

# Climate change, rural systems and innovation: the role of Internet

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**Abstract.** Climate change can compromise the development of the territorial systems with rural vocation. Nevertheless, these last can influence, both positively than negatively, the factors that determine climate change. Starting from this dichotomous vision of the relationship between climate change and rural development, this study focuses on the role that Internet and the web marketing strategies can develop in the mitigation and in the adaptation to climate change through the spread of information on virtuous behaviour by individuals and firms. In such optics, the study, looking over agritourism as multifunctional farm with an orientation to sustainability, provides a survey to evaluate the diffusion of Internet in the Campania Region and the propensity of firms to use the web in order to promote responsible behaviour among the users of websites (suggesting virtuous behaviours) or to valorize their commitment in the fight against climate change.

**Keywords:** rural systems, climate change, web marketing, multifunctionality.

## 1 Introduction

In the last years, global issues have exposed rural systems to challenges that have begun to pretend a declination in key of sustainability of the relative development processes. These challenges are very complex: management of natural resources and the fight against climate change, the balanced development of territories and the availability of healthy and safe foods, ask for strategic, but above all sustainable answers, based on the integrated and shared vision of all the stakeholders in the territory.

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So, among the environmental factors that could jeopardize the development of rural systems we have climate changes (Peixoto and Oort, 1992, European Commission, 2010; Andreopoulou et al., 2011).

After the industrial revolution, in fact, the strong increase in the greenhouse gas (GHG) indicated the existence of an unbalance among the different economic sectors, society, environment and the different territories with their specific particularities. The relationship between climate change and development has always been considered from two points of view: both in terms of the impact that development determines on the climate and in terms of the effect that climate change can have on development (The International Bank for Reconstruction and Development, 2010).

Starting from this dichotomous vision of the relationship between development and climate change, this study focuses on the rural development, looking at the role of agriculture. In this regard, it focuses on agritourism like an innovative form of multifunctional agriculture projected towards sustainability. In fact, climate change can be compromised by the development of the territorial systems with rural vocation, but, vice versa the agricultural component of these systems can influence the factors that determine climate change, either positively or negatively. In particular, with the purpose of emphasizing the strategic role that today these rural systems could play, in order to develop and overcome this challenge, the study looks at the principal levers which are able to sustain their development by projecting them in a perspective of sustainability. Among these, the modern Information and Communication Technologies (ICT) constitute more and more the representative tools of an innovating society moving towards an economy based on ever increasing knowledge and information. In particular, considering the role that Internet and the web marketing strategies can develop in the mitigation and in the adaptation to climate change through the sharing or the spread of information on the causes of climate change or on virtuous behaviour by individuals and firms, a survey has been conducted with the aim to provide useful reflections for policy makers, evaluating the diffusion of Internet among the agritourisms of the Campania Region and, especially, the marketing strategies they've implemented through the web with the aim to share information on climate change, suggesting virtuous behaviours to users or valorizing the commitment of the firm in the battle to fight climate change.

All this, to testify the propensity of agritourisms to assume responsible behaviour toward the society, or better, toward a global and worrying question for the society.

## **2 Rural systems and challenge of climate change: the role of ICTs**

Rural territories are areas of notable interest for modern development, representing development systems directly interested in the consequences of climate change: increase of mean temperature and extreme meteorological phenomena, diminution of water resources, biodiversity loss and degradation of ecosystems. At the same time, rural systems could determine climate change because of an incorrect management of their physical and anthropic components, for example: the natural systems - like parks, reserves, forest ecosystems, etc. - or the biological systems

modified by mankind like the agricultural ecosystems. In fact, in such optics, rural systems would be ecosystems resulting from interaction between the environment and man. Man, would have modified, in particular, some original features of the natural resources and, at the same time, helped in determining its specificities, both in terms of biodiversity and in socio-cultural terms (that is all the competences, uses and traditions that mark out the local communities)<sup>1</sup> (Inea, 2001; Cesaretti and Scarpato, 2010).

The relationship between rural systems and climate change is very complex, due to a multiplicity of interrelations and interdependences involving environmental, social and economic aspects that evolve dynamically and in an unpredictable way. Besides, this complexity subsequently increases when we try to classify the responsibilities of the different components of the same system (e.g. agriculture and other productive sectors, traditional handicraft, landscape and architectural excellences, local institutions, eno-gastronomic tourism) towards climate change, and when we try to classify the impacts of climate change on the rural systems.

This study focuses only on the agricultural component of a rural system.

It's now broadly recognized that agriculture develops a double role towards climate change because it passively suffers its effects but at the same time it can increase or limit global warming (Essex et al., 2005). In fact, agriculture represents a source and a reservoir of GHG, because it causes emissions in the atmosphere and removes carbonic anhydride from the atmosphere through photosynthesis and the memorization of the same process in vegetation and in the ground (a process known as sequestration) (Bishop, 1993; Misso, 2010). Due to the link between nature and agriculture, from the production point of view soil becomes a mix of biological, cultural, social values, a source of biodiversity and hydrogeological equilibrium, setting itself as nerve centre of the system of natural, human and social capital that creates a territory and that from it takes energies.

In such optics, rural systems sustainability would be more and more connected to the quality of life, or better: sustainability would represent the ability of rural systems to assure economic, social and environmental wellbeing to the community living in a territory, both for the present and for the future (Cesaretti and Misso, 2011). In this respect, traditional measures for the wellbeing of the rural territory claim an innovative model of rurality, able to develop and to know how to take opportunities for example by ICT and this, above all, in light of the need to overcome more and more complex global challenges like, for instance, climate change (Marsden and Murdoch, 1994; OECD, 2001a; Commissione delle Comunità Europee, 2009; Cesaretti, 2011).

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<sup>1</sup> In other terms, the rural and agricultural areas are not only considered in systemic key due to their complex structure constituted by resources and relationships (exchanges of material, energy, information) that they establish among them; but also and above all since they show an inside organization that varies with their degree of development and a behaviour (maintenance, reproduction, self-regulation, cycle of life) that according to the theory of the systems, would aim to the equilibrium and the reproduction of the same system, in face of climatic, demographic or technological changes. Finally, external relationships, the presence of institutions (among which the marketplace), help in determining these areas as an open system (Inea, 2001).

So, the overcoming of the challenge of climate change imposes new strategies and tools on rural systems which are able to reread the territories of reference in light of a multidimensional and integrated vision of their specificities, but especially in view of a new culture of rurality. This last, in particular, has to be intended as an expression of:

- a more and more diversified and multifunctional agriculture, strongly rooted in the territory;
- environmental and landscaping resources which are increasingly more integrated in identity and innovating matrixes;
- relational and institutional assets based on systems of sustainability oriented values.

According to Hodge (1986) rural development can be defined as "*a general increase in the wellbeing of the residents of the rural areas and, in general, in the contribution that the rural resources give to the wellbeing of the whole population*". Just because of this last contribution, all the components of a rural system, in particular the agricultural ones (e.g. agritourisms, farms, agricultural and territorial institutions, tourist agencies), have to contribute in the overcoming of the challenges to the sustainability, including precisely climate change (Hoggart, 1988; Groote et al., 2000). In particular, this becomes the key to interpreting the ability of development of a territory and of its typical elements. This is true for the rural territories, for which the challenge of climate change is a real constraining factor of development that requires a substantial review of the territorial strategies with a view to sustainability<sup>2</sup>. In fact, the complex meaning attributed to rural development must, necessarily, consider the changes in the role of the agriculture in the economy of a territorial system. Today, agriculture has a multifunctional role, so it not only provides for the production of foodstuffs and non, but also for the production of protection and conservation services for the territory, receptive and recreational services, through the valorization of the local resources.

In the last few years, the multifunctionality of agriculture, has attracted the specific attention of the people responsible for the politics of agricultural and rural development, both in industrialized and in developing countries, and on the definition of such functions. The key functions of the agriculture are the following: food safety; environmental function; economic function; social function (FAO, 2000a). The importance of multifunctionality of agriculture, can be examined in relation to

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<sup>2</sup> Literature has consolidated the strategic vision of the territory in which the analysis of all the present components, their different combinations and their different levels of radiation provide a more appropriate theoretical picture in the study of context with rural and agrifood vocation. At the same time, the analyses to support the rural development strongly underline the territorial features, considering the development as a socio-economic, cultural and environmental phenomenon deriving from "local" features. All of this, obviously, pushes towards the recognition of the non homogeneity of the territory, and of the necessity to read and interpret the differences of the rural areas and to undertake trajectories of sustainable development calibrated on the specificities of each one.

specific global environmental problems, such as climate change<sup>3</sup>, desertification, biodiversities, the quality and the availability of water and pollution (FAO, 2000b).

Moreover, on the wave of the new orientations of Common Agricultural Policy founded on the multifunctional and sustainable European agricultural model, rural systems are living a moment of strong innovation, starting with the rediscovery of the multifunctional nature of agriculture and with the new awareness that the farmer has of this, with the development of agricultural practices with smaller environmental impact<sup>4</sup> or new approaches to consumption and to distribution (for instance, km0 or biological products), and the spread of new productive and consumption models more and more inspired and founded on innovation (OECD, 2001b).

Therefore today, more than ever rural systems have to testify on their ability to innovate themselves and to offer their own contribution to the construction of a productive system able to answer social claims on environmental issues, like the struggle to combat climate change, besides the need to obtain margins of sustainable competitiveness on the markets.

It is in the sphere of this process that ICTs play an important role. Their advent (in particular of Internet) has become an important production and organizational factor in the search for new opportunities both for enterprises and for rural systems, but also an important tool for the environmental, social, economic and territorial sustainability. Many companies, for example, are developing projects on Green ICT<sup>5</sup>, but this last play also a significant role in enhancing rural development in developing countries and in general as a key enabler of renewed and sustainable growth, given that it has become an essential element of the infrastructure underpinning competitive economies (Niederhauser et al., 2008). In this way, ICT can play an equally central role in promoting environmental and social sustainability, both as an industry and as a key element of enabling infrastructure (Guimarães Pereira et al., 1999; Guimarães Pereira and O'Connor, 1999; Pade et al., 2006; Dutta e Mia, 2010). From the phases of production to processing and marketing, the firm has the opportunity to use precision farming or web marketing tools and to adopt a variety of technological applications: all this for the pursuit of their sustainability and for the sustainability of society.

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<sup>3</sup> Agriculture can contribute to reducing the greenhouse effect, through better management in the use of nitrate fertilizers and replacing coal with the use of bio-fuels. Moreover, it supports the development of "green economy" by promoting a model of energy production by small-or medium-sized cogeneration plants powered by renewable sources. Moreover, the efforts for agro-energy, in reference to the overall development of renewable energy is one of the main challenges of the new agricultural and environmental policy that will contribute significantly to CO2 reduction and the achievement of the 2020 objectives of Kyoto and the European ones.

<sup>4</sup> The no-till land, the minimum tillage, establishment of grasslands and permanent crops, the cultivation of a deep root, the use of manure and compost, crop residue management including their use for energy production, improving techniques of fertilization and irrigation, the reintroduction of rotations, the spread of organic and all so-called land use changes that characterize the transformation of farmland into forests, meadows and pastures.

<sup>5</sup> The formulas of Enterprise 2.0, for example, allow to reduce significantly costs de-locating their data and using social platforms Software-as-a-Service.

### 3 Internet and sustainability of rural systems: the case of agritourism in Campania Region

The challenge of climate change exposes the rural systems and farms that operate in them to constant search of innovative approaches, in terms of managing internal and external relations. To support these requirements are involved:

- the new formulas of increasingly multifunctional and diversified agriculture;
- ICT as an undisputed lever of sustainability.

As regards the first aspect, a multifunctional farm innovates itself developing a series of activities besides the traditional ones. The agricultural entrepreneurs have to rethink their own activity not only so that it can be more and more competitive, but also because they are called to take upon new responsibilities in society, aiming more and more to innovation. In the last decades the most remarkable example of multifunctionality is represented by agritourism which is also seen as the most important innovation of product which has involved Italian agriculture. The remarkable spread of agritourisms in Italy has indicated on, one side, new possibilities of economic development in agriculture, and on the other, the role of the agricultural sector in the promotion of the territory and in the satisfaction of the claims of society in terms of environmental and social sustainability.

Agritourisms are determinant and "innovative" components of the development of the rural systems and so they assume a key role in the orientation of such territories to sustainability and therefore, they can also affect, in a significant way, the contribution that rural systems can give to the fight against climate change.

As regards the second aspect, instead, among the numerous applications of ICT, the Internet is now widely used at individual and institutional level and very important for the sharing of economic, social, environmental or territorial information (Anderson and Weert, 2002; Steinke and Nickolette, 2003; Schiefer, 2008). In the companies, Internet can be used with different modalities, not only for e-commerce but also in support of commercial activity in pre- and post-selling phases and as a channel of communication to and from markets as a means of promotion and marketing (Canavari et al., 2000; Wolcott et al., 2008; Wang, 2008).

Company policies have evolved, focusing on "information" and on company-client relations in an integrated vision that may produce value. In such optics, enterprises have developed web marketing strategies with high potential for agrifood products (especially for highly differentiated products), giving enterprises located far from the main commercial areas access to direct and short commercial channels and visibility with the ever-growing public of web surfers. As recognized by Canavari et al. (2005) Italian agrifood companies although recognizing that Internet increases their visibility in the world markets, have yet to exploit it as a relational tool to increase competitiveness, or better, they must invest more in websites that are more coherent with more general communication and promotional strategies<sup>6</sup>.

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<sup>6</sup> Among the latter, *advergaming* or the new opportunities of exploiting knowledge and information offered by the Web 2.0, blogs, forums, online videos, are innovative web marketing tools.

Based on the spread of Internet, the use of web marketing has increased with the evolution of relational marketing (innovative web marketing tools, for example are linked to the Web 2.0) that allows enterprises to understand consumers and to adapt their strategies to the consumers' needs. In this way, the possible applications offered by Internet represent important tools for the implementation of strategies that aim to satisfy collective and more global interest (e.g. consumer health) because it allows enterprises to keep a fine tuning with society's needs. As regards rural areas, however, it is indisputable that the provision of infrastructural networks and telecommunication services, accompanied by access to Internet at high speed (broadband) by now constitutes an essential condition for the development of such areas, as they are able to reduce isolation, stimulate and transfer innovation to improve the quality of life (Commissione Europea, 2010).

So, one of the most pressing challenges facing humankind and in particular the rural systems is climate change. Taking this into account, we have investigated the diffusion of Internet in agritourisms as an innovative form of the farm business which, in multifunctionality, find its orientation to the sustainability of development.

In particular, this study wants to investigate on the propensity of these firms to implement web marketing strategies that testify their responsibility towards the challenge of climate change (Borrelli et al., 2011). In such optics it focuses on the type of information they provide by the websites to give a contribution in the fight to climate change, promoting responsible behaviour among the users of websites (suggesting virtuous behaviours) or valorizing their commitment in the fight against climate change. Especially, the survey has aimed to evaluate the diffusion of Internet among the agritourisms of the Campania Region by their presence on the world wide web, the characteristics of the websites and, overall, their capability to share information on climate change (Havlicek et al., 2009, 2010; Niederhauser et al., 2008).

### **3.1 Brief presentation of Campania agritourism**

According to the data of the National institute of Statistic (Istat), in 2009, in Italy there are 19.019 farms authorized to exercise agritourism (539 more (+2,9%) in comparison to the previous year). The major increases regard catering and accommodation, increasing respectively of 407 and 347 units.

The 44,9% of agritourisms are located in the North of the Country, 35,2% in the Centre and the remaining 19,9% in the South. In particular, the highest percentage of farms with catering (respectively 44,2% and 31,4% of the total) are in the northern regions and in the South, while in central Italy 59,1% of the agritourisms also have tasting.

In the Campania Region, the agritourist activity has significant dimensions.

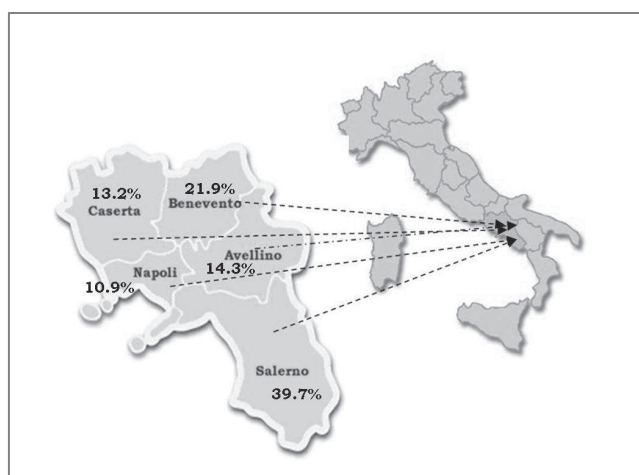
Considering that a firm can be authorized to exercise one or more typologies of the agritourism activities (e.g. lodging, catering or tasting). Istat data (2009) observes that in Campania there is 7% (in comparison to the National total) of the firms authorized to exercise catering. Those firms however represent around 22% of the firms of the Southern of Italy. Whilst as regards the firms authorized to exercise tasting, Campania represents about 8% of the National total, but 50% in comparison

to Southern Italy. In regards to lodgings the percentage of representative decreases significantly, to about 4% in comparison to the National total and to 19,6% in comparison to the South.

On the basis of the typology of the majority of lodgings some regional specializations can be distinguished and, as regards full board, it is more available in Campania (480 lodgings, i.e. to 78,9%).

The combination of restoration with lodging and other activities, although present in all regions, is mostly diffused in Campania (besides Tuscany, Emilia-Romagna and Sardinia).

However, the Campania Region is a territory in which a strong rural vocation persists, especially in the inside zones, where the wealth of biodiversity, local wisdom and popular traditions, have preserved its wine-gastronomic patrimony which only in the last few years is receiving adequate valorization through the development and the diffusion of the agritouristic activity.



**Fig. 1.** Farms authorized to exercise the activity of agritourism in Campania Region.

In July 2009, there were 1.345 farms registered in the regional register authorized to exercise the activity of agritourism. In the five provinces of the Region the number of authorized farms is distributed as follows: 14.3% in the Province of Avellino, 21.9% in the Province of Benevento, 13.2% in the province of Caserta, 10.9% in the Province of Naples; 39.7% in the Province of Salerno.

### **3.2 Methods, targets and main results**

Internet provides two different ways of online presence of agritourisms: an active presence and a passive presence. The first concerns the presence of web sites of the



owner of the firm. The second, provides the availability of informative elements (e.g. mail address, phone contacts, photo, video) or comments on the firm that circulate on the web through forum, blog or other portals.

Starting from these considerations, the study has aimed first of all to investigate the attention that agritourisms of the Campania Region give to the use of Internet, defining the kinds of participation in the network in an active or passive way.

In particular, research aims to give some indications about the tendency of Campania Region agritourism to employ the web as a supplementary instrument for marketing policies, trying to understand the consistency of planned offline marketing strategies with web marketing tools in order to inform users or to suggest virtuous behaviour regarding the commitment of the firm in the fight against climate change.

Specifically the empiric analysis proposal was to achieve the following goals:

- Verify the presence of Campania Region agritourism on the world wide web;
- Illustrate the use of Internet in agritourism marketing strategies, analyzing the typology of diffused information.
- To analyze the web marketing strategies and their possible correspondence with the management model of the firm.

Firstly, to achieve these goals, the analysis has identified, surfed, directly observed and evaluated the web sites of Campania Region agritourism.

From the research, in particular, it has emerged that only 20% (271) of the 1.345 farms on the regional register and authorized to exercise agritourism is online. As regards the kind of involvement online, unfortunately, the percentage of active presence is rather modest: in fact only the 61% (or, only 166 firms) is online with a well structured web site, while the remaining firms use the net with the purely promotional purpose of the activity providing principal information such as location, e-mail contacts and phone numbers and the typology of services offered (lodging, restoration, spoken languages, number of seats) or extras such as swimming pool, park for children or solarium. Primarily, such firms are on other portals that sometimes simply allow users to get directly in touch with the agritourism, whilst others contain a whole lot of information for each agritourism such as:

- clients' comments about their stay;
- location and proximity sites of interest;
- prices;
- equipment and facilities offered.

We are speaking substantially of information of a structural and economic type useful to the client that substantially expresses the potentialities of the Net in transmitting the vitality of the firms and which cannot be considered satisfactory not even from the touristic point of view. Starting from this data a casual sample composed of 25 agritourisms reflecting the regional distribution and representing about 40% of the total number of regional agritourisms with an active online presence has been extracted.

The devices of the virtual retailing mix has been used to observe and analyze the elements used in the web marketing strategies. The analysis has substantiated that most of the agritourism websites have an informative and promotional character.

The information commonly found in the websites is essentially related to the description of the offered services, the prices, the equipment of the structure. Rarely

(only in 10% of the cases) the web sites draw the attention of the consumer to the management philosophy of the firm or to the values and the traditions of the territory of reference. On the other hand, video and virtual visits (60% of the cases) to the agritourism to see the eventual bedrooms and the structural equipment of the firm are used. Only in one case the site offers the possibility to purchase products of the firm through a service of e-commerce, while in all the other cases for information or for bookings (which is obligatory in 87% of the cases), the site promotes e-mail contact or telephone contacts.

Moreover, the websites don't offer advanced and interactive services to the guests, like discussion forums, blogs, virtual visits, and so on.

Finally, it is significant to underline that in about 90% of the cases the websites visited have an English version and only in 10 cases is the website available in another language, mainly German.

In other words, the sites resemble business cards in which the active role of the agritourism doesn't appear and that substantially it denotes a state of backwardness in marketing strategies which, in fact, seem to offer only a tourist answer, giving little importance to the agricultural component.

With the aim to analyze the strategies of web marketing and their possible correspondence with the model of management of the firm, a focus group with 6 managers of the investigated firms has been conducted.

In particular, two farms were chosen for the province of Salerno, while for the other four provinces one farm. The choice of the six entrepreneurs was made on the basis of:

- the presence of the farm on the world wide web with a well-structured site;
- the territorial relevance of the company<sup>7</sup>;
- and finally, above all the willingness of the entrepreneur to participate in the focus.

First of all, the managers were asked, in particular, to express their interest regarding the fight to combat climate change. Further topic of discussion regarded their trust in Internet and the role that they assigned to it. In fact, the focus group showed the elevated attention and worry of the managers of the agritourism in regard to climate change even if, in effect, none of the firms tries any specific actions to mitigate the effects of such changes. In other words, it appears evident that the firms consider themselves more the victims than the cause of the changes of climate because they still haven't acquired awareness of their role. The lack of information on the sites (concerning the theme of climate change) is therefore justified by the fact that none of the firms undertake concrete actions in the fight to combat climate change denouncing thus a substantial backwardness of the rural systems of reference. However as regards Internet, the managers of the 6 firms recognize the importance of such tool to communicate commercial information to tourists (not only foreigners but also local) while they don't give any value to the use of such tool to communicate

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<sup>7</sup> Have participated in the focus the following agritourisms: Di Meo (Avellino: <http://www.dimeo.it/>); Torre Gaia (Benevento: <http://www.torregaia.net/home.php>); Masseria Giò Sole (Caserta: <http://www.masseriagiosole.com/masseriagiosole/>); La Villanella (Napoli: <http://www.lavillanella.it/>); Petrosa and Scaraiazzo for the province of Salerno ([www.lapetrosa.it/](http://www.lapetrosa.it/); <http://www.loscaraiazzo.it/>).

information that we could define as extra-commercial, as for example those connected to the themes of health, environment, territory and so on.

## 5 Conclusion

This study wants to offer some points of reflection for the future of agritourisms in Campania Region. In fact, we are faced with a clear case of scarce exploitation of the potentialities offered by Internet to share information, but also with an evident case of educational indifference, by part of the firms, in regard to the theme of environmental order of notable interest for the rural society.

The main findings of this survey on one hand encourage a deeper research on the typologies of firms investigated to verify their propensity to innovation but overall on their real interest to participate to the fight to one of the most pressing challenges facing humankind and in particular the rural systems like climate change. Moreover, these findings push to understand if really the agritourisms have consciousness of their responsibility towards the environment and the society.

On the other hand, this study aims to offer important suggestions to the policy makers of the Campania region regarding the necessary actions to re-direct the agritourist sector towards more responsible web-marketing strategies. These latter, in particular, have to find foundation in a more aware use of Internet that is, the employment of Internet has to consist of an exploitation both of its informative potentialities and its educational ones. In this optics, fundamental will be the territorial governance to make the tools of ICT the lever for sustainability of its territorial system with rural vocation, promoting a responsible use of them by the enterprises and in this case by the agritourisms.

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