

# Multifunctional Agriculture and ICT: Incompatibility or a Recipe for Territorial Development?

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**Abstract.** The purpose of this paper is to provide insights as to the usability of ICT in the process of rural development. Through a theoretical framework embracing territorial development, social innovation and pluriactivity, the paper describes how ICT enables the provision of goods and services from the agricultural sector and their use as development assets. Examples showing that ICT may transform agriculture's externalities to territorial tools are provided. Current policies are assessed as to their contribution to territorial development, especially when it comes to funding opportunities for ICT applications towards these objectives. The critical assessment of various ICTs in the framework of environmental protection and rural development provides useful guidelines regarding their applicability to future development patterns.

**Keywords:** Sustainability, Rural Development Policies, Social Innovation, Pluriactivity, Diversification, Information and Communication Technologies

## 1 Outputs of Multifunctional Agriculture

The multifunctionality of the agricultural sector has been well-documented, especially during the past 20 years, since its emergence within the agricultural policy agenda. The “European Model of Agriculture” manifests the multifunctionality of EU agriculture as it plays a significant role in maintaining vivid rural areas and protecting the environment and cultural heritage (Casini et al., 2004). The term refers to the fact that agriculture produces externalities influencing society in numerous ways without, nonetheless, the results of these externalities being incorporated in market prices of agricultural products (OECD, 2001). According to Lankoski and

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Ollikainen (2003) the externalities of multifunctional agriculture can be categorized as those affecting the environment, rural amenities and food security.

Concerning the environment, conventional farming systems in the EU produce negative environmental externalities which affect soil, air quality and surface and ground water resources. The CAP encourages environmental-friendly practices by remunerating farmers who adopt integrated or organic farming, expand fallow lands and forests, reduce the use of inputs, develop mountainous pastures etc. (Axis II, Reg. (EC) 1305/2013). In addition, agriculture formulates unique landscapes, which include natural and man-made elements reflecting historical, social, cultural and political changes that occurred during centuries.

The role of agriculture in rural development is highly significant. Functions such as maintaining rural populations and protecting cultural heritage and the farming trade are some of its non-traded outputs affecting rural amenities. In particular, life in the countryside and employment in agriculture are endowed with numerous values including a symbolization of a more pristine way of life. Indeed, these activities have shaped the cultural heritage and the mere identity of rural regions; hence a wide range of folklore features, such as traditions, music, dances, norms and architecture characterizes the countryside. These elements comprise the intangible cultural heritage (ICH)<sup>1</sup>, which is constantly gaining attention in Europe and stimulate the emergence of policies protecting it and regulating the availability of its elements. The public perceives farmers as the keepers of this heritage, thus recognizing concrete links between farming and culture (Abler, 2003).

Some externalities are unique to agriculture or are produced at the lowest cost, thereby yielding benefits for society. In this context, Jervell and Jolly (2003) adopt an alternative approach of multifunctionality recognizing that agricultural non-market outputs are resources that can cause increased tourism and visitability of farms or rural areas and increase incomes by selling quality products and providing recreational services. They also argue that a promotion strategy of these resources will have higher development impact than income support, which is important considering increased consumer awareness about quality, healthy and safe food, animal welfare, biodiversity and environmental issues, culture and tradition, product origin etc. This paper presents the concept of multifunctional agriculture and discusses the role of Information and Communication Technologies (ICT) in the use of non-traded outputs as territorial development inputs.

## **2 ICT Supporting Territorial Development**

Most countries agree that the diversification of rural economies is a prerequisite for lively rural areas; however, in remote regions such as in EU's Less Favoured Areas, the role of agriculture is predominant in the local economy and in employment. Thus, taking into account the issues of competitiveness and

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<sup>1</sup> Intangible cultural heritage (ICH) ([www.unesco.org/](http://www.unesco.org/)) includes monuments, artifacts, local architecture but also oral traditions, performing arts, social practices, rituals and festivals, knowledge and practices concerning nature and the universe or the knowledge and traditional craftsmanship passed on through generations.

sustainability, a strategic goal of rural economy diversification emerges towards a pattern of less reliance on agriculture and of introduction of new and novel economic activities. This pattern is highly pertinent to '*territorial development*'. This type of development occurs through two pillars i.e. the social capital in an area and the production of specific products characterizing local territories. The innovative element of this model is that it allows to 'build' development socially through cooperation and networking among stakeholders of a specific area (e.g. producers, public Services, local groups, Associations etc.), all of which aim at the sustainable use of resources. Activities generated within the territorial development process may include alternative marketing methods, accommodation, restaurants, manufacturing by developing tacit knowledge, naturalistic or sporting events, local and folklore festivals (e.g. festivals associated with local products) etc. In this model, agriculture provides for all sectors of the economy, generating multiplicative effects.

Territorial development requires to detect and focus on territorial-specific characteristics which can be used as development resources. In the context of multifunctionality these resources are agricultural externalities and the process of discovering and focusing on the 'correct' multifunctional outputs for territorial development constitutes *social innovation*. Social innovation is not limited to a particular group but can rather be developed by the vast majority or even by all members of a rural society; by definition, social innovation requires networking.

In order to promote, sustain and successfully induce territorial development many alternative strategies and means have been proposed and Information and Communication Technologies (ICT) can be integral to all of these. ICT are nowadays important factors in agricultural development, providing innovative applications which promote economic and environmental sustainability combined with easy, targeted and useful interventions. In addition ICT can offer valuable solutions in the fields of primary production, farm management, phytosanitary issues, animal health and welfare etc. Apart from on-farm applications, the use of ICT in the development, promotion and proper utilization of non-traded outputs of agriculture can be very efficient. Indeed, it can provide feasible solutions to a variety of issues related to the implementation of territorial development strategies. In what follows, real-life solutions enabled by ICT are briefly presented and discussed, organized according to the domains where they are applicable.

- Applications for agricultural land use optimization. The designation of effective land uses at the local/regional level is a prerequisite for the regulation of the provision of non-traded outputs of agriculture at the socially optimal levels. In other words, land uses should be designed based not only on purely economic criteria, but should also incorporate environmental, cultural and social aspects and aspirations. Geographical Information Systems (GIS)-based applications, Radio-Frequency Identification (RFID) systems (Faccilongo et al., 2016), internet-based applications and a great variety of other tools is now available to practitioners and policy makers in order to assist this endeavor.

- Decision-support systems are integrated tools, which may process lots of information regarding all aspects of territorial development. They can be proven useful in modeling and predicting the potential impact of the implementation of development projects. It is common for research projects to elaborate such tools which can sometimes available online to farmers and other stakeholders. Decision

support systems are available to policy makers and local actors in order to choose the most effective solution for their areas. Information Systems are also important in the elaboration of applications of this sort.

- Precision agriculture and other applications, which fall into the category of ICT-enabled services. They include a variety of cutting-edge technologies such as GIS and Global Positioning Systems (GPS), Variable Rate Application Systems (VRS), remote sensing and on-field records, all of which fall into the concept of Precision Agriculture (Fountas et al., 2009). Precision technologies also extend to irrigation systems (Papadavid et al., 2011) and livestock production with applications enabling the positioning of grazing animals in natural grasslands (Sturaro et al., 2011). All these systems contribute to environmental protection and to the achievement of economic, social and environmental sustainability, thus contributing to the provision of non-traded outputs. Environmental Impact Assessment tools also contribute towards the same direction.

- Promotion of areas. A broad array of internet-based tools and applications enable the promotion of the territorial assets of rural areas - such as landscapes, production practices, ICH etc -, all of which constitute development resources and comprise the overall identity of these areas. Municipalities, regions and whole territories are nowadays extensively represented on the internet providing detailed information to interested individuals (e.g. visitors, residents, policy-makers, students, scientists etc).

- E-Government. This type of services and the democratization of information, including the open access movement, are important drivers for territorial development in modern societies. Online tools can be available to locals in order to improve their access to public services and common resources, thus enabling social inclusion and solidarity and making remote rural areas better places to live in.

- E-networking and communication cultivating multi-agent collaboration. E-networking promotes the establishment of formal and informal networks pursuing common goals and triggering territorial development, which is otherwise based on collective action. This type of ICT-enabled networking and communication embraces all actors and allows regular information flows and effective management of common resources. An example of the sort can be found in Stefanis et al. (2016) who described the elaboration of a tool for communication between producers of biomass and companies. This type of networking can also bring together actors from a diversity of geographical settings motivating the dissemination of “good practices”

- E-learning and information. There is ample evidence that ICT-based training programs and internet-based sources of information are more and more available to farmers and other relevant actors (Kountios et al., 2014). Moreover, training and information campaigns are now expanded to pluriactivity and diversification, aiming to help farmers undertake non-agricultural activities, which would be, nonetheless, highly connected to the local cultural identity, history and environmental resources.

- E-business and e-commerce. The 'word of mouth' promotion of local products, services (e.g. hotels and restaurants), female entrepreneurship and short supply chains has been effective for many years. Now this method is supplemented by a great variety of internet and online tools, mobile applications and other media. These methods can be very effective in the proper promotion of territorial and

certified products, brands and labels of specific quality products, increasing their added value, through better acknowledgement of their quality features.

The multifunctional character of the farming sector has been incorporated in rural development and agricultural policies of the European Union (EU). The recently introduced Regulations (EC) 1305/2013 and (EC) 1307/2013 recognize that farming should always protect the environment, including biodiversity and agricultural landscapes. In addition, they envisage better infrastructure and a diversity of economic activities for rural areas. Special interest is focused on short supply chains linking territorial stakeholders, thus generating added value for local actors. Using the “correct” mixture of policy incentives, the CAP could be proven a useful tool for territorial development. Policy tools are available to farmers who seek to move towards alternative models, such as measures for the mitigation of environmental externalities and the transformation of rural communities to places of opportunity for urban dwellers. The use of ICT is more than encouraged by legislation and particular interventions and activities can be funded, including the following

- Improvement of infrastructure, better broadband access, wireless internet to support the generalized use of mobile phone applications
- Applications and websites for the promotion of rural areas and sites, including videos and virtual tours
- Websites and applications for territorial product promotion and e-sales platforms
- Online decision support tools, which could be the outputs of targeted scientific projects
- E-networking and e-learning platforms especially if they are established and operated by producer groups and other collective actions

### **3 Conclusions**

The territorial development approach is highly pertinent to the outputs of multifunctional agriculture. This strategy is expected to yield important results, being a process "from the inside", because it leverages local expertise and resources. This type of development is sustainable, because it does not burden the environment and protects collaboration and social inclusion by inducing all local actors to work collectively towards a common goal. Therefore, synergies between institutions and stakeholders and interdisciplinary approaches are required and this is the most important domain where ICT may play a key role. ICT also provide much room for social innovation, as they constitute technological tools for novel uses of existing resources. From innovative farming systems and methods to e-business and promotion, involved groups may work together in order to incorporate them in existing practices and achieve benefits at the territorial level. A common criticism to this approach could be that changes in agriculture could affect non-tradable outputs, thus altering assets for territorial development. Here, the role of ICT is important in training and governance to support the evolution of the innovative activities alongside with changes in the primary sector. ICT could not only help locals to get accustomed to novel production patterns but also to inform the public about the

benefits of such a shift, thus establishing innovation. Another important aspect that would be interesting to examine in the future how Strategic Management techniques (SWOT Analysis, PESTLE Analysis, VRIO, Value Proposition Design etc.) could be used to discuss the role of ICT in the mobilization of non-traded outputs

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