These restaurants are not only in the big cities but also in the same Molise region. This contributes to the development of ICT demand in the region, it generates a new organizational proximity based on the common value and the reduction of cognitive distance within local and regional firms and citizens. This enables new and effective communication and new forms of cooperation.

The value creation is based on the use of ICT to eliminate the mistrust of consumers in the Organic Food Certification Schemes, to increase their awareness on the farming cycle and the knowledge needed to produce safe and quality food. The direct control of farming practices

results in a higher price for the products. This control is assured by an advanced ICT infrastructure based on video cameras, remote control of irrigation, fertilization and pest control. All infrastructures and internet connection were designed and realized by the three young entrepreneurs. At the beginning, they had to connect to the web through a radio link system, but later the business development based on the activation of new ultrafast broadband infrastructures, allowed them to connect not just their area, but all rural areas in Molise region. As for the vegetables production and delivery, the farm is working on the same logic for the production and delivery of olive oil: the customers can rent an olive grove cultivated with organic practices in remote and abandoned areas. It is possible to follow all the practices by live web cameras and to receive at home the extra virgin olive oil obtained from the processing of their rented olives. If the customer wants, he can participate in the olive harvest.

In 2017, “Natura Vicina” farm requested and obtained the status of “innovative start-up”, the only case in Molise for the agricultural sector, as well as a rare case in Italy. The new technologies and services representing the core and the success of the farm are performed only if the needed infrastructure is available “*the functionality of broadband was what worried us the most*” (refers the young engineer partner of the company). In the beginning, the lack of broadband infrastructure was successfully overcome by using the installation of a radio link system of a company operating at a national and regional level. This system had many gap or bug as the speed remained suboptimal.

The deficiencies in the infrastructures were not experienced as a too big constrain to face, as to demotivate and to make the youngest desist in the establishment of their business. These three young entrepreneurs considered them as an additional challenge to overcome the disadvantaged conditions typical of rural and internal areas. They developed a software solution to allow data compression and a “point to point” satellite connection, which made it possible to overcome the band deficit. The new ultrafast broadband infrastructure ensured the needed efficiency in case of multiple connections that the rapid market growth requested, especially the B2B one (pub and catering), which is particularly demanding in terms of information and communication device. The farm also faced the unavoidable critical phases as every start-up. A critical aspect was the inexperience of the three entrepreneurs about promotion and communication actions. The turning point came on when a very popular broadcast of public TV took care of the initiative, emphasizing above all the social benefits and promoting their farm.

The award to “Natura Vicina” farm as “innovative start-up” created a new interest from the regional administration, who considers it as the best practice, presents it as an example to promote innovative activities supported by the European and regional rural development funds.

### **Case study 2: OltreBIO.it: trading online of local products**

The firm OltreBio.it is located on a hilly area in the centre of Molise region<sup>7</sup>. This area is affected by heavy and long-standing depopulation problems, and its survival is increasingly threatened by the long-distance migratory phenomena and the attraction of urban poles where the level of health, education and transport services is more acceptable than those available in rural areas. The nearest urban centre is the regional capital, Campobasso, which is just 27 km away and reachable in 30 minutes by car.

The farm started up in 2017, conceived and incubated in Brussels for two years as a “neo-rural” project by a young Italian-Belgian couple of entrepreneurs. One day, they decided to leave Brussels and move to a rural area in Molise region. The two partners are well educated, they both have a university degree, one in Political Sciences and the other in Communication Sciences. They had an interesting work experience in international networks for social services and in projects concerning the relations between food, waste, energy and mobility. All experiences played an important influence in the choice to start up a business in Molise’s rural area.

Their idea comes from the experiences of young entrepreneurs who buy Bio products online, considering this new way of selling products a tool for creating an added value for the local products of Molise region. They had the awareness that this “alternative” form of shopping in

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<sup>7</sup> Municipality of Lucito, a town with 667 inhabitants and 21.13 inhabitants/km<sup>2</sup>.

a short supply chain was a way to support small farms in Molise region and the local economy. *"It is an act of responsibility towards health and the environment"* – from the interview.

Their objective is simple: reconnecting demand and offer of local agricultural products through an e-commerce platform. The products must be fresh (seasonal) and organic, produced by local farms (2 hours' maximum of transport time). *"We realized that it was virtually impossible to find local, fresh and organic products in Molise region. We were aware of the existence of this supply, although it was scattered in many parts of the region. Therefore, we understood the need to organize local producers, offering them a platform for a joint and more profitable placement of products on the market"*, the two entrepreneurs declared in the interview.

They overcame the scarce and inadequate presence of broadband infrastructures in Molise region using cloud services provided by a well-known international company. The cloud services guaranteed a high speed of navigation using the smartphone connection technology. The website was adapted to be used with smartphones, in order to respond to the propensity of customers in making orders through smartphone and to get a high-speed performance in navigation.

The challenges, in the beginning, were to find both suppliers and customers. The two entrepreneurs decided to explore the regional territory searching for potential suppliers through the web. They soon encountered the difficulties related with farmers' scarce knowledge and familiarity in using Internet, mainly due to the lack of infrastructures, an adequate training and advice. Hence, the partnership with local farmers was created through a farm visit, during which farming methods and values were discussed and shared. In this way, the geographical proximity was redesigned by the new tools in a dynamic manner so as to create a new organizational proximity. These proximities became a real instrument of innovation in the relations and in programming and structuring methods of production processes and work. Through the web, purchase orders directly arrive to the individual producers. As soon as the order arrives, the producers start to collect or pick up the products. Orders are purchased according to product availability as defined by the producers. An institutional (sharing norms and ethics of the productive process) and cognitive (sharing knowledge in processes, products and territory) proximity is created through the activity of OltreBIO. The firm plays a double role: it acts as an element of social proximity and it avoids the risk for an opportunistic behaviour, ensuring reputation and trust between producers and customers.

Currently, the relations are structured both directly and through the web. Orders are made using the new ICT tools (smartphone and cloud). The new ultrafast broadband infrastructure in Molise region will certainly facilitate the expansion of the partnership and the improvement of services for the supply chain and farms. To promote their business idea, the young entrepreneurs used information leaflets delivered in some strategic sides of Campobasso and its near towns. These leaflets invited people to visit the web side of the firm. This kind of promotion, linked with an article on their story in a local online newspaper, was very effective in creating a direct relationship with the customers. The second step was the creation of a newsletter and web pages on social media to retain their customers. The main problem that the entrepreneurs are facing nowadays, is the lack of supply compared to the demand that the web generated in few months. At the moment, they are starting an e-commerce activity with Belgium, exporting typical Molise region processed products (truffle and tomato).

The business idea is based on providing new services to small local farmers who, due to their size and culture, would have many difficulties to access to the new opportunities offered by e-commerce. Therefore, these are important services, especially in areas characterized by low economy density, in which the producers need to connect with markets capable of remunerating adequately their local products and the services connected to them. The Rural Development Programme in the Molise region encourages these new entrepreneurial activities based on innovative services. However, the lack of knowledge on these new innovative services entails a very low attention, private and public, on policy instruments to support such activities. This attention instead is given to conventional activities and investments (traditional technology, storage, machine, conventional marketing).

### **Case study 3: Social communication and marketing: “Molisanissimo” firm**

The firm is located on a mountainous area in the north-west part of Molise region<sup>8</sup>, an area included in the “Alto Molise” MAB natural reserve, characterised by a high level of biodiversity and quality of natural resources. Two young friends in 2015, both with high education degrees, made the start-up of the firm.

The idea comes from their personal experience in the field of the agricultural communication sector. Their goal was to bring Molise region’s tradition and culture beyond the regional boundaries, using modern communication tools such as web portals and social media.

The initial idea of these young entrepreneurs was based on the use of ICT as a tool to overcome local boundaries, which confined the consumption of many regional food products to the local market. Many agricultural and food products in Molise region are characterized by their uniqueness and no-fungible attitude. These characteristics are very appreciated by consumers from the big cities, who are not intercepted by a small farm operating in peripheral rural contexts, using traditional marketing tools.

A *multimedia hub* connected the “atomistic” food offer of the local system to the external context. The name of the Hub is Molisanissimo, an umbrella trademark that promotes the traditions and the peculiarities of Molise region’s products. The firm “Molisanissimo” offers communication and promotion services to farms and food companies selected for their typicity, genuineness and origin of their products; it organises gastronomic events and it created a B2B and a B2C networks serving Molise food system. The aim was to create a new social and organisational proximity to overcome Molise farmers’ historical individualism and distrust in collective actions.

The element of cohesion and co-ordination of Molisanissimo network is based on innovative communication and promotion activities: the story telling of each products and producers; the traditional way to prepare the food; footages of Molise region landscape, events linked with local food and consumption; direct connections between producers and customers. Another important aspect was the creation of stable relationships between the firms, in terms of building new supply chains for the communication and promotion of the activities. Hence, “Molisanissimo” firm is characterized by an offer of advanced services for the agricultural and food entrepreneurs aimed to add value to the products of the firms joining the network.

It is, therefore, a “social” firm trying to bypass the lock-in effect linked to the individualist attitude of local entrepreneurs, which is a part of the culture they want to promote outside the local context. However, the small size of the firms, the initial mistrust and the same individualistic culture did not facilitate the participation in the network, resulting to be the main obstacles to the development of the activities and to its economic performance. The scarce participation is also due to the difficulty for firms to evaluate the economic return linked to the services offered. The firm, at present, is rather quiescent. The entrepreneurs are trying to overcome this status by cooperating with regional institutions demanding new training and advisory activities for the potential users of their services.

As in all activities based on the creation of a network, in fact, its success depends on the activation of a network economy strictly linked to the number of users. The more the firms will be interested in these advanced communication and promotion services, the greater will be the added value. However, in the present case study, the actual lock is important and it depends on the cognitive and institutional proximity based on the same traditional aspects that the firm wants to enhance. Molise region’s farmers, focus on producing well and have no communication experience, especially those aimed at selling to consumers outside the region. There is no knowledge of new communication tools. Firms look at these new tools with certain scepticism especially on their future potentiality. This scepticism generates a cognitive distance between the young entrepreneurs and the firms they want to provide these services. Currently, only one of the two entrepreneurs manages the firm. He seems to be quite stubborn in the pursuit of his idea and he hopes for the recovery and re-launch of the firm activity. He is acting a two-fold strategy: the first one finalised to reduce the cognitive gap described above, by investing in personal relationships,

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<sup>8</sup> Municipality of Carovilli, a town with 1,324 inhabitants and 31.86 inhabitants/km<sup>2</sup>.

recreating a social proximity between him and his potential customers; the second one based on the enlargement of consumer's audience, by introducing information on ancient gastronomic recipes and involving in the initiative – an archaeologist who collected all the historical documents related to the ancient food tradition of Molise region. The initiative is on-going, and results are expected by next year.

## 6. Case studies discussion

The three cases were analysed with the aim of identifying how the ICT, and the related innovations, create an interconnection between the four characteristic elements of the BMs and the restructuring of proximity dimensions. They have several communalities, but also different aspects with respect to our objective of analysis: there are different ways in which the four characteristic elements of the BM are constructed and also different is the role that the different dimensions of proximity play in structuring the innovation process.

In the first case study, "Natura Viva", the creation of value is obtained through the possibility of following and participating directly in the production process. The farm represents itself as a single supply chain. The products go directly from the farm to the final consumers using the web platform and home delivery. ICT allow consumers to take part in the production decisions by creating a new form of co-production with the farmers. Finally, the financial model is based on the participation of the consumers in the farm economic risk by paying for the product in advance.

In this case, the most significant proximity dimension is certainly the cognitive one. This proximity is established between farmers and consumers. It is based on a common understanding and knowledge on the importance of ICT for a new management and monitoring system of production and selling processes. This proximity dimension is enriched by the knowledge concerning the farming practices and cultural heritage, and it creates a strong interconnection with other proximity dimensions in particular institutional and social ones. The first, within the farmers and consumer relationship, they relate on the rules governing the farming process, the quality and healthiness of the products in the organic sector. The second, represented by the revaluation of co-production (between man and nature), an attitude of peasants with a new awareness of the skills and work that this entails. Sharing the risk between farmers and consumers is based right on the recognition, by the latter, of the co-production attitude of farmers, which leads to a new trust. Thanks to this trust the consumers are willing to pay a higher price for products and in advance. They believe that this action is important for the survival of the farm, for the reproduction of nature and for their own needs. Finally, the organizational proximity dimension is relevant as it allows to share the supply chain control in a transparent way and the absence of transaction costs minimizes the risk of opportunistic behaviour by both farmers and consumers.

The less significant dimension appears to be the geographical one. This makes this case a good practice to be transferred immediately to other places. The following table shows the proximity dimensions and their relevance in the construction and shaping of the evolution of the BM elements.

In the second case, "OltreBio.it", the most relevant proximity dimensions are social, geographical and organizational. Indeed, the value creation is based on these dimensions that link traditions with innovations. The other dimensions of proximity are restructured around the geographical proximity. The link with the territory is relevant for all dimensions and it is the driver of the innovation linked to the use of ICT. The main objective of the two entrepreneurs is to safeguard small farms and their typical products. This objective is implemented through the construction of a new organizational proximity within the supply chain and with the customers. The relevant aspect of this proximity dimension is its flexibility, through which an interdependence is created between the "OltreBio.it" firm and its small suppliers/customers without a specific "sunk cost"<sup>9</sup> investment for them. Moreover, organizational proximity is built on mechanisms of relations and feedback using ICT incrementally. Referring to customers' interfaces element, the cognitive

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<sup>9</sup> Sunk costs are those costs paid that cannot be recovered, and therefore they should have no impact on future decisions (Baumol and Willing, 1981). Sunk costs are caused by an entrepreneurial error. They derive from the uncertainty over the time horizon (because without a passage of time under uncertainty there can be no error) (Machaj, 2013).

proximity assumes a great importance. In this case, this proximity is understood as the sharing of knowledge and the use of new tools, as for the smartphone. It is through this proximity that new social and organizational proximity is also built among small farmers/suppliers. The financial model is closely linked to the “creation of value” element and, therefore, to the most relevant proximity dimensions for this element. In particular, it is strongly linked to the consumers’ willingness to pay a higher price for products characterised by: high level of services (e- commerce, home delivery, storytelling and packaging); high quality of the products linked to the craftsmanship of small firms; local origin of the products. This BM is emerging in various Italian and European rural areas. The following table shows the proximity dimensions and their relevance in the construction and shaping of the evolution of the BM elements.

Tab 2. Interrelation between proximity dimensions and BM elements of “Natura Vicina” farm.

Proximities dimension	“Natura Vicina” BM elements			
	Value creation	Supply chain	Customer interfaces	Financial model
Cognitive	Very relevant (monitoring processes via web)	Very relevant (coproduction farmers-customers)	Very relevant (coproduction farmers-customers)	
Institutional	Relevant (structured inside the farmers-customers relations)			
Social		Relevant (new awareness of social role of peasants)		Very relevant (sharing risk no opportunistic behavior)
Geographical	low relevance	low relevance	low relevance	low relevance
Organizational		Relevant (control of the supply chain)	Relevant (minimizing opportunistic behavior)	

Tab 3. Interrelation between proximity dimensions and BM elements of “OltreBio.it” firm.

Proximities dimension	“OltreBio.it” BM elements			
	Value creation	Supply chain	Customer interfaces	Financial model
Cognitive	relevant (interlinked with other dimensions)	Low relevance (ongoing construction)	Very relevant (sharing knowledge on ICT tools – smartphone)	
Institutional		Very Relevant (based on ethic value)		
Social	Very relevant (maintenance of small farmers/entrepreneurs)	Relevant (based on small farmers/entrepreneurs)	Relevant (direct relation with farmers/ entrepreneurs)	Very relevant (availability to pay more for products of small farms/firms)
Geographical	Relevant (local products)	Relevant (local network)	Relevant (local products)	Very relevant (availability to pay more for local products)
Organizational	Relevant (availability of new services: home deliveries )	Very Relevant (based on flexibility)	Relevant (minimizing opportunistic behavior)	Relevant (availability of new services )

In the third case, “Molisanissimo – firm” the BM is characterized by service activities delivered through the creation of a web/hub platform identified by an umbrella trademark recalling on the traditions and peculiarities of Molise region’s products. Referring to the “creation of value” element, the relevant proximity dimensions, in this case are geographical, linked to a common

promotion of the atmosphere, the regional and social values, understood as proximity of behaviours and expectations of the consumer towards food and local food events.

In general, the organizational proximity dimension in this case represents the most significant one, with respect to the ability to minimize the opportunistic behaviour and the willingness of firms to pay for the delivering services of the platform. Furthermore, it is proximity who allows a sharing of knowledge and product references between firms, using the same platform and tools. This characteristic is the base of the success that leads to network economies and to economies of scope, which are strictly linked with the number of the members that use the services and their matching. The higher the number of members, the greater are the obtainable economic benefits.

Directly linked to the organisational proximity is the institutional one, especially in the beginning of the initiative of this case study. In fact, the elements characterising the network success and development are: trust between firms and between them and customers; the opportunity to access to public incentives aimed at the start-up of firms and promotion of quality products and practices. Referring to the last element, the institutional proximity is defined as the convergence of regional government private and political interests. This last aspect makes the BM very dependent on public and private institutional activities on the territory and on the interrelation of these institutions at micro and macro levels. The scarce institutional proximity registered for this BM, linked to the low density of entrepreneurial activities in the area, the individualistic culture of entrepreneurs and the lack of interest of local authorities, caused economic difficulties over time, which can no longer be overcome. The following table shows the proximity dimensions and their relevance in the construction and shaping of the evolution of the BM elements.

Tab 4. Interrelation between proximity dimensions and BM elements of “Molisanissimo” firm.

Proximities dimension	“Molisanissimo” BM elements			
	Value creation	Supply chain	Customer interfaces	Financial model
Cognitive	Relevant (linked to the sharing knowledge on the high potentiality of ICT tools)		Relevant (linked to the sharing knowledge on the high potentiality of ICT tools)	
Institutional		Very relevant (public institutions support)	Very relevant (trust, non-opportunistic behavior)	Relevant (availability of public incentives)
Social	Relevant (embeddedness in ongoing social food behavior )			
Geographical	Very Relevant (local atmosphere and values)		Relevant (local products)	
Organizational	Very Relevant (network economies)		Relevant (minimizing opportunistic behavior)	Relevant (network economies linked to the numbers of customers/firms)



## 7. Conclusions

The main objective of the paper was to analyze the role of ICT in rural economy. From the analyses of the case studies, it emerges that the main impact of new technologies regards the organizational innovation reshaping all farm/firm relations. A strong point in organizational innovations is their capability of valorizing farm/firm products and processes, locally specific, and to reproduce in time natural resources from remote rural areas. The new BMs deriving from these organizational innovations overcome local physical boundaries by connecting rural with urban areas.

The ICT-enable innovation, especially organizational, does not lead to a one-size-fits-all solution. The solutions seem to be territorially and human capital sensitive, based on needs and potentials of the respective territory and human capital they are able to mobilize. They should be supported by new or existing public territorial strategies that include the construction of digital infrastructure.

According to the analysis, the introduction of ICT in rural areas is leading to the creation and development of new BMs areas, as it enables the introduction of different types of innovations to influence the four elements described above, which characterize the BM. At the same time, these innovations are closely interrelated to the dimensions of proximity and to their co-evolution, which in turn leads to an evolution of the productive activities and of the territories over time (Boschma 2004; and Morgan, 2004).

These interrelations are characterized by a great heterogeneity and, therefore, by a diversity of weight of the proximity dimensions in structuring the BM. This work analyzed three illustrative case studies of how ICT-enable innovations lead to the emergence of new entrepreneurial activities that stand out from each other for the relevance of ICT and the weight of proximity dimensions related to the structure of BM.

The following elements of communality emerge from the analysis:

1. ICT increases the importance of cognitive proximity, consisting of the actors' ability to share the same knowledge and skills, allowing them to communicate more fluidly and effectively, fostering mutual learning. This allows the development of BMs in which the supply chain and customer interfaces are based on co-production or co-creation processes.
2. ICT always allow the creation of new networks and partnerships between local economic actors by restructuring the organizational proximity and allowing new agreements that respect the autonomy tendency of individual agricultural enterprises, especially peasant ones or family members (Milone et al., 2015), creating economies of network and scope. The dimension of organizational proximity assumes, in fact, a considerable importance in all three cases as it allows to coordinate the remote control of exchange of products, knowledge services and/or information within actors who have to share choices or decisions in competitive contexts, characterized by uncertainty.
3. Spatial proximity is also redesigned, it is no longer centered on knowledge externalities, deriving from localization and the existing tacit knowledge (Ievoli et al. 2017), but from the collective action based on territorial values finalized to interact with the external context. This allows to obtain a new interest from the citizens of urban areas to the problems, needs, traditions and values of rural areas.

The importance of these new BMs is in their capacity to respond to the need of remote rural areas, characterized by low economy density, to be socially and economically revitalized. The key aspects are:

1. Create new economic and social relations with consumers able and willing to pay more for products and services from rural areas (compared with the local market) and that are geographically far away from them;
2. Attract young entrepreneurs with high education, who, through the new ICT tools, are overcoming the main obstacles of remote rural areas which are physical, social and cultural isolation.

Referring to the conceptual framework, the analyses carried out confirmed the importance of agriculture and farmers for the development and diversification of the economies of remote rural areas. New figures and new actors emerge, characterized by a high level of education and relations with extra-local realities. These elements are fundamental for the design of policies and interventions for the development of internal areas. The study confirms the importance of investments in human capital, especially where public policies are investing in infrastructures to facilitate access to new ICT technologies. The relevance of cognitive and organizational proximity in the analyzed BMs brings the attention to the centrality of knowledge and skills of the economic and institutional actors that participate or interact with the described BMs.

The use of ICT, even in internal areas, is a response to the consumers' growing demand of new services that could be conveyed by digital technologies, which are in continuous evolution. From the analysis of the second case study, it shows how the presence of entrepreneurial human capital capable of using these tools, it becomes a means to disseminate them among farmers, even within those with less aptitude to the use of these tools.

One general lesson raised from the study, concerns the issues of public investments in ICT infrastructures. With the assumption that in rural areas, in case of market failure, the role of public intervention is essential to guarantee the survival of local communities, timing of mentioned investments is a relevant key factor of success. Investments, actually, must be well-timed and the connections need to be rapidly functioning. If this does not happen, the infrastructures risk to become rapidly obsolete and cannot contribute to economic viability of rural communities.

A second lesson concerns the role of these ICT connection infrastructures – also the ones provided by the market – that must be related with the development of production in rural areas, and that cannot become a tool of over-exploitation of resources. With regard to this, the relevance of new forms of entrepreneurship in agriculture, based on environmental and social values, needs to be adequately supported, e.g., encouraging farmers and entrepreneurs to overcome cultural limits related to ICT, as highlighted by the cases studied. Traditional media can be useful to this scope. This last issue requires further studies, in order to provide appropriate policy-makers instruments to set up more effective European programmes, addressed to both infrastructural and soft skills developments.

The on-going processes of innovation, in particular the ones' based on ICT, to be transferred to the remote rural areas, must be supported by public training and advisory actions that should have considerable flexibility to be able to effectively affect the different situations created. A too homogeneous spread of knowledge could lead to certain lock-in phenomena, due to an excessive cognitive proximity. The risk is the loss of the ability of producing novelties or to be too creative. It is a present risk, for example, in the precision farming implementation process or in the spreading of conservative agriculture (Marandola et al., 2019).

The analysis of the case studies showed that the success of BMs depends on a balanced rate of proximity, neither excessive, nor too scarce. This is precisely because in a dynamic perspective only a balanced presence of different dimensions of proximity can lead to their coevolution and to differentiated paths of innovation capable of responding to the fast dynamics of a digitalized society. These proximity dimensions are the driving force of rural web and of its relation with the external context. A balanced presence of these proximity dimensions is important to create the needed coherence among and within different dimensions of the rural web.

These considerations give a new role to the action of public administrations, which should intervene in order to create a coherence within projects of public and private initiatives. In other words, public support for the creation of broadband infrastructures makes sense only if accompanied by incentives or interventions for the qualification of human capital, with interest in the use of ICT, for the offer of broadband management services and, finally, for the creation of networks capable of expressing a growing demand for these services.

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