



LIFE Project Number
<LIFE15 ENV/IT/000641>

**Deliverable “Report on socio-economic conditions affecting soil
management”**

Sub-action B4.1 “Socio-economic conditions affecting soil management”

LIFE PROJECT Soil4Wine



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1. Introduction

Soil4Wine project “*Innovative approach to soil management in viticultural landscape*” aims to achieve a better soil management in the whole vineyards ecosystem by developing an innovative decision tool and related management solutions, to be tested in several farms located within the Project area and across Europe. In particular, 4 protected areas within Emilia Romagna have been identified and involved in the project activities: Parco dei Boschi di Carrega, Parco del Taro, Parco dello Stirone e Parco della Val Trebbia.

This report presents the main results of the activities performed under sub-action B4.1 related to action B4 “Economic, social and policy evaluation” of the Soil4Wine project. ERVET is the main responsible for this action, while UCSC is the other project partner involved.

The main aim of sub-action B4.1 is to conduct a study regarding the socio-economic conditions affecting soil management, as well as conservation of soil and other natural resources realized in the study area. The purpose is to identify the social and economic constraints that may affect the farmers’ decisions to introduce new solutions, as the one proposed by the project.

2. Characteristics of the innovative tool and its usage

The innovative tool proposed by the project is a Decision Support System (DSS) able to guide growers in: defining their specific soil and related environmental problems, selecting the best solutions for addressing them, self-evaluating the results of the implementation of the solutions, and finally, maintaining the result obtained. The tool is based on Information and Communication Technology (ICT), which is intuitive and user-friendly.

The introduction of this innovative tool in vineyards requires an initial investment for the purchase of necessary equipment, which includes a DSS software license (annual fee) and the weather station. For instance, for a small-medium farm, this initial investment may vary from 2.700 to 3.200 euro.

The DSS requires the entry of several data regarding vineyards, e.g. soil characteristics, soil management and environmental parameters. In order to gather the most accurate data about climatic condition, the DSS requires installation of a weather station in the farm. The information collected via the DSS and the weather station allows the software to indicate a list of potential threats connected to soil management. For instance, the DSS software can detect an erosion in hillside vineyards with a steep slope.

The users of the DSS, i.e. the farmers, will have at their disposal a set of indicators useful to verify the presence or absence of the possible problems related to soil and other natural resources. Based on the problems detected by the farmers, the system will indicate specific and practical solutions to the identified issue. Then, it will monitor the effectiveness of the intervention(s) implemented.

The main solutions which can be proposed by the tool to solve the identified problems, relate to the following techniques: alternate row-grassing, temporary grassing (natural or artificial), permanent grassing (natural or artificial), underground drainage, superficial water control.

The techniques proposed by the program have also a cost, some of them are less expensive and do not require specific know how and investments (e.g. natural permanent grassing); on the contrary some other techniques require buying or renting machinery and increased internal or external labor force.

3. The aim and the structure of the survey

The aim of this deliverable is to investigate the main conditions affecting soil management to define the social and economic constraints that may affect the introduction of the new solutions as the one proposed by the project.

The survey conducted by UCSC had the objective to investigate the critical socio-economic factors, which may influence farmers' decision in the adoption and usage of new technologies, including the **DSS tool and the connected techniques**. The factors, which may have a significant effect, can be regrouped into the followings categories:

- a) Demographic characteristics of the farmers;
- b) Agronomic and environmental knowledge and expertise;
- c) Recognition of benefits linked to conservation of natural resources;
- d) Economic return in investing resources for the purchase and/or rent of the necessary equipment.

With this aim and objective, UCSC has conducted this study by using the following main tools:

- Socio-economic data available on the main data warehouse;
- A survey among the farmers involved in the project.

The statistical data used in this study originates from the last available Census of Agriculture conducted by ISTAT in 2010. More recent data were not available as the next census is due to be published by ISTAT in 2020¹.

The survey has been carried out among the members of two out of the three stakeholders' groups involved in the project, namely the "demo farmers" and the "living labs".

At this stage of the project the selection of the members of the demo farmers group have been completed, while the living labs one only partially. These two groups are the ones involved in the development and testing of the innovative tool presented by the project (the former are the internal testers, while the latter are the external ones). The third group, i.e. the "exploitation group" – composed by stakeholders representing the local wine value chain, is not involved in the testing phase of the project. Their contribution is linked to ensuring the future utilization of the project results through public, private and/or public/private initiatives. For this reason, this group is mainly linked to the last phases of the project, and not to the testing ones.

The participation of these two groups, demo farmers and living labs, in the survey differs, as the demo farmers have been more responsive, while the living labs have been less receptive. The different level of responsiveness relates mainly to their participation to the project activities. The demo farmers are directly involved in all the developing and testing activities related to the innovative tool proposed by the project, while the living labs only play a minor role in the project activities with an external testing role.

The survey carried out among farmers includes four main sections:

1. First section consists of several questions useful to categorize the farm from a general and economic point of view (e.g.: arable land, cultivated crops, number of employees, etc.);

¹ Since the available data refer to last Census, which took place 8 years ago, the situation may have varied overtime.

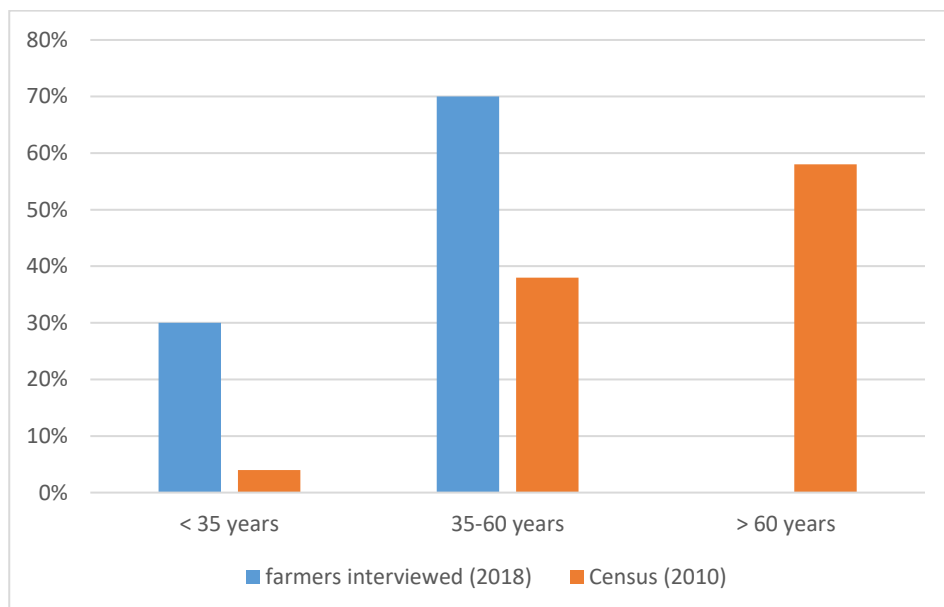
2. Second section asks information about the owner of the farm useful to investigate his/her inclination to adopt innovative tools (e. g.: age, education level, etc.);
3. Third section investigates the future prospective of the farm, is useful to acquire information as regards the generational turnover;
4. Last section enquires the farmer belief as regards conservation of natural resources.

4. Socio-economic condition affecting soil management

4.1 Demographic characteristics of the farmers

The **age** of the entrepreneur is one of the socio-economic factors that may influence soil management. In our survey all the respondents are younger than 60 years and 30% of them are millennials², thus younger than 35. Moreover, 80% of our sample has a high level of **education** (50% with high school diploma and 30% with university degree). This data may suggest an easiness in using ITC tools and more in general, a positive attitude towards innovations. However, our sample is not representative of the population of the provinces of Parma and Piacenza, where almost 100% of farmers are older than 35 years, and more than 60% of them are older than 60 years. In addition, the majority of farmers (59%) in those two provinces has a low level of education (elementary school or middle school). These results can indicate a greater difficulty in using ITC tools by the population compared to the survey sample.

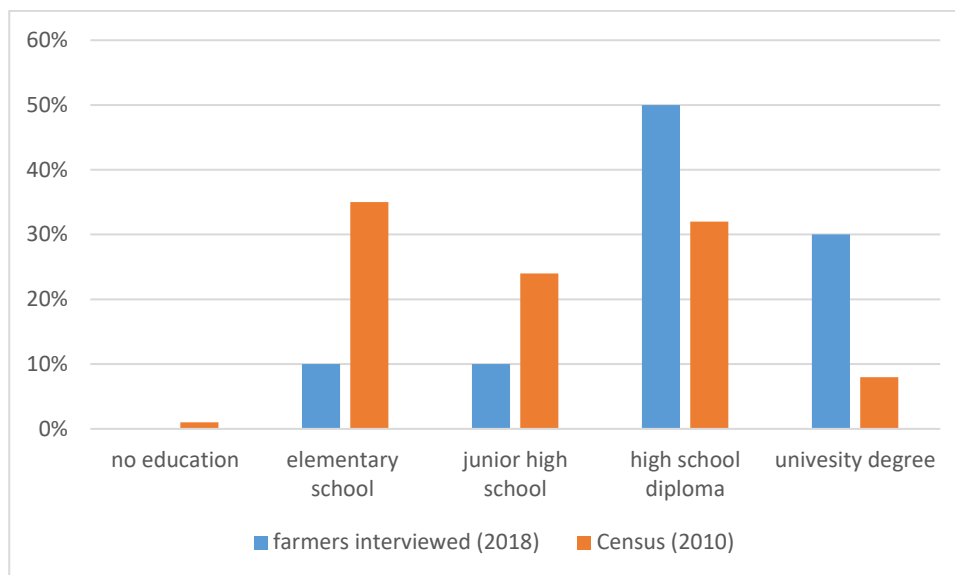
Graph 1 - Distribution by age of the farmers interviewed and the Census' farmers.



Source: UCSC elaboration of the survey and Census data

² Millennials: This term is usually considered to apply to individuals who reached adulthood around the turn of the 21st century. This generation is generally marked by an increased use and familiarity with communications, media, and digital technologies.

Graph 2 – Distribution of the farmers interviewed and Census' farmers based on level of education



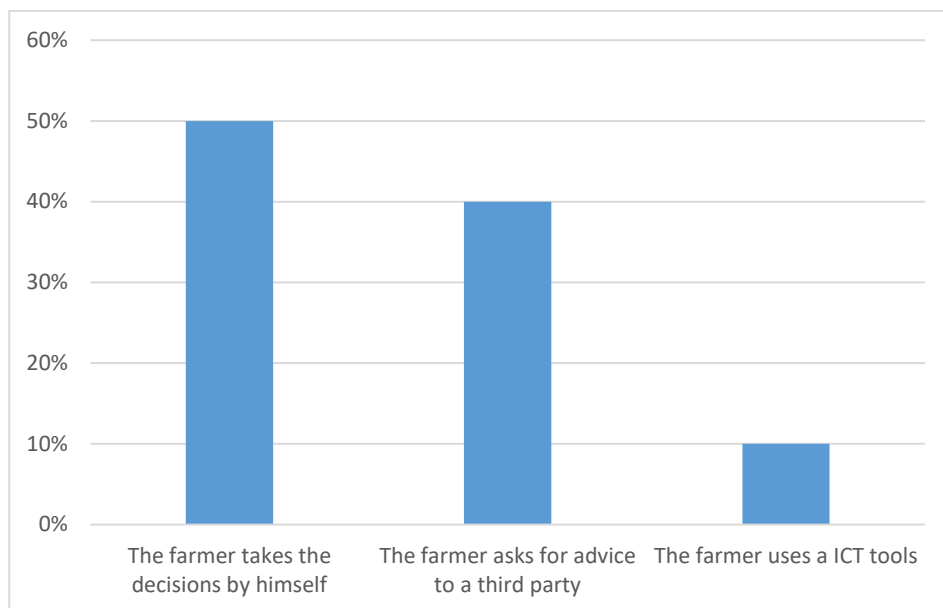
Source: UCSC elaboration of the survey and Census data

From the survey emerged that 80% of the interviewed entrepreneurs attended several **meetings about viticulture** in the last five years. The topics of these events ranged from the appropriate use of agrochemicals, to the cultivation of new varieties, up to the collection and the analysis of the weather data. Therefore, with reference to the sample of farms involved in the project, a large majority of them not only has a high level of education, but is also willing to invest their time and money in enhancing their knowledge in viticulture. This could also include the adoption of IT techniques such as the DSS software.

4.2 Agronomic and environmental knowledge and expertise

In our survey, 50% of the farmers takes **decisions about the technical management** of the farm by themselves, without any advice, 10% asks for advice to the agrochemical seller, 30% is supported by an agronomist and another 10% uses the DSS. In addition, as reported in the previous paragraph the majority of them participates to events to enhance their expertise about technical management of the vineyards. Furthermore, it is worth to highlight that 90% of the intertwined entrepreneurs are **professional farmers**. These additional results may suggest an even greater open-mindedness of the interviewed farmers toward innovation and willingness to apply the most innovative and effective methods to manage the vineyards.

Graph 3 - Decision making about agronomic aspects



Source: UCSC elaboration of the survey

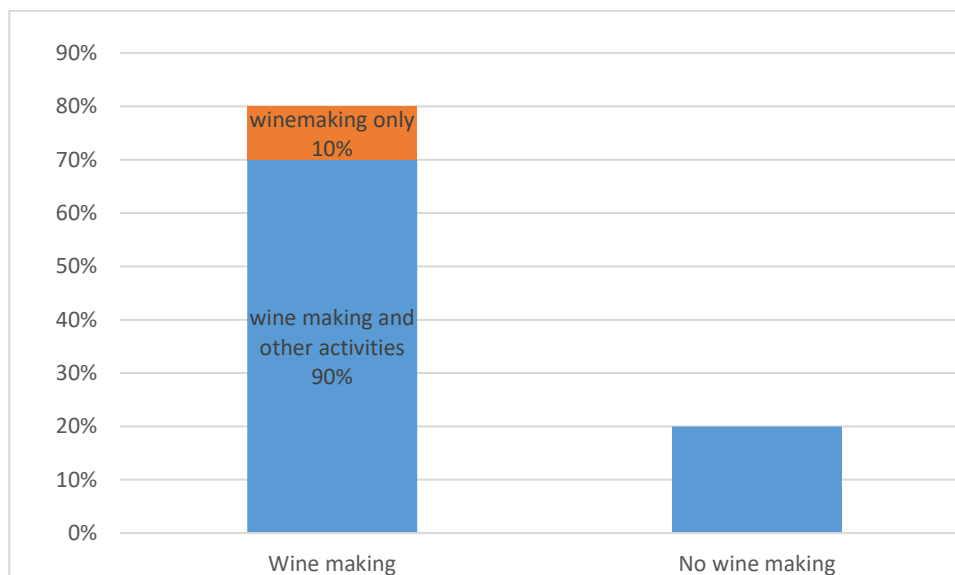
4.3 Recognition of benefits linked to conservation of natural resources

All the interviewed farmers are already implementing specific **voluntary methods to increase the respect of the environment** above the minimum legal requirement: 80% of them are using voluntary integrated pest management measures, 10% are involved in organic farming, and the remaining 10% a combination of the two. This farmers' attention to the preservation of natural resources is certainly enhanced by the location of their farm in a protected area. What is even more interesting is the fact that all the sampled farmers consider their **location as an advantage**, mainly because they believe that consumers are increasingly receptive to friendly-environmental production processes.

In recognition of this market advantage, 90% of the interviewed farmers who produce their own wine have already started **collateral activities** with the aim of making profit from this strength: e.g. direct sales of the product in the farm, farm visits, tastings, or B&B.

Moving to the general situation in the region, according to Census data, the majority of the farms (56%) with tree crops in Emilia Romagna have already implemented at least one technique to improve environmental aspects related to agricultural production above the minimum requirements by law. This suggest that those techniques are already well known in the region and know-how, specialized work force and appropriate machinery are available. In the provinces of Piacenza and Parma, however the data of the Census indicates a much smaller number of farms adopting one of those techniques (16%). This suggests that there is still a margin of improvement in those two provinces, or, on the other hand, that this issue is not perceived yet as a major one by a large majority of farmers located in these two provinces.

Graph 4 - Activities held in the farms object of the study



Source: UCSC elaboration of the survey

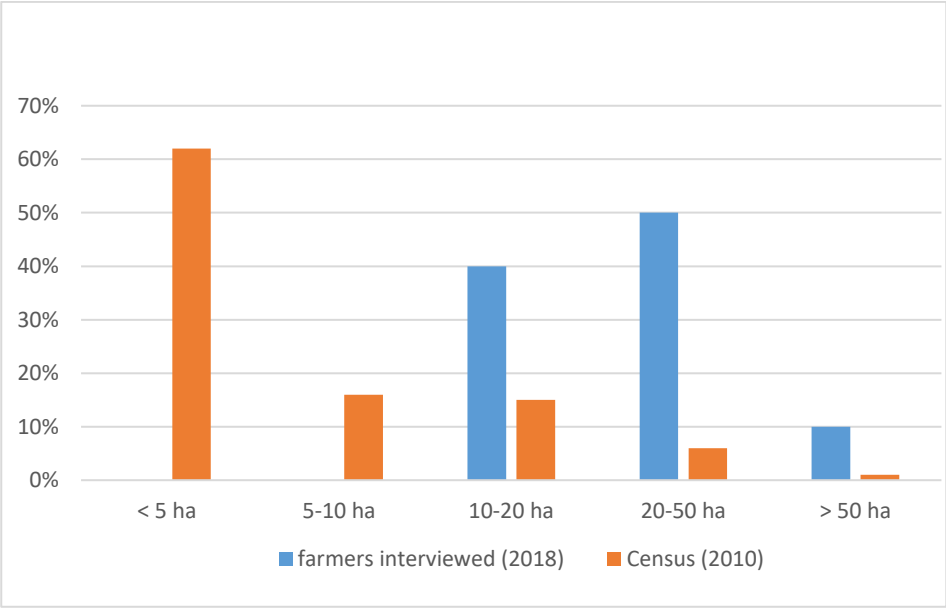
4.4 Economic return in investing resources for the purchase and/or rent of the necessary equipment

The **size of the farm** and **specialization** may play a relevant role in explaining the willingness to introduce innovation and the technical and economic feasibility. With reference to the surveyed farmers, 50% of them has a utilized agricultural area between 20 and 50 hectares and another 40% between 10 and 20 hectares. The interviewed farmers are specialized in viticulture: on average 73% of the utilized agricultural area is dedicated to vineyards (from a minimum of 23% to a maximum of 100%, with half of the respondents falling into the latter category). In particular, 50% of them cultivates only vines, 30% mainly vines with a small area dedicated to less remunerative crops and 20% vines and other crops like tomatoes. The most specialized farms (80%) are managed by young entrepreneurs; this may suggest that the structure of farms is going towards specialization. New entrepreneurs are aware that specialization may lead to a better management of the farm.

The significant extension of the farm and strong specialization are both incentives for the adoption of new equipment and techniques to conduct their farm activities in a more efficient way and to increase their income.

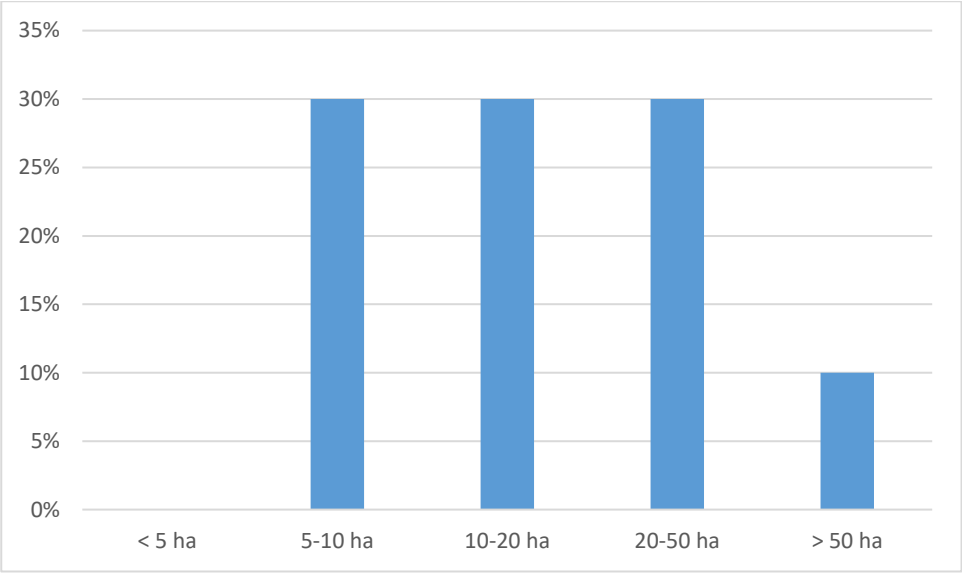
From this point of view, however, the sample is not representative: the data of the last ISTAT Census on Agriculture shows that more than 60% of the farms specialized in viticulture have a utilized agricultural area smaller than 5 hectares. Therefore, in the area farmers might have fewer resources to invest in the purchase of new and more advanced equipment. However, they could be willing to buy or rent the equipment needed, if the benefits provided by the new technique exceed costs of its implementation. This structural information, therefore, suggest that the farmers potentially interested in the adoption of new technology will need to be carefully identified and addressed with appropriate information and support tools.

Graph 5- Distribution of the farms object of study and Census' farms based on utilized agricultural area



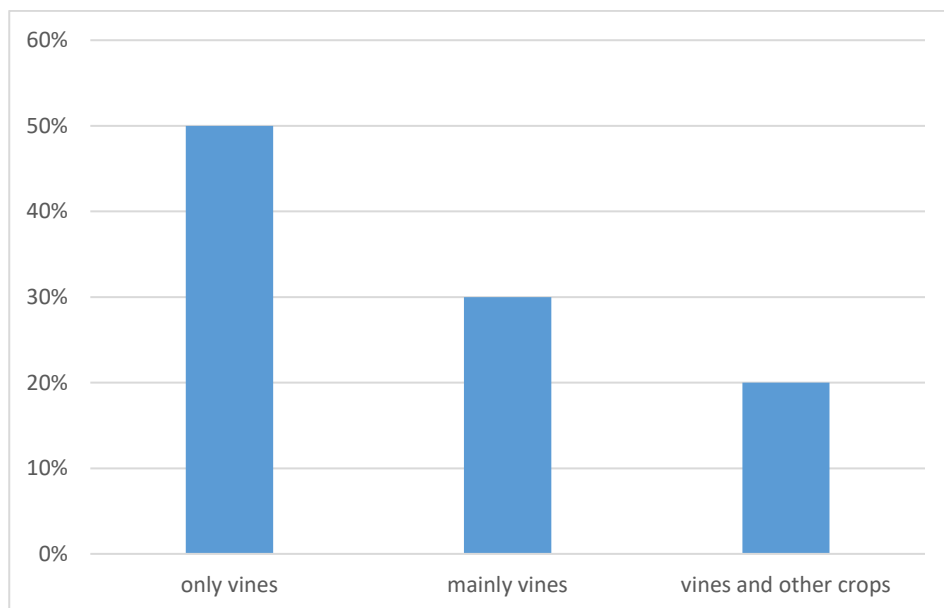
Source: UCSC elaboration of the survey and Census data

Graph 6 - Distribution of the farms object of study based on utilized agricultural area dedicated to vines



Source: UCSC elaboration of the survey

Graph 7 - Crops cultivated in the farms object of the study

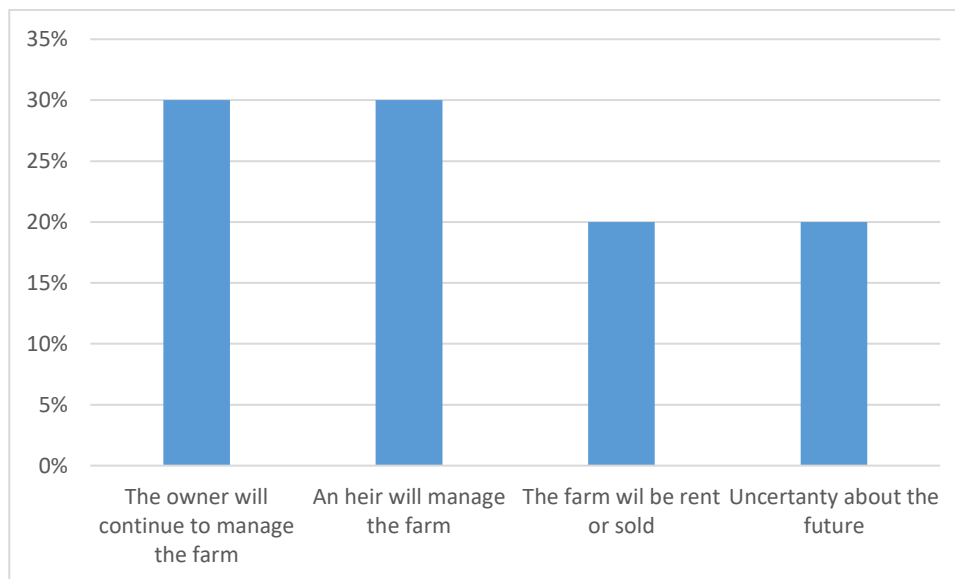


Source: UCSC elaboration of the survey

Returning to data related to the interviewed entrepreneurs, 90% of them are **professional farmers**, meaning that farming is most probably their primary economic activity. In addition, 50% of them involves several family members in the **farming activity** and almost all entrepreneurs use external work force. This could be another indicator of their willingness to invest in new techniques and manage their farms in a more efficient way.

In our sample, 30% of the farms are managed by young entrepreneurs, who will continue their activity in the future. Of the remaining 70%, 50% have already decided about the **future of their farms** (30% has already an heir and 20% will rent or sell the farm), while 20% is still uncertain about the future. Thus, 60% of farmers has a positive attitude about the future of their farm and there will be continuity in the management. This also suggest a propensity toward investment of new techniques to improve the technical management of the vineyards.

Graph 8 - Future perspectives



Source: UCSC elaboration of the survey

5. Main results and considerations

All the socio-economic variables considered in the survey seem to play a relevant role in the determination of the easiness and willingness to adopt the new techniques object of this project. **Based on the results of the survey, the most decisive ones appear to be related to the characteristics of the farm owner (grouped in section 4.1 of the report), and the size and specialization of the farm (grouped in section 4.4 of the report).**

The demographic characteristics, especially age and education, provide an important indication about the positive attitude of farmers toward ITC tools and innovations in general. The degree of specialization, instead, provides a good proxy of farmers' willingness to invest their funds in new ITC tools and farming techniques. Farm specialization, in fact, is strictly linked to the farmer income and related economic return. Any entrepreneur, farmer included, will invest in new tools only if the economic benefits will overcome the costs. The other variables are also important, but to a less extent. In fact, the factors linked to the agronomic and environmental expertise (section 4.2 of the report) and recognition of conservation of natural resources (section 4.3 of the report), are determined – entirely or partially – by the socio-economic variables related to the owner and the specialization of the farm.

From the data obtained through the questionnaires, we have been able to describe a quite unique situation among respondents with respect to the farm owner characteristics and the farm structure. On average, the respondents are younger than the farmers located in the two provinces considered in the study, and the degree of specialization of their farms is higher than in the rest of the study population. Moreover, 90% of them are professional farmers. **All these conditions tend to support a positive attitude towards innovation.**

Among other factors that may affect the willingness to introduce innovation, it is important to notice the role of economic incentives. A large majority of the farmers interviewed (70%) have introduced other economic activities in their farms (agro-tourism, B&B, direct sales of wine, etc.). The starting of collateral

activities in the vineyards allow the owner to show to consumers (i.e. the farm clients) the importance and efforts made to respect the environment, and therefore use the introduction of innovative farming techniques as a market advantage compared to less eco-friendly competitors. Wine produced in a sustainable way is, in fact, a very important tool to support the environment as well as the competitiveness of the company.

It is also fair to highlight that the respondents are aware of the importance of being in a highly qualified area. All the interviewed farmers regard their location as a positive aspect from a marketing and communication point of view. In their opinion, the constraints to which they are subject, from being located within a protected area, are beneficial for their activities: the cost to implement those requirements are greatly overcome by the related benefits.

As regards future economic perspectives, the respondents are conscious of the increasingly competitive business environment in which they are operating. Most of them share a quite pessimistic or neutral view about the market; only a very few of them have a relative positive attitude in this respect. This general pessimistic view could, on the other hand, make them more receptive to any economic incentive connected with soil management and environmental issues which could strengthen their economic results and market position.

Moving to the farmers located in the provinces of Parma and Piacenza, the general situation is quite different from the one presented above. In fact, the 2010 Census data suggests that the farmers in these two provinces are older and have a lower education level compared to the interviewed ones. In addition, their vineyards are smaller in size (i.e. hectares of arable lands) and less specialized. As explained previously, these socio-economic variables provide an important indication about vine growers' attitude toward innovations. **Based on these results, farmers in these two provinces might have a limited ability to use ITC tools and limited economic resources and incentives to invest in the adoption of new farming techniques for their vineyards.**

It is worth to emphasise that current situation in these two provinces might be more positive than the one reported in this report as the Census data used refers to a statistical survey conducted 8 years ago. In particular, some among the oldest farmers may have already left the sector, while the role of younger and more educated farmers may have increased. However, while the situation might have altered slightly, it cannot be changed radically as generational changes in the general management of a company - farm included - takes a long-time lapse, especially in a country like Italy.

The adoption of innovative techniques in vineyards might take some time in the two provinces and in general in the Emilia-Romagna region. As explained in the diffusion of innovation theory of E. Rogers, the innovation will first need to be adopted by innovators and early adopters before reaching the mainstream users, and this might take a lapse of time. Therefore, the success of an innovation is strictly linked to the ability of the innovation developer to clearly define the target of potential innovators and early adopters.

The vine growers to whom the innovation will be presented for possible adoption needs to be selected carefully. Based on this research, they would need to be selected based primarily on their demographic characteristics (for instance age and education) and their farm specialization and size.