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ENVIRONMENT AND SUSTAINABLE AGRICULTURE IN ITALIAN REGIONS

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ABSTRACT

The final research work prepared for presenting the final defence of the PhD thesis analyses and brings back to unitarity, as far as possible, some of the research activities carried out by me during these three years, whose common thread is the environmental impact of human activities and the promotion of sustainable development in agriculture.

The research analyses and investigates the connections between factors considered as influential for the development of sustainable agriculture and sustainable economic development, by making leverage at the agriculture sector, and the preservation of the environment.

Decision making processes focused on the allocation, accessibility and exploitation of primary resources, combined in an economic model of interdependence and interaction, in a win- win strategy between actors of the agriculture sector, have been investigated by making use of both primary and secondary data.

This has been developed by using both *deductive and inductive approach*, respectively in the investigation of the legal framework that governs the EU policy and development strategies, impact they have in member countries and their sectoral structure, as well as in how the specific characteristic of the environment, sector structure and actors operating in member countries and their regions influence and must be taken in account when shaping the EU policy on strategies and their budgeting for a sustainable agriculture.

Development paradigms have been investigated, considered as independent variables of different behavioural and attitudinal choices of farmers and policymakers in resources and budgets allocation, embodied in economic models, to investigate the effects they might have in sustainable agriculture and sustainable development. This by developing a descriptive research and a causal comparative approach.

The trade-off between short run and long run perspective of investments in agriculture, human resources development in the sector and environment have been considered by developing a quantitative approach on this purpose.

My line of research has been marked, from the point of view of economic and environment policy, on the historical analysis of the development of the agricultural sector from the beginning of Common Agriculture Policies (CAP) to the present day and the changes that have occurred in contemporary socio-economic context and national territory, referring to issues related to farmers involvement and environmental impact.

Relevant impact has environmental sociology with the interaction between the society and nature considering the stakeholders as the most important actor on their natural environment with the inclusion of physical context related to social factors. From the sociological point of view the stakeholders with their direct activities on the natural resources and their intervention on policies and governance have imposed important reflections and agreements.

Part of my research has been, in fact, focused on the analysis of the level of education between stakeholders, population of organic farming in Italian regions, social farming about the agri-food sector and the management of water for irrigation.

Emphasis is placed both on the policies implemented at EU level with focus on Water Framework Directive (WFD) and national level on the change of consumption, about the purchase of organic products.

In fact, the need to change the production paradigm by promoting sustainability is also seen from the point of view of climate change mitigation and its socio-economic impacts, particularly from the point of view of environmental disasters.

This point is also analysed in terms of EU Member States and Italian level, with reference to the possible changes and global adoptions for more sustainable agriculture.

It is therefore possible to hypothesize a dynamic-functional model of the prospects for improving global sustainability, in the sense that the endogenous factors that cannot

be changed in the short term, i.e. the farms structure and the productive system, and the exogenous factors, i.e. the characteristics of the physical and socio-economic environment in which the farms are inserted, in relation to the current situation, into opportunities for improvement for farms that are in a position to increase their size, defined as -developing, and into threats for those that, conversely, show signs of a possible exit from the sector, called -declining.

The analysis carried out, therefore, indicates the possibility, above all for policy makers, to be able to act on the factors that have proved to be statistically significant, in order to outline a framework of improvement of the overall sustainability of agriculture in Italian regions, allowing the movement of farms from the condition of - balance to that of - development, which may eventually extend to those that are in the condition of - decline.

Finally, the analysis model can be defined as static, in that a change in the current situation is not considered likely, given the absence of incentives from within the farms and their inability to seize the opportunities presented by the external environment.

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ABBREVIATIONS

AEE	Agricultural Ecosystem and Environment
AHP	Analytical Hierarchy Process
CAP	Common Agriculture Policy
CEI	Comitato Elettronico Italiano
CIS	Common Implementation Strategy
DOP	Dominazione di Origine Protetta
EAA	Economic Accounts for Agriculture
EC	European Commission
EFA	Ecological Focus Area
ENEA	Ente Nuove Tecnologie, Energia, Ambiente
EUROSTAT	Istituto Europeo di Statistica
FHD	Flood Hazard Directive
ICWE	International Conference on Water and the Environment
IFOAM	International Federation of Organic Agriculture Movements
IGP	Indicazione GeograficaProtetta
IPCC	Intergovernmental Panel on Climate Change
ISO	International Organization for Standardization
ISTAT	Istituto Nazionale di Statistica
MCDM	Multi-Criteria technique
MS	Member States
NGOs	Non Governamental Organization
PCA	Principal Components Analysis
SDG	Sustainable Development Goals
SINAL	Sistema Nazionale Accreditamento Laboratori
SINCERT	Sistema Nazionale Accreditamento Organismi di Certificazione
UAA	Utilized Agricultural Area
UNESCO	United Nations Educational, Scientific and Cultural Organization
WFD	Water Framework Directive

CHAPTER I

SOCIOLOGICAL APPROACH FOR A SUSTAINABLE DEVELOPMENT AGRICULTURE

1. Introduction

This chapter will begin by providing the concept of sustainability development in the agriculture sector. The focus in this research will generate interest not only in the agriculture sector but in the administration and governance of the environment queries at EU level. Consideration of farmers in learning more about sustainable agriculture will be amplified through empirical research tools that can give more insights into these processes as currently occurring and required from the "new paradigm policies" in the European Union.

Although, the request to bring agriculture development to ensure the promotion and the possibilities of an economically, socially, and environmentally sustainable future is an urgent query worldwide. Those policies will focus on empowerment of farmers in agriculture research, extension services, training, and education to improve agriculture sustainability and productivity as the next step to be reached for the future of the next generations and the future of all policies and practices to be accomplished. The Common Agriculture Policy (CAP) will be discussed. The role of sociology is important as the main object of this discipline is the human being with all his natural environment, economic environment, and political environment.

The purposes for sustainable development, policies and governance will be discussed. The politics in terms of organization and implementation of the CAP in all the EU countries will be discussed as well and will be followed as a specific research of academic papers and articles to put in evidence for all the shades that it represents. The farmers' contribution and the environment issues are the main actors of the research and their concern for the more sustainable actions is the most argued topic for its governance.

Moreover, the development of the environmental sociology concept in the past was concentrating on showing how it represents an attempt at social changes that were difficult to comprehend from traditional sociological perspectives. The emergency of environmental sociology as a proper discipline to

afford the sustainable development in a new paradigm in this research will show the contribution of the sociological approach in the scientific research fields. The sociological approach will contribute to a better understanding of the contemporary and future social conditions than the previous sociological perspective. In this perspective it has been necessary to rethink the traditional Durkheimian norm of the discipline of sociological purity – those social facts can be explained only by linking them to other social facts. The gradual result of such rethinking has been the development of environmental sociology that will be the main subject of this chapter in this thesis research.

Finally, the purpose for the environment aspects in the agriculture sector with the farmers as the main actors has created and developed a very interesting approach in the EU and Italian Regions community. The economic aspect of the adoption and the social effects for sustainable agriculture for farmers are the main topics to be encouraged. The market innovation system represented as more sustainable not only at EU level but especially at regional level and local one in terms of long life for green agriculture is the scope of Italian farmers. Guaranteeing the secure world market and productivity in a sustainable way in local organization is the perspective of the future sustainable agriculture.

1.1. Understanding Sustainable Agriculture Sector under Common Agricultural Policy

The concept of sustainable development has become dominant, it is described by people from a very range of political and social viewpoints, who clearly use this term in different ways (Lele, 1991). Rather than concluding that this reflects its vacuity (Jacobs, Greenwald, & D, 1995) and of course others that have studied sustainable development as another essentially contested concept (Gallie, 1955). The concept is

conflictual in interpretations where contestation takes place, and despite the fixing of the meaning when the term was first given widespread political currency in the Brundtland Report (WCED, 1987) disagreement inevitably continues. The other important definition is the World Conservation Union, declaring that improving the quality of human life while living within the carrying capacity of supporting ecosystems (WCU, 1991). We cannot mention the most known definition where sustainable development is about ensuring a better quality of life for everyone that meets the needs of the present without compromising the ability of future generations to meet their own needs.

Sustainable Development Agriculture is one of the most disputable arguments in the agriculture sector all around the world. Food production and the agricultural practices influence the policy incentives to innovation versus a sustainable agriculture and the access to use the natural resources. The framework used in this study – elaborated by the data available and the methods of food production greatly influence the quality of the environment and the landscape in which we live and which we share with numerous other animal and plant species and ultimately our well-being and our health. Farmers, the main stakeholders, generally manage more than 50% of the European territory and it is therefore not surprising that agriculture is, for better or for worse, a factor of primary importance (often the most important) in determining the conservation status of biodiversity and the integrity of our ecosystems, not just agricultural one. Most of the environmental indicators available at both EU and national levels indicate that our agroecosystems are rapidly and inexorably deteriorating. The mid-term report of the "*European Union Biodiversity Strategy to 2020"* made public in 2016, highlighted a clear delay in the objective of halting the decline of biodiversity and ecosystem services by 2020. The impact of human activity such as the environmental effects of poisons from industry and agriculture are useful faces and present (Wigboldus & Jochemsen, 2020).

In particular, the focus is (to preserve, restore and enhance ecosystems related to agriculture and forestry) related to agriculture contribution of maintaining biological diversity, highlights the absence of progress, indeed the continuous decline of species and habitats linked to agricultural environments, protected by the Habitat and Birds Directives. This decline, in the Mid Term report, explicitly linked to the CAP

(Common Agricultural Policy), while acknowledging the largely unexpressed potential offered by its most virtuous part, the Rural Development policy. The capacity of ecosystems (including agroecosystems) to provide tangible and intangible ecosystem services, and to maintain the natural capital on which we all depend, is largely influenced by the prevailing agricultural practices which in turn are encouraged or penalized by sectoral policies attentive to environmental sustainability. Therefore, the European Union, and even Italy, is certain, and partly admitted by the Union Institutions themselves, that the Common Agricultural Policy (CAP), despite a long series of reforms that have taken place in the "last half century. It has massively supported some ineffective and dramatically dysfunctional practices in agriculture as regards the environmental and even economic sustainability of large segments of the agricultural sector (Peer, et al., 2014).

Sustainable development has emerged through political and environmental integration struggles, through a business, citizen, and governmental engagement with the complexity of contemporary ecological and other problems, and a vast array of perspectives, values and interests that have been applied in seeking to understand and deal with them (Blewitt, 2015). From another point of view sustainable development has been seen as an opportunity with consideration in changing ideas and practices within environmentalism and revolutionary thinking. The complexity of Sustainable development governance is not only driven by its different functions, but also by the multitude of its players, such as governmental agencies, national and international organizations. The first important distinction needs to be made between bilateral and multilateral organizations, mostly in terms of their institutional nature and the governance mechanism. The participation by all groups in society should reflect with interest and achieve sustainable development. The policies and the mechanisms through which sustainable development is being sought and considers the outcomes for particular groups and environments in both rural and urban contexts (Elliott, 2013).

Development sustainability should be adopted by all the single countries in the world adopting a common framework. The focus of this agenda on the global challenges of sustainable development is with an understanding of inter-linked crises in climate, poverty, economy, and social injustice. That should not be taken for granted because it is linked also to the historic nature of the sustainable development

task, but these issues are leading to deep questioning of what sustainable development is, what it should be, and how sustainable development policies and mechanisms are being reconsidered. Of course, the situation of Covid-19 pandemic has embarked in a particularly difficult time and context for all purposes for human welfare. More than this situation, the collaboration with the 193 states for climate adaptation, as well as technological developments in agriculture should guarantee more environmental economic optimism for the future.

More recently, interest has expanded in two directions: globally, in the context of meeting the 2030 Sustainable Development Goals (Jianguo Liu, 2018); (Simpson & Jewitt, 2019) and locally, with respect to its application in urban development and governance (Artioli, Acuto, & McArthur, 2017). However, few studies have examined sustainable development, linked to environmental challenges, social challenges, and economic challenges. Our search for the Italian regions for the sustainable farms was supported by different sources, like the websites of the social farms themselves, and press reviews about them (Maxey, 2006).

Recent studies are showing that governing agriculture in a more sustainable approach is shifting in increasing the focus in organic and alternative farming. Of course, this new paradigm of governance shifts a new institutional structure which, as suggested by some, might be facilitated by new tools and frameworks for measuring impacts in order to steer agriculture towards sustainability (Adinolfi, Capone, & Bilali, 2014).

Sustainable development will be able to develop policies, measures, regulations that are truly sustainable. This is what we aspect from the notion of sustainability, to have responses that make it through the test of time, and not just band-aids, but make a difference. Ensuring that the CAP is consistent with development objectives, which constitutes about 38% of the EU budget (360 billion euros), thus becoming as "*main driver*", is far from being green and has led to a gradual and unsustainable intensification of the agricultural sector, for example, by undermining the quality of soils and water and ultimately putting the future productivity of our companies at risk. In the meantime, just think that the so-called "*greening*", elevated to the symbol of the green does not apply to permanent tree crops (orchards, vineyards, olive groves),

regardless of their environmental value, and that about 1/5 of the Utilized Agriculture Area (UAA) in Italy is exempt from any rules relating to this ecological payment. The number of farms that must allocate a share of agricultural land to the Ecological Focus Area (EFA) is equal to only 82 thousand units (5.1% of the total) corresponding to 3.4 million hectares whose EFA must cover 170 thousand hectares. The obligation of crop diversification is a requirement that affects 3.8% of Italian companies (about 61,000 units) which correspond to about 1.9 million hectares of arable land (equal to 27.8% of the total arable land area). Since exemptions have therefore become the norm, intensive monocultures continue to prevail in the 2014-2020 causing biodiversity loss, soil degradation, massive use of pesticides and synthetic fertilizers and trivialization of the landscape.

While agriculture sustainability is a very important potential arena for differentiation and competition between farmers communities, ongoing use of tasks on actual farms to assess further progress can be limited. This is due to the high time and financial costs of performing sustainability assessments, limited data availability, and a lack of perceived relevance of these assessments among farmers (Brunori, Galli, Barjolle, & broekhuizen, 2016).

Moreover, is to consider that the methods for applying "greening" by each Member States leave ample margins of discretion, in particular identifying equivalent measures, which essentially favour the economic sustainability of companies with impact to environmental sustainability, or in any case maximum reduction of burdens for businesses with respect to effective and effectiveness for the protection of biodiversity and sustainable management of resources as (soil, water, climate). In practice, "*greening*" as defined by the implementing regulations in the EU and in Italian regions has become just an additional bureaucratic and management complication for farms without producing concrete positive effects for the protection of the environment. In terms of these complications the management and the promotion of sustainable development within the economic conditions can block the activities and the possibilities to adopt the implementation of the policies in a local area.

Furthermore, the CAP is no longer even able to protect the economic sustainability of farms: the agricultural sector has lost 20% of jobs in five years (2007-2013) and

shows the same dynamics that are found in society, namely those of a growing inequality in the distribution of resources (EC, 2017). The farmers that have received the most CAP aid is those of larger size and that produce undifferentiated (monocultural) goods but that, on the contrary, have a lower net income and on which the crisis has had the greatest impact. This is an issue that has collected the problems of financing and aid for the small farms. On the other hand, diversified, multifunctional companies, both small, medium, and large, that produce quality products and maintain agricultural areas of high natural value and sustainable, are those who receive less financing from the CAP, and in particular are better able to withstand the economic recession to the direct payments of the first pillar. Therefore, almost all farms in Italian Regions that often carry-on agriculture with a high natural value and sustainable, derive very limited benefits from the CAP, often insufficient to remain on the market, and that farms that have important CAP support have no future even on an economic level; billions of euros have therefore been spent in recent years for a socially and ecologically unsustainable agricultural model. Furthermore, the CAP also has given negative impacts not only in Italy but beyond the borders of the European Union. For example, the meat and milk sectors depend on the import of protein feeds whose production causes environmental and social damage, such as soy, mainly from South American countries, with significant impacts on the most biodiverse ecosystems globally. The Non-European producers whose goods are imported do not have to comply with the environmental regulations of the CAP, and to increase production to meet European demands they apply methodologies that cause further environmental problems outside the EU, as well as exercising an unfair competition against EU farmers. Despite massive efforts, the numerous attempts by civil society to make the CAP more sustainable have invariably failed. Even the last reform of 2013 missed the initially stated goal of making the CAP more sustainable and fairer, although it is often presented as "*green"*. Once again, the interests of a few prevailed over those of millions of European citizens. The CAP, among other things, absorbs almost all the chapters of the European budget dedicated to the conservation and management of natural resources. It is therefore clear that the ecological and biodiversity crisis cannot be stopped unless the agricultural model is radically changed. It is about our environment, our health, and the survival of large segments of the agricultural sector. Fortunately, important signs of attention and sensitivity towards a real ecological conversion of

European agriculture also arrive from part of the agricultural world. On the part of young farmers as we will discuss largely in this research, there is attention to cultural models and practices that refer to agroecology and a multifunctionality of the farm capable of enhancing the natural heritage and guaranteeing important welfare services in marginal rural areas. Unfortunately, these models and good practices are not yet adequately supported by the application of the CAP, even though there is an explicit reference in EU regulations and programs for rural development. Furthermore, from civil society there are encouraging signs of a growing attention to the negative impacts that agriculture causes on the environment, the eating habits of Europeans are changing towards a more sustainable diet. The demand for organic products is constantly increasing (over 20% in 2016), attention to conscious and sustainable consumption is growing, as is the demand by citizens who are consumers of environmental and social services by agriculture (a growing demand that is also reflected in the dynamism of related to agriculture such as agritourism, educational and social farms). Even ISTAT in its annual BES report (Fair and Sustainable Wellbeing in Italy - study aimed at exceeding GDP, as an indicator of economic well-being), also includes the landscape among the parameters of measurement of the quality of life and among its indicators the protection rural landscapes, emphasizing, among other things, the economic potential inherent in landscape protection, in terms of added value for quality production and sustainable tourism; as well as for its social and cultural value, as well as protected by UNESCO. The time has therefore come for a radical change. We need a different CAP that favours truly multifunctional agriculture and allows the production of ecologically and socially sustainable food. We therefore need a new economic paradigm capable of reconciling economy, ecology, health, and social equity (Lawhon & Murphy, 2012). The new CAP reform, which will be in force from 2021, must seriously, effectively and in an integrated way addresses the challenges of the decline of biodiversity and natural capital, mitigation and adaptation to climate change, and the prevention of soil contamination and water and, ultimately, food safety and the healthiness of our food, the landscape, social cohesion in rural contexts and the competitiveness of our most virtuous farms, with a long-term vision. The work experience of these years has highlighted the difficulty of "communicating" the CAP to the general public, its essence, the consequences it determines on the environment, on society, on the healthiness of our environment and in particular on the food that

each citizen puts on the table. Sometimes one gets the impression that thanks to the limited possibility of understanding how the CAP affects our everyday life, this policy has been able to go in a direction that is not attentive to the real needs of citizens and farmers who are more attentive to the environment and sustainability. The concept of sustainable development agriculture is taken here to refer to a large range of issues and solutions of how to reconcile the possibility of conflicting goals of economic growth, social participation and environment preservation and protection (Leach, Scoones, & Stirling, 2010). However, different points of wives and interpretations of the concept involve different prioritizations of goals between the agriculture field and different positions of the general concept of sustainable development. Policy makers and commenters approaching agriculture sustainable development from all perspectives agree that farmers' involvement is an essential component for the process of achieving a sustainable agriculture community. The farmers' involvement and their participation and consensus could be incorporated in a modified representative democratic system. At local level this would be a local authority more responsive to the farmers, allowing them more involvement and participation in governance and knowledge in economic, social and environmental features (Michael Carley, 2000). Working in this prospective the outcomes of farmers involvement in policy agreements could be socially acceptable but not environmentally sustainable. Equally plausibly, public involvement might not generate consensus, with the local government, regional and national policies (Kambites, 2014). In this point there is a dilemma, that while sustainable agriculture appears to imply a level of democratic decision from farmers' involvement, there is no guarantee that the outcome of such direct involvement will be environmentally sustainable (Leach, Walsh, & Stewart, 1994).

The realist position from one side and managerialist conservative position from the other side informs many policy documents, those decreed from the national policies and some local authorities. Further, it is argued that the current political and economic system has not only been the cause of the environmental crisis where actually we are involved, but that it has systematically resulted in an inequitable distribution of environmental goods and bads (Evans, Evans, & Gable, 1989).

Even in the 21st century the political and economic system therefore cannot be trusted to deliver equitable solutions to the crisis and must therefore be modified.

Supporters of this approach assert that this should involve the inclusion of the farmers in the policy debate as they are affected directly and drive support from empirical evidence that the CAP tends to be more environmentally responsible for all the EU countries. Despite all the varieties of these challenges, they essentially all make the same claim, that the possibility to achieve environmentally sustainable agriculture sector and equitable development remains in the aim of the participation of the stakeholders for more involvement and governance.

Sustainability science has emerged over the last decade as a new interdisciplinary field that attempts to conduct problem-driven and action-oriented research on the challenges mentioned above, striving to link knowledge to social actions and creating new visions of natural and social well-being (Miller, 2013).

Sustainable agriculture is linked with other factors such as the contribution of education for sustainable development to its quality. Sustainable agriculture is applied in social context, environment approach, and in economic growth as a development strategy for achieving a better type of sustainable growth, whereas the term sustainability would give more emphasis on the environment society and stand for the final goal of humanity being able to live within the environmental limits of the planet (Fergus & Rowney, 2005). All those aspects are elaborated and discussed from the literature and from this research work in terms of society changes and needs providing a role among different food-systems dimensions, such as environment protection and sustainable rural development. This literature reviews and discusses the trends of CAP from the beginning till now with regards and attention to challenges relating to environment and agriculture. In addition, we attempted to attempt and identify further trends related to the literature in the area for the future policy and research directions related to the CAP. Sustainability challenges are of course simultaneously scientific and cultural in nature. Scientific discourses have dominated and engaged the sustainability literature to date, yet the arts, as drivers of culture (Kagan, 2011) has had a crucial role to play in societal transformation to agriculture sustainability. Sustainable agriculture is a pressing concern in all the EU countries including Italy, as for sustainable food production, new technology, knowledge more efficient resource use and responsible and sustainable value chains. All these points are the goals to achieve for creating a sustainable, smart, and efficient agriculture production and

developing innovative solutions. Farms as main actors should help in modernizing traditional agriculture for further innovation, knowledge to increase sustainable solutions and applying new technologies in this sector. Supporting these policies, the government should afford all the practices and ideas to have efficient food production and resource use efficiency finding new ways to exploit full resources, using and recycling.

1.2 Purposes of Sustainable Development in Agriculture, Politics and Governance

The complexity of sustainable development is not only driven by its different functions, but also by the multitude of its players, such as governmental agencies, national and international NGOs, intergovernmental and supranational organizations. The first important distinction needs to be made between bilateral and multilateral organizations, mostly in terms of their institutional nature and the governance mechanisms. One example of multilateral cooperation in EU countries is the Common Agricultural Policy (CAP) introduced in 1962 and it has changed a lot nowadays. The CAP has tried to follow the continuous changes in European agriculture through the various reform processes but has failed dramatically. The 2005 Paris declaration is still considered a milestone of this political agenda, establishing the principles of ownership, alignments, and harmonization. The Sustainable Development Goals (SDGs), adopted in September 2015 by the United Nations, remind us of the numerous environmental and social challenges that humanity faces, the negative effects of which are also visible in Europe. They are governed through a collective decision-making mechanism, which mirrors the broad consensus on priorities and interventions. The role of these multilateral policies is crucial, for example, to facilitate and enforce international treaties and agreements, norms, and standards, to engage stakeholders and mobilize cross sectoral partnership and, to provide a coordinated and harmonized humanitarian assistance and international development activities. One example is that the data on childhood obesity in the EU are shocking, price crises hit the agricultural sector every month now due to financial speculation, the demographic decline in rural areas continues unabated. The effects of climate change are becoming increasingly

dramatic, and biodiversity is in crisis, our precious nature, from habitats, from fauna and flora, as it is disappearing before our eyes. All these factors are influencing the role of farming and their future perspectives are changing and becoming more and more sensible versus more sustainable approaches and practices. At the same time, the European Commission has committed itself to a program for "better law making" and therefore carries out "suitability checks" on many pieces of Community law. The European Union would not be credible if a policy like the CAP, which commits nearly 38% of the EU budget, were completely exempted from this exercise. Yet, even if the European Commission has just started a process to modernize and simplify the CAP with the presentation of the proposal for the future Regulations, the current reform process has not been based on an adequate fitness check of this important Community policy. Therefore, following a series of analyses and countless requests from civil society for the activation of the fitness check process, some of the major European non-governmental organizations have decided to commission a study that adopts the same survey methodology as the European Commission.

The Objective of the research is, in fact, to collect data on the impact of the CAP on our society in Italian Regions, the economy and the environment; assess whether the CAP meets the stated objectives; evaluate the capacity to contribute to the achievement of the United Nations Sustainable Development Goals (SDGs) by 2030. Over 800 publications have been selected and evaluated as potentially relevant for the evaluation of the CAP. With limited time and resources, more than 450 of these were used to analyse the CAP and produce the report and 306 of these publications were included in a database available for any useful study. Of course, the notion of sustainable development in its current form, the term arises from the spoils of the Second World War and the attempts to promote human, sustainable, economic, and social development in the agriculture sector. The approach manifests in many ways, including growing technical capacities in public governance, reforming the economic system, and lending, or at least granting financial resources for development (Isaksone, 2014). The modern notion of humane development includes competitiveness, quality of life, and well-being, and carries with it the notion of self-determination of nations, strong democratic institutions, and civil society participation (Schoolman, Guest, Bush, & Bell, 2012). Our interest is allocating all these elements in a strong collaboration with the farmers to achieve more competency and growth. Since farmers

and natural resources such as land, water etc are the main factors to active human resources in the agricultural sector, increasing their productivity assures and guarantees economic growth.

As it emerges, sustainable development activities in agriculture are extremely varied, as well as the actors of this sector. It is therefore crucial to briefly explain the main functions of sustainable development, even if it might be challenging to reduce the complexity and the variety of sustainable development activities to a discrete list. In many areas, the harmonization across national borders and the set-up of minimal standards are fundamental to enable development and elevate social well-being, trade safety, and other intangibles. A second cluster of interventions relates to providing policy advice on specific technical areas related to public governance and public services and goods, such as health care, education, justice, energy production, and utility management. A third function of development is to provide data, information, and evidence to inform policies and development plans.

Finally, a fundamental function of international institutions concerned the provision of essential public services and goods, especially in emergency situations as it is now the question of environmental issues. The focus of European Countries has agreed, particularly with the Sustainable Development Goals, that development equals sustainable development. It promotes prosperity and economic opportunities, social wellbeing, and the protection of the environment.

The concept of governance in international development and specifically in the agriculture sector is not fully understood concepts such as global governance, and good governance, are frequently used. Yet, framing with which kind of good governance is not easy and that is because of the multiple contexts in which it can be applied and the different angles it can be explored from. We will strive to provide a common definition of governance, drawing a clear picture of the different layers of governance, from the institutional decision-making mechanism to the rules of the game in multilateral negotiations, to complex sectoral regimes of standards and regulations. Another important concept of governance is the one of issue governance, or in other words, the rules and the dynamics governing international agreements and regulations for sustainable agriculture. By exploring concrete concepts of issue governance means

into practice, and to appreciate its importance in the context of the mandates, strategies, and operational activities of multilateral development organizations. Most of the societal challenges cannot be solved only through the intervention of public authorities but the collaboration with the stakeholders and different players are extremely important. The intrinsic nature of addressing these challenges requires the voluntary engagement of multiple stakeholders.

Governance, in a broad sense, is defined as a non-hierarchical mode of governing, where non-state, private corporate actors, both profit and non-profit, participate in the formulation and implementation of public policy. If governance is effective, then relevant stakeholders are on board, they collaborate well, and societal challenges are effectively addressed. If governance does not work, problems remain unsolved and often get worse. Good governance includes respect for the rule of law, transparency, responsiveness, consensus orientation, equity and inclusiveness, effectiveness and efficiency, accountability, and participation (Lafferty, 2004). Obviously, good governance is difficult to achieve in its totality. This is because the stakeholders are not all equal. They hold different amounts of information, different degrees of interest. Different ability to influence outcomes, and different levels of experience in farming issues. The way in which governance works is, therefore, essential to solve complex multi-stakeholder issues.

The principle of good governance should be incorporated in both governance mechanisms and governance processes. Mechanism and process are obviously related, but they deserve to be discussed separately. Mechanisms are the formal rules of the game used for decision-making. When we refer to entire multilateral development organizations, governance is usually intended as organizational, institutional, or corporate governance, the regulatory framework laid down in the international agreement which established that organization.

1.3 CAP Reform for a more Sustainable Agriculture

The next reform will determine the post-2020 CAP. In preparation for the negotiations, the European Commission carried out a public consultation which collected over 330,000 views and opinions on the potential modernization and simplification of the CAP. Furthermore, the European Commission has carried out an impact assessment which, according to previous experiences, tries to examine alternative scenarios for the future CAP. To be considered is the Next Generation EU the largest stimulus package ever. The EU's long-term budget, coupled with the Next Generation EU initiative, which is a temporary instrument designed to boost the recovery, will be the largest stimulus package ever financed through the EU budget. A total of €1.8 trillion will help rebuild a post-COVID-19 Europe. It will be a greener, more digital, and more resilient Europe (Commission, 2020). The new long-term budget will increase flexibility mechanisms to guarantee it has the capacity to address unforeseen needs. It is a budget fit not only for today's realities but also for tomorrow's uncertainties.

On 10 November 2020, an agreement was reached between the European Parliament and EU countries in the Council on the next long-term EU budget and Next Generation EU. This agreement will reinforce specific programs under the long-term budget for 2021-2027 by a total of €15 billion. More than 50% of the amount will support modernization through:

- research and innovation, via Horizon Europe;
- fair climate and digital transitions, via the Just Transition and the Digital Europe Program;
- preparedness, recovery, and resilience, via the Recovery and Resilience Facility, risk EU and a new health program, EU4 Health;
- traditional policies such as cohesion and the common agriculture policy, in order to ensure stability and modernization;
- fitting climate change, with 30% of the EU funds, the highest share ever of the Europe budget;
- biodiversity protection and gender equality.

Table. 1.1. The Multiannual Financial Framework 2021-2027 total allocations per heading

	MFF	NextGenerationEU	TOTAL
1. Single market, innovation and digital	€132.8 billion	€10.6 billion	€143.4 billion
2. Cohesion, resilience, and values	€377.8 billion	€721.9 billion	€1 099.7 billion
3. Natural resources and environment	€356.4 billion	€17.5 billion	€373.9 billion
4. Migration and border management	€22.7 billion	-	€22.7 billion
5. Security and defence	€13.2 billion	-	€13.2 billion
6. Neighbourhood and the world	€98.4 billion	-	€98.4 billion
7. European public administration	€73.1 billion	-	€73.1 billion
TOTAL MFF	**€1 074.3 BILLION**	**€750 BILLION**	**€1 824.3 BILLION**

Source: European Commission 2020.

The amounts include the targeted reinforcement of ten programs for a total of 15 billion, compared to the agreement from 21 July 2020. The programs are Horizon Europe, Erasmus+, EU4 Health, Integrated Border Management Fund, Rights and Values, Creative Europe, Invest EU, European Border and Coast Guard Agency, Humanitarian Aid (Commission, 2020).

However, despite this big new challenge in Europe until now, the CAP reform has never been subjected to a systematic evidence-based assessment or a proper fitness check. This process, defined by the European Commission as the most advanced standard for evaluating its policies, has been used for other sectors and policies (for example for the EU Directives on nature conservation), but so far not for the CAP.

The CAP allocates billions of euros and as such constitutes the biggest share of the EU's budget, roughly a third of the EU's €1.1-trillion ($1.3-trillion) budget for 2021-2027. Many farmers depend on these funds from Brussels to stay in agriculture business.

This assessment would be particularly important for the political negotiations already underway for the definition of the future CAP, in the face of conflicting

demands from stakeholders. It is believed that an adequate fitness check was not guaranteed either by the public consultation of 2017 (which collected opinions rather than evidence) or by the impact assessment carried out by the European Commission.

The study promoted by the European environmental associations therefore completes the activities carried out by examining the data available so far relating to the performance of the CAP 2014 - 2020. The CAP Fitness-Check based on evidence, aims to:

- collect data on the impact of the CAP on our society, the economy and the environment;
- assess whether the 2014-2020 CAP meets its objectives;
- assess the capacity of the CAP to contribute to the achievement of the United Nations Sustainable Development Goals (SDGs 2030), which the EU approved in 2015.

In order to generate a solid knowledge base to meet these purposes, the study focused on an analysis through a process of "rapid assessment of evidence" (as devised by Collins et al., 2015, "The making of reviews Quick and Quick Assessments of Evidence: A How to Guide "). The first phase of the evaluation aimed to collect the data base. It was conducted between January and July 2017 and included a series of online meetings and two workshops. An interdisciplinary selection committee comprising 18 members was established; defined key questions, evaluation criteria, and selected SDGs to be evaluated in relation to the contributions of the CAP and outlined the literature search methods with a working protocol, addressing, for example, the inclusion and exclusion criteria. The available literature covering socio-economic and environmental aspects was searched, trying to reach a balanced knowledge base both at thematic and geographical level. Publications dealing with basic phenomena and trends relating to agriculture in general have been separated from those providing a direct assessment of the CAP, its tools and impacts. The evaluation included peer-reviewed scientific literature from 20014-2019 (i.e. after the Fischler-Reform), as well as reports and additional data sources such as Eurostat, FAOSTAT and national / EU / EC reports and data (Songa, et al., 2017). The eight key objectives

of the CAP 2014-2020 as reported in the Article 39 of the Treaty on the Functioning of the European Union (2009) specifies that the objectives of the common agricultural policy should:

- ❖ increasing sustainable and agricultural productivity promoting technical and innovative progress in rational and development labour of agriculture production;
- ❖ sensitizing and achieve higher standard of living and welfare for the agricultural community considering very important the process of increasing the individual income for all the farmers engaged full time in agriculture sector;
- ❖ aware the local markets and reasonable prices. In 2010 the European Commission outlined new general objectives (CE 2010): sustainable food production, including contribution to agricultural income, improving the competitiveness of the sector and compensating for natural constraints.
- ❖ sustainable management of natural resources and climate action, including support for the provision of environmental public goods, promoting green growth through innovation, pursuing climate change mitigation;
- ❖ balanced territorial development, including support for rural employment, promoting diversification, improving the rural economy, and granting structural diversity.

Since the three new objectives have not been formalized with the integration into the Treaty on the Functioning of the European Union, they are called "priorities". As a result, two databases were created. The first database lists all publications potentially relevant to the evaluation, while the second database corresponds to the outcome of an in-depth evaluation of a subset of relevant publications. The collect database has been done from 2014 to 2019 it is an elaboration extracted from the website of google scholar with reference Italian regions on CAP discussion. Most of the authors are Italian but the publications very often are international, and the articles selected are all peer-reviewed. This is to guarantee the coherence and the high level of the academic research for this subject. To classify the evidence collected we are based on the most relevant criteria of CAP adoptions. Of course, after the end of CAP reform 2020 it will be a good opportunity to conclude the research including the publications of 2020 and

2021 exactly one year after the reform, this is the perspective to consider active for the future research on this behalf.

Till the year 2019, over 850 publications have been selected and assessed as potentially relevant for the evaluation of the CAP in the European context. These publications cover 27 Member States, as well as the impact of the CAP in countries outside the EU. Over 250 of these are collected with regard of Italian regions. The categorization it has been done basically by the answer that respond to the question for each article that we have selected and elaborate the context and the purpose of the research:

- Effectiveness: Does the design of tasks and implementation of the policies of the CAP have contributed to achieve the goals in the EU and especially in Italian Regions?
- Efficiency: Are the coast-benefit reasonable and prudent. How are investments distributed in the EU and especially in Italian Regions?
- Relevance: Are the objectives and the implementation of CAP policies in some way in conflict with each other in the EU and especially in Italian Regions?
- Coherence: How does the CAP react in front of the challenges and priorities organized by farmers, policy makers and the EU citizens and especially Italian Regions?
- Impact: Does the CAP operate in conflict in terms of objectives, implementation, and effects with other EU countries and especially Italian Regions?
- Sustainability: How does the CAP consider sustainability on an international, national, and regional level.

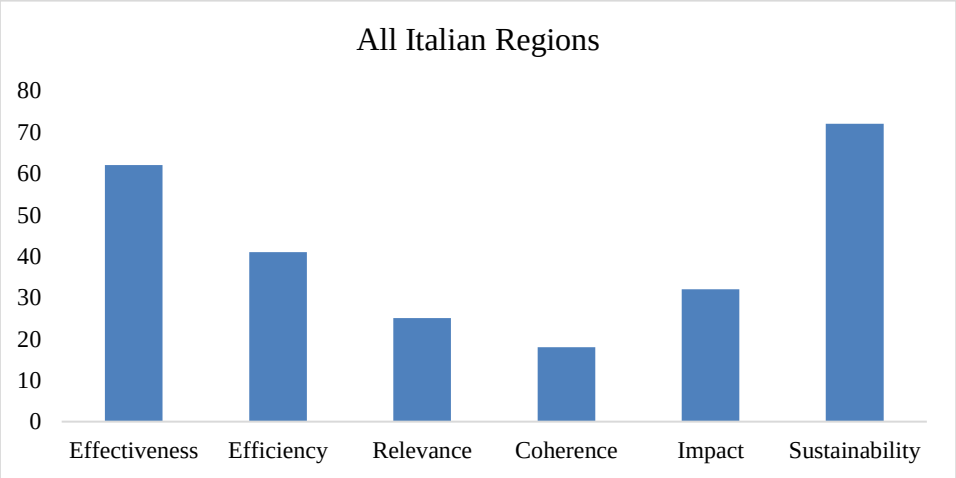
Following the publication collection process, from July to October 2017, the database was checked and expanded, knowledge gaps addressed, and further data analyses performed with an expanded work. Here is the chart representation of the collected information.

Following the Council's general approach on the Common Agricultural Policy (CAP) reform package reached in October 2020, negotiations are ongoing with the

European Parliament. The goal is to reach an agreement for the adoption of the three new regulations that the CAP reformed for the period 2023-2027.

In May 2021, EU ministries of agriculture met in Brussels to discuss the reform package. The discussion focused on social conditionality, the destination of payments which implies a greater freedom of action for each Member State, but also greater responsibility. Interinstitutional negotiations took place in parallel with the session. As no final agreement was reached, ministries decided to return to the issue at their June session. In this term there are too many associations that have already critics on this issue.

Figure 1.1. Chart with academic publications divided in different topics on CAP query.



Source: Own elaboration

The most relevant arguments are Sustainability, Effectiveness, and the Impact. Those three dimensions we will explain in the next chapters with specific attention in the Italian regional agriculture sector. Less relevance has coherence – this is not because it is not important but a few times the authors discuss this factor both with other elements and the collection has done based on the keywords and findings. The major attention goes for sustainability impact and process in the agriculture sector on a local level but mostly in global aspects.

1.4 Sociological Concept of Sustainability in Agriculture

The concept of sustainability is a very frequent object of current debates over the use of the sustainable management of natural resources, yet there is no consensus on its meaning (Gale & Cordray, 1994). Various frameworks for assessing sustainability in the agriculture sector have been increasing rapidly. However, a common understanding of sustainability assessment is framed as a growing concept where all stakeholders understand each other and are informed about the impacts affected in agriculture. Sustainable agriculture has been clearly defined from Ikerd's as sustainable farming systems can maintain productivity and usefulness to society indefinitely. Sustainable agriculture is a new approach conceptually and practically different from conventional agriculture, where the focus generally is the quantity of the production. The European Union and all the other International Agencies about this specific issue are concerned and try to adopt international policies for more sustainable agriculture. This concept is highly and strictly related where farmers' perception, prevention and preservation of the environmental impact are considered not only in the local area but taking in consideration all the global meaning of sustainability. To achieve this goal, the theories and studies related to sustainable development are going to help us. Much has been written and said about sustainable development but much less has been done, as being able to consider a problem, at the same time, from an environmental, social, and economic point of view is not exactly easy. Very often economic interests, especially in a time of crisis like ours, end up prevailing over environmental and even social conditions. Furthermore, the Italian agricultural production, traditionally based on small or very small businesses, often family-run, contributes to creating obstacles towards the creation of virtuous innovative mechanisms. Italian farms, due to their limited size, rarely dispose of the necessary capital to increase the technological content or to renew production processes, effectively losing the sustainable possibility of increasing productivity levels. Investors in research and development are ultimately very lacking and instead of productive renewal, a reduction in costs is usually pursued. This attitude is to the detriment of development in general and sustainable development, because where investments and research are lacking, in addition to economic and social growth, not even a general environmental improvement is pursued.

For many years, the binomial "*Environment and Sustainability"* has been re-proposed in the most diverse areas, but, apart from declarations of intent, real

sustainability in development should be pursued and achieved with tools - technical, technological, political, participation - for more concrete than those generally actuated. Some substantially voluntary tools, the application of which is left to the good will of individuals. Furthermore, there is no doubt that the use of these instruments requires an initial investment. The effects of these investments are seen only in times that are not always comparable with those of a public administration dictated by politics, or a private administration dictated by economic needs. The current situation of economic crisis and the by now persistent technical-administrative difficulty also does not help on a path of sustainability procedures and applications. The few resources available are generally directed towards the needs of the emergency. Sustainability, originating from a careful evaluation and planning of activities, is poorly combined from a formal and substantial point of view with the emergency, which only remedies the damage. So, planning and management policy are versus policy of the relationship with environmental sustainability. The costs of non-action are much higher than those of management, especially in terms of human lives always in relationship with the environment.

Moreover, when dealing with the environment and sustainability, in fact, one has to do with people's lives, both from a physiological and a social point of view. In this term it cannot be established whether it is better to lose home or job, so there is no priority between adequate land management policies or maintaining the status quo to promote employment. The fact is that these issues should be part of adequate and complex overall development policies. The increasingly profound invoice between a design that considers the healthiness and liveability of the territory and management based on emergency needs to be urgently recomposed. This involves a review of the development agriculture models to refer to. The dominant trend is towards the search for a path that ensures a reformulation of current models and practices in an ecological sense. This approach of change is not neutral, because it involves a shift of attention from expansion models cantered on recovery and conversation, from plans lowered from above, to a more flexible and participatory design of stakeholders. At the same time this project involves an exit from the reductionist agriculture model, classic of improvisation, and the adoption of an approach that better responds to the needs of ecological agriculture for the future design.

A purpose in this research thesis in this sense comes from the ecosystem approach, a strategy for the integrated management of land, water and living resources that promotes conservation and sustainable use in a fair and equitable way. This definition contains an explicit reference not only to conservation about the environment but also to the use of resources, not only living, with a hint of justice and social equity. this reference is not a mere exercise in style, as one of the main characteristics of the ecosystem approach is the direct and substantial involvement of local stakeholders in the management of the territory, which is seen as an integrated process not only by the from an environmental point of view, but also from a social one (Padovani, Carrabba, & Mauro, 2003). Therefore, the ecological approach drives a working method, the ecosystemic framework. The aim of all this, always summing up a long debate, is to reach a new redefinition of the relationship between homo sapiens and the environment: for this purpose, the formula of predicting to prevent, in great vogue until some time ago, seems suitable. Predicting and preventing means unifying upstream what is divided into a wind of needs with contrasting values; is an anticipatory operation of advantages that involves multiple aspects:

- ethical approach - paying today for more tomorrow; pay today to avoid making future generations pay more, eliminate social inequalities;
- psychological approach - trust in one's ability to govern our future, trust in society, in technology and in those who govern us;
- cognitive approach - assess the real state of society today and in the future.

In other words, being able to have public policies based on a project, an active policy with richer and more flexible functions, in which previously excluded actors can participate, in a continuous process of mutual opening between culturally, socially, and economically diversified instances. The greatest merit of an active policy lies in the ability to enhance and take on the oppositions that emerge during its implementation: in the end, success is measured based on the degree of improvement induced on the social actors, on the territorial structure and on the economy (Borrelli & Andreopoulou, 2015). In the Italian regions these situations are considered. The negative examples to be given would be numerous. For example, Italy is considered within the Mediterranean as one of the areas at greatest risk of natural catastrophes due to the presence of faults, volcanoes, mountain territories and alluvial areas. Italian

regions have been hit by the natural catastrophes in recent decades and has not yet led to the risk management system, aimed not only at intervention actions in the field of rescue and damage restoration, but also by a policy and culture of prevention of widespread calamities at various levels. The set of technical-scientific activities, from the collection of information and data on the territory, thanks to the use of technologically advanced networks, up to their processing and interpretation based on models and simulations of events, should put the Civil Protection in condition, various levels, to assess the situations of possible risk and to intervene in a timely manner and, when possible, to resort to preventive measures. It is a question of minimizing uncertainty and therefore improvisation, through a system of forecasting and prevention. If the forecast is oriented towards an identification of the phenomena and a prediction of the expected effects, prevention is instead centred on the concept of avoiding or minimizing the possibility of damage resulting from disasters, natural disasters or connected with the activity of the man's life.

Therefore, the prevention activities are aimed at adopting measures for eliminating or mitigating the effects that natural disasters can produce on the territory. For example, science today is unable to predict the occurrence of an earthquake. Despite this, rigorous and scientifically verified information is available on the different exposure to seismic risk of the areas of the national territory which make it possible to identify where the problem consists of and where it is possible to intervene for the assessing period and normalize the situation. Of course, those are moments with huge problems in the environment and agriculture sector. Moreover, preventive interventions can therefore be structural or non-structural. The former consists of active or passive settling works which aim to reduce the danger of the event, lowering the probability of occurrence or attenuating its impact; the second consist of actions aimed at reducing damage through the introduction of constraints that prevent or limit urban expansion in areas at risk, the creation of warning systems and monitoring networks. The forecasting tools together with the preventive tools make possible to put in place an alert and surveillance system capable of activating the Civil Protection machine in the perfect time of the event of planned or ongoing events, leading to the implementation of planning and environment emergency management activities, in particular those for the protection and safety of people lives. The complexity of environment emerging problems such as the relationship between environment and

development that between design and decision are among the fundamental nodes to be overcome to arrive at a useful design and a new, concrete, development model. The influence of sociology has always been sociology of the environment. For a long time, it has been believed that relations between human beings were the basis of social action. Neglecting the fact that such relations take place in a biophysical environment with the influences and conditions in social dimension. It should be obvious that the environment influences social construction, as ecological problems are socially produced. A sociological approach that can critically probe the unfolding of the relationship between society and nature, is more necessary than ever, in theory as in practice, to address the main issues of the climate crisis.

The "classical" approaches of sociological thought, regardless of the reference paradigms (no exceptions: positivism, constructivism, symbolic interactionism, social Darwinism, structural functionalism, not even Marxism), often started from a common assumption: attention, in the analysis of society, the focus was on the manifestations and organization of social relations, sufficient by themselves to understand the upheavals, pathologies, evolutions, purposes.

Starting from the contributions of historiography and anthropology, it appears self-evident as the environmental and climatic context has conditioned the fortunes and misfortunes of the social constructions of man, without solution of continuity: from the disappearance of the Neanderthals to the collapse of the Roman Empire in the West, up to the Barbarossa Operation, it is impossible to *"put the ecological variable in parentheses*". It is no coincidence, in fact, that an (in) complete theorization of the sociology of the environment was reached only through an articulated theoretical path, which gained momentum from the 70s of the twentieth century, the decade of the oil crisis and of the mainstream proliferation of political environmentalism, and still struggles to establish itself on the scene of sociological debates. The environmental sociology presents itself as a rather difficult integrative in recompositing of apparently irreconcilable approaches, epistemologically united by the recognition of the interdependence between social system and nature: the political-economic structuralism of Allan Schnaiberg, with the direct analysis of the social and political consequences of ecological macro-variables (Pellow, Schnaiberg, & Weinberg, 1997). The functionalist objectivism of the new ecological paradigm of Catton and Dunlap,

which identifies ecological laws of a biophysical matrix that are limiting for social expansion and deployment (Dunlap & Catton, 1980). Social constructionism, which recognizes the environmental relevance of the subjective behaviours and attitudes of individual actors, rescinded by social bonds (Schnaiberg & Gould, 1994). Finally, attempts were made at a laborious recompositing (still to be perfected according to contemporary coordinates) between temperate constructivist individualism and non-mechanistic collectivist holism, co-present in the theorized approach of the socio-anthropologist. The individual and society interact with each other and with nature and the environment in a complex modularity, which can be explained through an inextricable system of mutually influencing variables (Douglas & Wildavsky, 1982).

The theoretical methodology of environmental sociology is founded as a new critical approach to society, the practice of a consequent social reshaping that considers this new awareness is inevitably expressed through the political struggle. Indeed, it would be impossible to consider the variable nature-environment in social development in the absence of a complete analysis of the networks of social power (first economic-productive, but also political and symbolic-cultural) that affect the impact of the first on the second. The current system of production and consumption, supported by a political class contiguous expression of such economic interests and therefore particularly insensitive to the environmental question, generates ecological damage of proven and incontrovertible seriousness, which contributes to aggravate a social suffering already inherent to the inequality of capitalism globalized.

Sociologists and economists such as James O'Connor, Joel Kolev and Michael Lowy go so far as to identify not only a proximity, but a direct link on the legal and economic level between the exploitation of nature and the exploitation of the working masses, which compromises their health, quality. of life and ultimately employability (just think of the consequences of climate change on agriculture, livestock, and tourism).

A political response based on these assumptions, which we could therefore define as eco-socialist as it is based on the sociology of the environment, is laboriously but inexorably articulating itself into what we could describe as a real environmental class struggle: the socio-environmental claims have already assumed the legitimacy,

notoriety and public attention necessary to exert significant influence in the field of what Hannigan called "multiple arena" (scientific community, media and governments) (Jickling & Wals, 2008). This is demonstrated by the success of the last movements, especially in the years 2019 and 2020 such as Fridays for Future and Extinction Rebellion and political parties such as the Greens in (almost) all of Europe, the increasing political centrality, especially on the left, of socio-economic platforms that refer to the precepts of the Green New Deal, but also in general, the growing relevance of ecological thinking in daily habits and behaviours, in consumption choices and in ideological sensitivity. The sociology of the environment is so relevant in the contemporary public-political debate, that it represents the main ideological construct to which those who intend to undermine the current socio-economic capitalist order to build a society based on equality and rights refer.

There is a contrast between nature and society: We must not delude ourselves, the way ahead to reach significant levels of hegemony is still long, and the sociology of the environment struggles to translate itself concretely into political power and therefore into government action. It is a passage that would even require the times of anthropological, rather than cultural, change: the social normativity in which we are immersed leads us to perceive nature as a foreign body, in opposition to society. This relationship is structured according to the logic of clash, rather than encounter, and identifies nature as neither mother nor stepmother, but rather as something other than oneself to be exploited without limits and / or to be feared fatalistically. This irremediable rupture of the original unity between man and nature is so profound that it has its roots in the cornerstones and founding myths of Western culture: from the myth of Prometheus and fire, from the Homeric adventures between cyclops and sirens of the Odyssey, sirens, up to the biblical representation of the expulsion of Adam and Eve from Paradise. Finally, the capitalist model of profit and exploitation is the translation of this irrational lack of communication between society and the environment from the ideal to the material and systemic one (Neckel, 2017). The intrinsic exosystemic interdependence means that the exploitation of nature is also irremediably exploitation on man and generates social consequences that can be found in current socio-economic contingencies. It is certainly not necessary to abandon oneself to easy Heideggerian, inherent in ecofascist and anti-progressive naturalism, but rather to take note of what the sociology of the environment essentially

emphasizes: the age of human exceptionalism and the irrelevance of the environmental context, nourished and supported by the antiquated anthropocentric and, so to speak, socio-centric sociological paradigm, it has broken against the wall of reality data of the climate crisis, which is and will also be an economic and social crisis. The omnipotence of the potential of technology, development and growth are anchored to the significance of socio-environmental sustainability.

The sociology of the environment demands the end of a senseless contrast on a scientific level and unsustainable from a practical point of view, that between society and nature (Karami & Keshavarz, 2009). The tension that runs through this relationship, between socio-technological hubris and naturalist submission, must be resolved in the awareness that both equally describe the unfolding of the human dimension, and that together they are the starting and landing point, or so it should be, of every analysis and purpose that aims to make up the future.

CHAPTER II

SUSTAINABILITY OF WATER USE IN AGRICULTURE SECTOR, ITALIAN REGIONS

2. Introduction to climatic change and EU policy

This research aims to open a discussion in the scientific point of view and policy making processes on sustainability of water policies and environment issues in the agriculture sector, examining the intricate process of sustainable development in the European Union's Water Framework Directive. Sustainable Development has since a very long time been at the centre of attention of the European Commission and Agricultural Ecosystem and Environment. Sustainability means satisfying our own needs of the present without compromising the capacity of future generations, guaranteeing the balance between economic growth, care for the environment and social well-being. Sustainable development is a concept that appeared for the first time in 1987 with the publication of the Brundtland Report (WCED), which tried to find possible solutions to the problems caused by industrialisation and population growth (Law, 1987).

The process of industrialisation has been associated with the level of economic development and productivity measured by gross domestic product (GDP). Many technological resource management regimes are in inflexible and not built to adapt to changes in environmental, economic, or social circumstances (Pahl-Wostl, 2002)

The water resource is currently undergoing processes of transformation at local, regional and global level. The water resource situation is changed where the water demand (diminishing in industrial countries and rising in development countries) is

under pressure for cost-efficient solutions, by worst water quality and by fast changes in socio-politics and economics conditions. In fact, Member States of the European Union have faced very often floods, water scarcity, water pollution, temperatures rise, decrease rainfall, all these factors will increase as consequence of climatic change.

Climate change is another important factor that will cause a higher frequency and amplification of all these problems of water management in the agriculture sector (Intergovernmental Panel on Climate Change, 2008). Agriculture Sustainable Development and productivity development were transformed from primarily agricultural production to heavy industries and manufacturers production. This process has been discussed with the Malthusian theorisation of populations growing in geometric progression and food production increasing in arithmetic progression. Malthus concluded that there will be a higher population than availability of food where many people will die from the shortage of food (Malthus, 1798). The sustainable agriculture in the farming system in Italy has been organized as a relation between farm as - unit of production and the household – the family importance on conserving the heritage and the originality of production. The research on family farming has focused upon structural changes, following economic and political trends in modern society (Buttel, Larson, & Gillespie, 1990).

The social and environmental impact on the agriculture sector in Southern European countries especially in Italy will be investigated. Analysing the adoption of measures taken by policy makers on water management for irrigation and the position of sustainable farmers participation will focus different assessments and discussions in the following research.

The research assesses the economic and environment implications deriving from alternative measures of regulation of the irrigation and environment use of water resources. The community assets of farmers will have an important role in the implementation of different strategies concerning agriculture water management.

This research work will focus on the role of farmer's participation as central actors of implementation in water policy and future decision making for a more sustainable agriculture. Furthermore, the social and the environmental aspects will be addressed as the main tool to enhance and improve the development of sustainable agriculture.

This research established a framework to moderate the EU's vulnerability to the impact of the climatic change, with a starting point for implementing a strategic and vanguard approach to ensure the adoption of measures, such as water.

Furthermore, and with greater relevance, the Commission adopted an EU strategy on adaptation to climate change in April 2013 (European Commission E. 2013). The aim of this strategy is to make European Member States more climate-resilient, competent on-going efforts within MS, promote information-sharing, coordination of efforts, and sector and policy coherence. It provides funding tools to strengthen adaptation capacities and address specific vulnerable areas such as water resources. The agriculture in the MS is an essential driving force in the management of water use having significant impacts on water quality and water quantity. Water is an important component of agriculture production. Water is the source of life. Human activities and the natural world depend on it, and in recent years we have become increasingly aware of the need to protect it.

This chapter discusses key issues for water quality in agricultural sustainable production and the confrontation between producing enough food quality. To make sure that enough good quality water is available in the long term, at the beginning of the millennium the European Community adopted ground-breaking legislation, the Water Framework Directive 2000/60/EC (WFD), widely accepted as the most substantial legislation to date.

Agriculture is a complex process that involves biological, physical, socio-economic, and political constraints, which control sustainability in agricultural policy planning (Yunlonga & Smit, 2003).

In this thesis the careful and effective water management will form part of these considerations, as well as helping the farmer to continue producing profitable production. Farmer's aim is to guarantee that the safety and quality of the water which they use will satisfy the highest expectations of the food industry and consumers.

2.1 Geographic extension and climatic conditions

Sustainable development has been in the centre of attention of the European Commission and Agricultural Ecosystem and Environment (AEE).

Water resources and sustainable agriculture are well related in terms of environmental and developmental concerns through the incorporation of economics, social and policy making. Achieving sustainable agriculture is not a simple task for concerted governmental action of European Commission, national or regional statement, but involves all the groups in society in their actions and in the proper policy making. Sustainability is a broad discipline, used by hundred authors which gives insights into most aspects of the human world from environment to social sciences and economic measures and aspects.

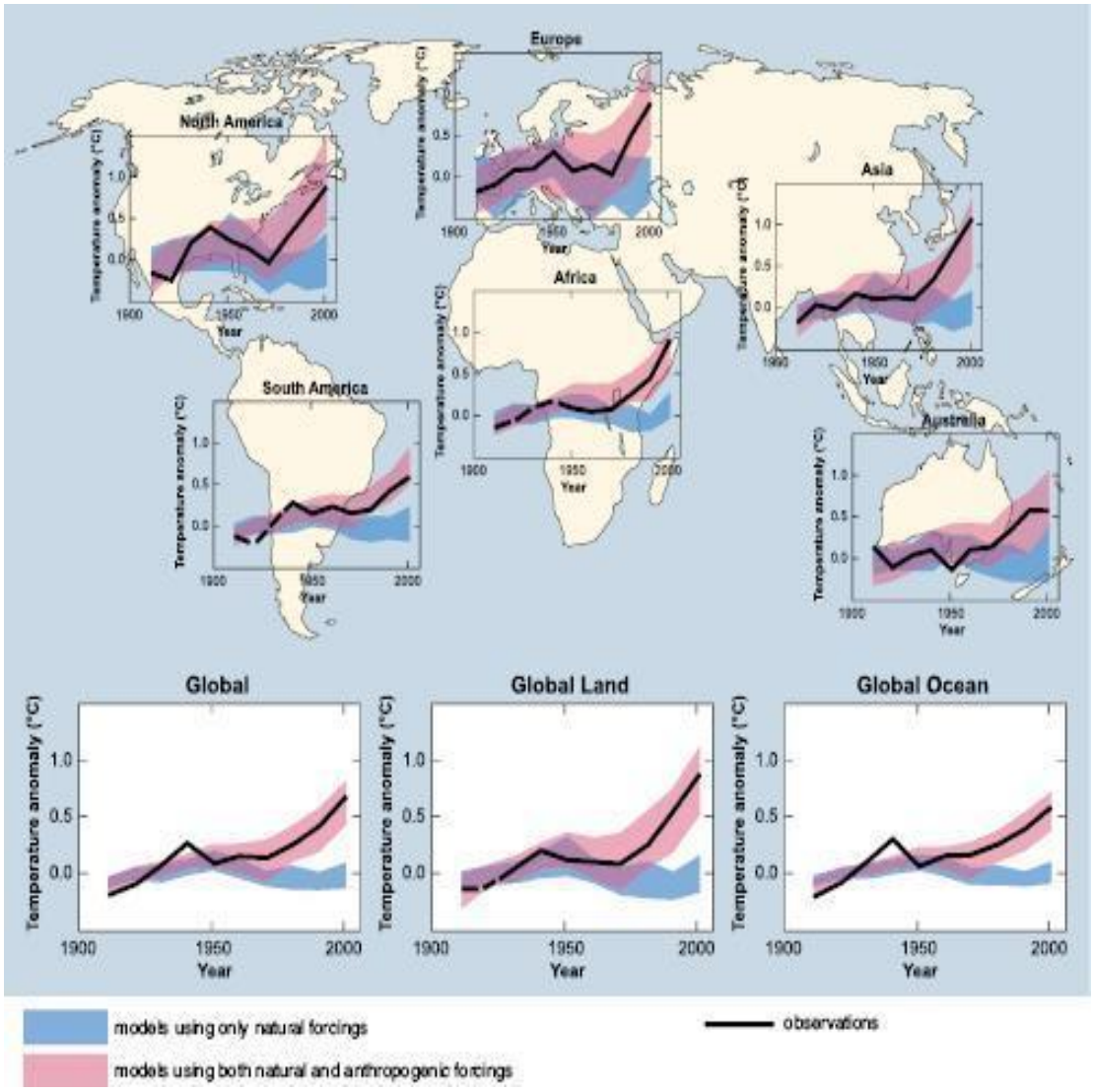
In recent years, the three strategic pillars of sustainability (economic, social, and environmental) have become central to different policy objectives and assessments (Mouysset, 2014).

The National and local governments train and guide the local authorities in developing their own approaches in policy and practice. In recent years, researchers have focused primarily on evaluation of climatic change, the impact on economic activities and human health. Although, agriculture is the most susceptible as weather heavily affects agriculture production as crop production trends, yield variability and reduction of areas to be cultivated.

While a rising length of spring and summer periods, and the related increase of temperatures, could favour crop production at northern temperate latitude sites, conversely, higher temperatures could heavily reduce yields and threaten some crops in areas at southern latitude (Auci & Vignani, 2014).

Economic development improves the quality of life during the process of the challenges in social and environmental fields, through politics and demand for the effective and real public involvement and integration in this process.

Figure 2.1. Temperature change on global and continental scale



Source IPCC data.

Climate change effects represent a "challenge" that European agriculture has to face in the immediate future being subject to relevant risks generated by new local meteorological change conditions (Iglesias, Garrote, Quiroga, & Moneo, 2009). In many countries, temperatures have become more extreme with consequences and economic losses due to extreme weather events and decreased water availability have risen considerably in the last decade in European Countries.

The intensity of rainfalls and snowfalls in several regions has increased with more frequent floods in Northern Europe, while in Southern areas rains have decreased substantially and drought periods are more frequent than in the past. Several regions

change in climate are assessed to occur with global warming up to 1.5°C as compared to pre-industrial levels, including warming of extreme temperatures in many regions (high confidence), increases in frequency, intensity and/or amount of heavy precipitation in several regions (high confidence), and an increase in intensity or frequency of droughts in some regions (medium confidence) (Hoegh-Guldberg, et al., 2018).

In those areas in fact, as summer temperature is already high, water scarcity would make it impossible to deal with this consequence of climate change. In this context, farmers have to deal with these risks in presence of more competitive global market conditions and modest policy support programs finalized to adapt to climate change in European countries (Auci & Vignani, 2014).

Many specialized studies have been conducted to adapt to changing climatic conditions and to estimate climate change impacts on the agricultural sector in different areas of the world (Shrestha, Ciaian, Himics, & Van Doorslaer, 2013). These possibilities are today increasing by technological innovation and development and the permanent availability of information.

The literature underlines that the effects of climate change induced shock on agricultural inputs (e.g. land or water) on crop yields are strongly related with the geographical location of the agricultural cultivation or outputs (e.g. quantity/quality of crop production) propagates to the rest of the environmental and economy, and shows that some regions of the Earth would benefit in changing prices reflecting changes in scarcity induce an autonomous substitution process between all factors of production, decided by policy decision makers for each country (Ghaffari, Cook, & Lee, 2003).

The existing literature relating to climate change effects on agriculture focuses on the impacts in territory, involving experimentation and gradual adjustment to a circular vision of the economy, with great risks but also great opportunities (Vineis, Carra, & Cingolani, 2019).

Figure 2.2. Italian regions and geographic extension

In this figure we show all the 20th Italian regions. All the regions have a different climatic composition and the agricultural production changes based on the area where it is located.

Italy has a geographic extension in Mediterranean region with semi-arid climatic conditions, where the water scarcity is posing serious constraints on irrigation (Mekonnen & Hoekstra, 2016). Water quality degradation, caused by over extraction, often makes water resources unavailable for irrigation, forcing farmers to find new approaches to cope with water scarcity (Berahmani, Faysse, & Gafsi, 2012). The Directive 2000/60/EC (Water Framework Directive - WFD) (European Commission

E. , 2000) establishing a framework for Community action in the field of water policy has introduced an innovative approach in the European water legislation, both from the environmental and administrative-management point of view. In the following years, the Water Framework Directive (WFD) had to be transposed by all Member States, with different adoptions, given the weight of the measure and the innovations it brought, in all sectors related to the use of water and environmental protection.

Our study is focused on giving insights for all the regions based on the agriculture production and the management of water for those areas. As described in the Declaration for a New Water Culture, climate diversity is seen as the health of the environment (Angelini & Pizzuto, 2007). Recognizing and taking advantage of the opportunities provided by this characteristic in each region, while also accepting the limitations that this imposes, is the key to the design of sustainable development criteria in each geographic context. The Directive pursues ambitious objectives: to prevent qualitative and quantitative deterioration, to improve the status of water and to ensure sustainable use, based on the long-term protection of available water resources.

Over the years, pressure grew from various components of society, not just environmentalists, for a fundamental rethinking of EU water policies. Various parts of the European institutions had stressed the need for a more comprehensive approach, and a broad consultation process was launched among various stakeholders. wide consultation process was launched among the various stakeholders. What became clear was that despite considerable progress on isolated contexts and issues, the framework for action was still very fragmented politically, both in terms of means and objectives. All agreed on the need for a single block of legislation to solve these problems. As a result, the Commission's proposal to establish a framework for Community action on water, the Water Framework, was proposed. Water Framework Directive 2000/60/EC aims to achieve the following comprehensive and innovative general objectives:

- the expansion and protection of all waters, both surface and groundwater;
- the achievement of 'good status' for all waters within a fixed time frame;
- to management of waters resources based on river basins;
- proceed the combined approach of emission limits and quality standards;
- price adjustment taking account their real economic cost;

- closer citizen involvement in the choices made in this area;
- more reasoned legislation;

In the following years the Water Framework Directive (WFD) had to be transposed by all Member States, with different adoptions, given the weight of the measure and the innovations it brought, in all sectors related to water use and environmental protection. The WFD is considered the most ambitious package of environmental legislation ever created by the European Union. At the time of its passage, it was seen as a unique opportunity to restore Europe's waters, even being seen as a model for future environmental regulations. However, nearly two decades since its adoption, the WFD has failed to deliver on its objectives of no deterioration in water status and the achievement of good status for all waters of the European Union.

One of the reasons for this failure is undoubtedly the problems and delays concerning the implementation of the Directive.

Experts and stakeholders have questioned the directive, accusing its lack of a paradigm shift towards a more integrated system, which was one of the founding principles of the initiative, and paradigms shift towards a more integrated system, which was one of the founding principles of the initiative. In fact, the WFD has often been criticized as not being political enough, and in several cases implementation efforts have revealed a misunderstanding of the WFD have brought to light a misunderstanding of the key principles of the directive. In order to establish a framework for action to protect European waters, the Directive provides for six-year cycles in which member states have had time to implement measures, with the aim of enabling them to achieve the environmental objectives of the WFD by 2015.

In the case of non-achievement, the set dates coincide with the next cycles of implementation, i.e. 2021 and 2027.

The introduction of the directive was intended to facilitate a gradual replacement of fragmented policies by a holistic approach, integrating all parts of a comprehensive environmental system. The emergence of integrated watershed management in several countries, in Europe as well as outside, the awareness of the multiple and often competing uses of water, and at the same time the growing interrelationship of water systems with other socio-economic water systems with other socio-economic systems,

have been the main drivers of the WFD. Another interesting aspect concerns the prerequisites for public participation provided in the directive, which highlight the inherent complexity of water resources management. This has generated a push for decentralized policy making in freshwater governance.

Through the Common Implementation Strategy (CIS), the WFD has led to the introduction of an experimentalist approach to "water governance," thus offering more flexibility than previous legislation and opportunities for more fluid and continuous learning and adaptation of policies. In this way, many choices remained open to member states. Unlike other environmental directives that set specific targets, the WFD is blatantly a piece of non-target-based legislation. The only exception is the explicit requirement that bodies of water not deteriorate from water from one status class to another. Rather, the obligations lie in the technical and operational criteria for the member states, which can be referred to the EU Court of Justice if they do not follow these principles of action.

In general, the WFD is indeed considered to be the first European directive with a strong focus on sustainability and therefore its introduction, and the innovations it brings, give it a prestigious revolutionary, being considered a potential model and example for future legislation.

In 2019, the Commission published the fifth implementation report of the Water Framework Directive, in which the evaluation of the second watershed management plan and the first report on the implementation of the Flood Hazard Directive.

After two decades of reinforced water policies at European level, the trend of declining water quality has been reversed. Water quality in Europe has generally improved. Several Member States have taken the necessary policy measures and made a few financial investments.

However, in several water basins the results on water improvement will still take time to be visible. A large majority of groundwater bodies have reached the objectives of Directive, while less than half of the surface waters are in good status, although recently some improvements have been made.

In its latest report, the European Commission therefore stated that various EU funds will continue to support these implementation efforts. The path to full compliance with these goals before the end of the third cycle, i.e., 2027, is currently seen as very difficult and currently seen as very difficult. The report emphasizes that the measures planned for 2021 will not be sufficient and that therefore further measures will have to be taken in the subsequent period. Summing up, almost two decades after its introduction, achieving the goals set by the directive remains a major challenge.

In Italian regions the total area is 301,338 km2 (116,350 sq. mi), of which 294,140 km2 (113,570 sq mi) is land and 7,200 km2 is water (2,780 sq. mi). Total area of agriculture is 48.7% (ISTAT, Istituto Nazionale di Statistica, 2010). It lies between latitudes 35° and 48° N, and longitudes 6° and 19° E. This figure represents the extension of Italian territory subdivided by regions.

The aim of this research is to analyse the economic impacts of climatic change on the agricultural sector in Italy at regional scale, insights of policies and mitigation decisions undertaken by the country in accordance with the commitments and the decision of the EU Policy in the light of climate change.

The Intergovernmental Panel on Climate Change (IPCC) was created to provide policymakers with regular scientific assessments on climate change, its implication and potential future risks, as well as to put forward adaptation and mitigation options.

Through its assessments and the verifications, the IPCC determines the state of knowledge on climate change overall the status. With the adoption of the Paris Agreement in 2015, the United Nations Convention on Climate Change asked the Intergovernmental Panel on Climate Change (a United Nations body responsible for scientific research on climate change) to produce a special report by 2018 on the impacts of global warming of 1.5°C above pre-industrial levels and global greenhouse gas emissions.

The IPCC is part of the global response to the threat of climate change and policies aimed at sustainable development and eradicating poverty.

The IPCC shows that limiting global warming to 1.5ºC requires rapid, far-reaching and unprecedented changes in all aspects of society. In addition to certain benefits to populations and ecosystems, limiting global warming to 1.5ºC rather than 2ºC would make it easier to promote a sustainable society. The IPCC draws attention to some

consequences of climate change that could be avoided by limiting its growth to 1.5 ºC. For example: by 2100 global sea level growth would be 10 centimetres lower, the probability of Arctic glaciers melting at sea during the summer would be one per century instead of one per decade, coral reefs would be reduced by 70-90% instead of being lost entirely or nearly so. In addition, net global human-caused CO2 emissions would be reduced by about 45% by 2030, reaching "net zero" around 2050. The IPCC, on which some 90 authors from 40 different countries collaborated, was a key scientific contribution to the Conference of the Parties (Cop 24) held in December 2018 in Katowice, Poland. The reports of TPCC are drafted and reviewed in different stages with the objective to guarantee objectivity and transparency. The cyclical approach of the Water Directive, with specific steps and periodically revisions, which allow incorporating scientific and technical progress, and the integration of other Directive's domains within the text (habitats, agricultural development) make this policy suited to adapt to and manage climate change impacts (Quevauviller, European Water policy and research on water -related topics: an overview., 2014).

Climate change could aggravate future anthropogenic pressures, expected impacts should therefore be considered within the framework of the Directive (Quevauviller, 2011) and (Wilby, Hedger, Forrow, & Blackmore, 2006).

Long extension from north to south of Italian territory makes different areas with a variety of climate and geographic relief. In addition, on-farm practices should ensure that water management is produced under sustainable economic, social, environmental conditions. At the same time, the application of water in agriculture should avoid waste of a valuable resource and be in sympathy with the environment. Understanding, measuring, and assessing how water flows around the farm, and recognising how farming practices affect flows, will help farmers to manage water efficiently and reduce pollution risks.

Economic, environmental, and social considerations are playing an increasing role in agricultural production. The water management in agriculture aims to address the key aspects of water and irrigation management at an environmental, economic, and social level. Emphasis is given to correct management of water, both in terms of quantity and quality. The aim of water management is meant to be completed with specific guidelines and practical tools based on local innovations and adopted to local

prevailing conditions as well as respecting national and European Union (EU) laws and regulations.

Water in its natural state exists in three states: liquid, solid, and invisible vapour. It forms the oceans, seas, lakes, rivers, and the underground waters found in the top layers of the Earth's crust and soil cover. In a solid state, it exists as ice and snow cover in polar and alpine regions. A certain amount of water is contained in the air as water vapour, water droplets and ice crystals, as well as in the biosphere. Huge amounts of water are bound up in the composition of the different minerals of the Earth's crust and core.

To assess the total water storage on the Earth reliably is a complicated problem because water is so very dynamic. It is in permanent, constantly changing from liquid to solid or gaseous phase, and back again. It is usual to estimate the quantity of water found in the so-called hydrosphere. This is all the free water existing in liquid, solid or gaseous state in the atmosphere, on the Earth's surface and in the crust down to a depth of 2000 metres.

Agriculture water use is the sector that will dominate the global withdrawals of water in the future. The Comprehensive Assessment of Water Management in Agriculture (Molden, 2007) posed the question: Is there enough land, water, and human capacity to produce food for a growing population over the next 50 years, or will we 'run out' of water? It is possible to produce the food, but it is probable that today's food production and water is becoming scarce because of trends that are, to some extent, unavoidable, especially population growth and the resulting increased demand for water for food production and domestic, industrial, and municipal uses (Malthus, 1798).

Agriculture, food production and water are inextricably linked. For agriculture production, natural resources are critically important as a basic factor in the development of the agriculture economy and environment. On the one hand, water is an essential input for crop production, livestock, and food manufacturing and on the other hand the nature of agricultural land use affects the hydrological cycle in terms of the partitioning of rainfall between evapotranspiration, runoff and groundwater recharge, and the quality of run-off water in terms of, for example, nutrients and sediment. Water is used in agriculture to grow grass and crops, to support livestock and for general on-farm use (such as cleaning, sanitation, crop spraying), 250 million

m3 y-1 of water is also used by the food and drink industry in processing (DEFRA, 2007).

A "water crisis" is inevitable and the more predictable challenges (or potential crises) can be largely avoided by adjusting the way in which water is managed and governed (Butterworth, Warner, Moriarty, & Smits, 2010). These two important and crucial elements will be discussed in this doctoral thesis.

Nevertheless, water management and good governance contribute effectively to the basic human needs and livelihoods.

However, the right balance of basic measures of water allocation, service provision and management by end users in relation to a variable hydrological cycle and increasingly scarce resource is still hard to define. In a few words, the behaviour of water users needs to be better attuned to the growing reality of water scarcity environmental trends.

2.2 Water scarcity and its impact on agriculture

The issue of water scarcity is considered as an excess of water demand over available supply. Scarcity is signalled by unsatisfied demand, tensions between users, competition for water, over-extraction of groundwater and insufficient flows to the natural environment. The causes of water scarcity are all considered to be related to human interference with the water cycle. Water scarcity is fundamentally dynamic and varies in time because of natural hydrological variability, but more so as a function of prevailing economic policy, planning and management approaches and the capacity of societies to anticipate changing levels of supply or demand.

Science is currently engaged in the understanding and characterization of water functions, as it provides the basis for analysis to formulate appropriate management strategies. In fact, to establish priorities, rights, and management criteria, it is necessary to identify distinct categories of functions and uses linked by highly differentiated water value scales (Naredo, La encrucijada de la gestión del agua en España. El agua: un despilfarro interesado., 2003). For example, (Shamir, 2000) distinguishes up to ten dimensions of water: physical, economic, environmental, social, intergenerational, ethical, scientific, institutional, legal, and political. Water is

not a homogeneous good and its management must be formulated in a clear order from an ethical/functional point of view. According to (Arrojo, 2006) this distinction can be defined as follows:

Water for life: relates to the basic functions for survival for both the human beings (individually and collectively) than to all other living beings in nature. The allocation of the resource for this purpose must be recognized as a high priority and effectively guaranteed as a human right and heritage of the biosphere.

Water for purposes of general interest: concerns the functions of preserving the health and social cohesion, both in urban and rural areas, must be classified at the second level of priority, under the principle of responsible and socially efficient management, in relation to the social rights of citizens and the general interest of society.

Water for economic growth: concerns the functions of legitimate economic development, economic development related to production and private interest, which must be recognized at a third level of priority, in connection with the right individual of all to improve their quality of life, and must be managed effectively according to principles of economic rationality.

Finally, we cannot ignore the consideration of illegitimate uses of water-if not explicitly illegal - for productive purposes. The abusive exploitation of aquifers or irresponsible use in conjunction with the emission of polluting wastes are examples. Such uses must simply be avoided through the strict application of the law.

The role that waters and aquatic ecosystems have played in the course of throughout history for various civilizations has been closely dependent on the way in which nature was understood (FNCA, 2005). The view of nature as the basis of life gave rise to the principle of Nature as Mother in the most ancestral cultures.

However, that symbol was accompanied by a rather threatening vision of Nature, which motivated the need to provide interventions to control it. Through the pre-eminence of scientific knowledge, established by the renaissance and later confirmed by the Illumination, the principle of the Dominion of Nature has strengthened its hold as the basis of modern thought.

The conception of scientific skill as a means of placing nature at the service of man has thus become the basis of the very important concept and model of economic development during the 20th century.

Today, this model has entered in crisis, the principle of the domination of nature has done the same. The challenge for science is no longer focused as much on "domination" as on a better understanding of the environment, to achieve a harmonious integration for our socio-economic development with this natural order.

Thus, the challenge of the 21st century is to develop the principle of sustainability. The key to this shift to the new principle is to move from the concept of domination to the concept of wise and responsible government, based on the ethical principles of justice and respect for the rights of future generations.

The concept of sustainability of the interrelationships of human activities with the water resource has been defined in various ways by international conventions. international conventions. These can be summarized in 4 parts:

Ecological sustainability, which considers water as a natural capital whose irreplaceable environmental functions must be preserved.

Economic sustainability, which considers water as a scarce resource with an economic value and to be managed according to principles of efficiency.

Financial sustainability, which considers water as a service guaranteed through the presence of infrastructure whose financial solidity must be ensured, understood as the ability to reproduce assets over time.

Ethical sustainability, which considers water services as essential goods for which accessibility must be guaranteed under fair, non-discriminatory, and democratically accepted.

The evolutionary dynamics of development concepts can be understood through the description of the traditional water policies and the reasons for the crisis of that model that gave rise to a new paradigm of water policies.

Table 2.1. The main components of the evolution of the principles of management water

	From…	To…
General interest	Infrastructure to increase water use	Integrated management oriented towards sustainability
Target interventions	Water supply and public operations	Intersectoral conflict management and resolution
Finance	Public budget, Forfeit contribution	Cost pricing and economic incentives
Approach	Supply management	Demand management
Decision-making process	Public bureaucracy, construction industries, "large users"	Transparency of information functional to a decision-making and participatory process
Territorial scale	Central administrative boundaries	Decentralized-basin unit
Cost evaluation	ABC of infrastructure	Integrated assessment economic/social/ environment
Professional competency	Civil Engineering	Interdisciplinary
Management	Public Administration	Privat, public participation, coopérations, non profit

Source: elaborated from (Massarutto A. , 2005)

Traditional water management policies are based on the idea that scarce natural resources should be remedied through the construction of new infrastructure. This approach is also referred to as hydraulic structuralism and focuses on interventions in the supply of scarce natural resources (Massarutto A. , 2005). This position holds strong limitations due to low efficiency and problems of economic viability, unfair distribution of costs and benefits, severe social impact and irreversible ecological and environmental impact. As highlighted in the previous paragraphs, scarcity is to be considered a relative phenomenon [(Naredo & Estevan, 2005) (Llamas & Martínez-

Santos, 2005)]. Scarcity of water can result from short-sighted policies, such as the over-allocation of water use licences in a catchment, or the excessive expansion of irrigation areas with free or cheap water for farmers (depending on regions). Agriculture is the biggest consumer of water and in Italian regions, potential water scarcity will impose the need to find new water sources or technologies. Agriculture accounts for 70 percent of global freshwater withdrawals and for more than 90 percent of its consumptive use (from both surface and groundwater sources). It is also the sector with the largest scope and potential for adjustment in water consumption, but this will need to take place against a backdrop of increasing food demand (FAO, 2017).

Agriculture will continue to be the most important user of water in many countries and needs to be brought into the debate based on a clear framework for discussion of its impact, its legitimate allocation and the appropriate management response to the era of growing water scarcity. The real intervention in this issue is the management of water, and the governance of water at national and local level. The problem is present when the demand increases by users and the quality and availability of the resource is decreasing.

In all the territory regions where the infrastructure and the institutions to ensure the reliable, secure does not exist or is not functional and where there is no legal or institutional for improving access of water there is a present scarcity of water in a territory with presence of the resource, all these is present by a bad governance and a scarcity of water management. In this case many causes of scarcity of water resources can be prevented, predicted, and reduced by implementing new techniques and approaches. The causes of scarcity require specific response and treatment and some of the varieties are caused by the natural effects.

The Institute of Comprehensive Assessment of Water Management in Agriculture, states that water scarcity is a critical constraint to agriculture. This institute is occupied for the water management in agriculture including fisheries and livestock, and the full spectrum of crop production from soil tillage through supplemental irrigation and water harvesting to full irrigation in a sustainable environment context.

Water scarcity due to the climatic diversity of certain territories versus others, has traditionally been addressed as a problem of "hydrological imbalances" in terms of

time and space, introducing concepts such as watersheds hydrological imbalances" in terms of time and space, introducing concepts such as river basins or "surplus" regions. This "injustice of nature" perspective has led to an ethical concept of solidarity from regions rich in water or river basins to those with fewer water resources.

This concept, however, is often used demagogically, generally to promote the transfer of resources from less-developed regions to richer ones, aggravating the situation in developed regions to wealthier ones, exacerbating regional and social imbalances over time. The traditional strategies of promoting important hydraulic infrastructures in the name of a supposed general interest are rarely formulated using criteria of economic, social, and environmental rationality (López-Gálvez & Nardo, 1994).

Over the past century, in virtually every arid or semi-arid region of the planet, what has been called a "Silent Revolution" of intensive groundwater use has occurred (Fornés, Hera, & Llamas, 2005). This process has been qualified as a “revolution” since it has brought about drastic changes in water consumption and food availability in those regions. The "revolution" was defined as "silent", because it was achieved through millions of small farmers subject to very little planning and control by the official managers of water policy in these regions. It is a technological and social phenomenon so new that nevertheless remains virtually ignored or misunderstood by most of the international institutions dealing with water (Llamas & Martínez-Santos, 2005).

We can distinguish two main types of water scarcity: Physical water scarcity and economic water scarcity - The first is when there is not enough water to meet all demands, for agriculture, industry and domestically use including environmental flows. Symptoms of physical water scarcity are severe environmental degradation, declining groundwater in gross quantities, and water allocations that favour some groups over others. The second type of water scarcity is described as a situation caused by a lack of investment in water, lack of adequate infrastructure, or a lack of human capacity to satisfy the demand for water specially in semi-arid climates such as Mediterranean Countries in Europe. Symptoms of economic water scarcity include problems in governance, either global or regional levels, so that people have trouble

writing policies and practices for enough water for agriculture or even drinking water. Also, the distribution of water may be inequitable, even the vulnerability of water resources can be present where infrastructure exists. Human settlements, industrial and agriculture are the major sources of water pollution, these activities mostly agriculture could be simply and quantitatively related to the impacts on freshwater systems. This would be an ideal basis for creating legislation, for designing incentive schemes to optimize agricultural practice and for minimizing environmental consequences.

However, it is far from possible. Both agriculture and freshwater systems are complex and the relationships between them make a mesh of many dimensions. For all sectors of the economy, agriculture is the most sensitive to water scarcity.

Although the agricultural sector is sometimes viewed as a residual user of water, after domestic and industrial sectors, it accounts for 70% of global freshwater withdrawals. It is also the sector with the largest scope or potential for adjustment and tries to stabilise rules to be enforced by all countries and regions.

In most regions of the world, evapotranspiration from irrigated agricultural land is by far the largest consumptive use of water withdrawn for human use. Steadily increasing demand for agricultural products to satisfy the needs of a growing population continues to be the main driver behind agricultural water use.

2.3 Irrigation Systems and Management Tools

Agriculture water use is increasing the severity of water scarcity in some areas and causing water scarcity even in areas that are relatively well endowed with water resources. Agriculture, and irrigated agriculture, is undergoing rapid changes and facing both old and new challenges. Farmers across the world must adapt to a world where trade and globalization have rapidly increased interconnection and interdependence between people's production and consumption patterns, and where technological progress and innovation has boosted agriculture productivity. The role of water in agriculture productivity, rural livelihoods and environmental externalities must be correctly analysed through commonly accepted and scientifically robust definitions and water accounting methods. This involves assessing the efficient use of

water at field, irrigation scheme and river catchment scales; considering additional dimensions of productivity; and making macro-economic assessments of the water-related agriculture economy contribution to GDP and global trade. The context of these assessments is a continuum from the point of direct water withdrawal to the point of effective consumption in foodstuffs and industrial commodities.

In the recent past, extensive reviews have been made of the main issues related to water in agriculture and response options in terms of policies and management. Since the agriculture sector consumes about two thirds of all freshwater resources in the world, there is a strong concern over the impacts of future climate changes on the water resources and agriculture production. How already said the agriculture sector accounts more than 70% of the global water demand, and according to the Food and Agriculture Organization (FAO) more than 75% of total agriculture land is rain fed, while the irrigated land produces one half of the world's cereal supply (Siebert, et al., 2010). For many important agriculture production areas, groundwater will remain the ultimate source of freshwater when surface water sources have been depleted. The aquifers that host groundwater are the primary buffers against drought for both human requirements, and crop production. In many concentrations of intensive agriculture, groundwater offers reliability and flexibility in access to water that irrigation canals can hardly match. Within this context, the expected changes in both demographic trends and climate patterns will exacerbate the challenges faced by water resources. The rain fed land will be affected by the precipitation changes, while the irrigation facilities critically depend not only on precipitation, but also on reservoirs performance, which is linked to the glacier-melting rate (Parry, Canziani, & Palutikof, 2007).

Climate simulations suggest changes in precipitation patterns, which constantly increase the water availability in high latitude areas and decrease the water availability in mid-latitude areas.

Regarding extreme weather events, climate models predict an increase of droughts in the sub-tropics by the end of the 21st century (Parry, Canziani, & Palutikof, 2007). Furthermore, it is expected that the irrigation water demand will increase within the range of 5% - 8% globally by 2070. In relation to the local and spatial distribution of

water, at low latitudes, in southeast Asia for instance, early snowmelt could cause spring flooding that may imply a summer water shortage (Bates, Kundzewicz, & Wu, 2008).

The human response within this context of changing climate, with the agriculture sector facing increasing threats, will play a key role. Adaptation strategies can reshape the human system to cope with the expected impacts of climate change, and if possible, take advantage of favourable opportunities. In this regard, the way in which the human system adapts, (autonomously or planned) is very important, avoiding maladaptation, which could have unexpected results (Barker, Bashmakov, Bernstein, & Bogner, 2007). This adaptation should go hand in hand with mitigation policies that can reduce the determinants of climate change (greenhouse gasses emission), reducing the social costs associated with it. The expected changes described above acquire economic meaning as they are expected to modify systems and processes that have impacts on human welfare.

In the terminology of the international literature, both types of surfaces and groundwater have been defined as "blue" water, as opposed to "green" water, which refers to that, coming from the precipitation that is found in the root zone of plants.

Only recently "Green" water has been considered in water resource studies in a quantitative manner and its measurement and monetary evaluation are very complex. An analysis of the role of green water led to the concept of virtual water, i.e., that total quantity required to produce a good or service (Allan, 2003).

In the beginning, the study of virtual water referred to only to the production of food, but progressively it has been extended to the production of all goods and services that make use of the resource in a region (Hoekstra, 2003).

The sum of all the virtual water a country or region needs to provide goods and services for its inhabitants is called the (hydrological footprint). The concept of hydrological footprint is related and in a sense corollary, to that of ecological footprint, enunciated about ten years ago, which refers to the amount of land area necessary for a community to achieve sustainable development. The study of the water footprints of several countries is providing new data and allows for an optimistic view of the so-

called "impending water crisis." We will see if the available data will confirm what some have been saying for some time now: that the supposed water crisis is not a crisis due to physical scarcity of the resource but is essentially a problem of mismanagement (Llamas M. , 1997).

Therefore, in formulating sustainable water management policies, scarcity must be understood as a condition created in most cases for socio-economic reasons and not as a lack of physical resources (Groenfeldt, 2019). For example, some aspects of PAC may play an important role in the "creation" of scarcity by promoting and subsidizing hydro-demanding crops heedless of the availability of the resource in the territory (Gómez-Limón, Gutiérrez-Martín, & Montilla-López, 2020).

Is very interesting explaining how economists think about the conception of water in terms of goods. The distinction between market price and economic value was famously noted by Adam Smith in a passage in the "Wealth of Nations"(1776), describing the paradox of water and diamonds:

"*The word value, it is to be observed, has two different meanings, and sometimes expresses the utility of some object, and sometimes the power of purchasing other goods which the possession of that object conveys. The one may be called value in use; the other, value in exchange. The things which have the greatest value in use have frequently little or no value in exchange; and, on the contrary, those which have the greatest value in exchange have frequently little or no value in use. Nothing is more useful than water; but it will purchase scarce anything; scarce anything can be had in exchange for it. A diamond, on the contrary, has scarce any value in use; but a very great quantity of other goods may frequently be had in exchange for it*" (Smith, 1776).

Smith was using the comparison between water and diamonds to illustrate a distinction between two different meanings of value. In fact, neither the distinction between the definitions of value nor the use of water to illustrate it was original with Smith. Water is a private good and a public good. When water is being used in the home, in a factory or on a farm, drinking water is a private good. When water is left in situ, whether for navigation, for people to enjoy the view or for recreation, or as aquatic habitat, it is functioning as a public good.

Moreover, while the water in a reservoir is a private good, the storage capacity of the reservoir per se may be a public good. By contrast, most of the other commodities

associated with food, clothing or shelter are purely private goods and have no public goods aspect; this is one of the respects in which water is different from these other commodities in economic terms.

The public good nature of water in situ, historically associated with navigation, has had a decisive influence on the legal status of water. In Roman Law and, subsequently, in English and American common law, and to an extent in Civil Law systems, flowing waters are treated as common to everyone (*res communis omnium*) and are not capable of being owned. These waters can only be the object of rights of use (usufructuary rights), but not of rights of ownership. Thus, even though water and law are often complementary inputs, there is a crucial distinction in that land can be owned, while water cannot. For industrial and agricultural uses, the value to users is at least as large as the marginal value of the product. For domestic use, the willingness to pay for water represents a lower bound on its value, as there is additional value to the water as described below. The idea of "water as an economic good" is simple. Like any other good, water has a value to users, who are willing to pay for it. The concept of water as an economic good came up during the preparatory meetings for the "Earth Summit in Rio de Janeiro" of 1992. It was brought forward and discussed extensively during the Dublin conference on Water and the Environment (ICWE, 1992), and became one of the four Dublin Principles:

1. Water is a finite, vulnerable and essential resource which should be managed in an integrated manner.
2. Water resources development and management should be based on a participatory approach, involving all relevant stakeholders.
3. Women play a central role in the provision, management and safeguarding of water.
4. Water has an economic value and should be recognised as an economic good, taking into account affordability and equity criteria.

The interpretation of the concept "water as an economic good" causes confusion. Two schools of thought may be distinguished:

The first school, here called the market proponents, maintains that water should be priced through the market so the “water is just another economic good that needs to

have an economic price" (Savenije & Van der Zaag, 2000). Its economic value would arise spontaneously from the actions of willing buyers and willing sellers. This would ensure that the water is allocated to uses that are valued highest.

The second school interprets 'water as an economic good' to mean the process of integrated decision making on the allocation of scarce resources, which does not necessarily involve financial transactions (McNeill, 2009). The latter school corresponds with the view of Colin Green (2000) who posits that economics is about "the application of reason to choose". In other words: making choices about the allocation and use of water resources based on an integrated analysis of all the advantages and disadvantages (costs and benefits in a broad sense) of alternative options (Savenije H. , 2002). Although the ideas can be traced back to earlier periods, 1992 marks a convenient turning point in the debate on water pricing: in 1992, the Dublin International Conference on Water and the Environment proposed a set of four principles, the fourth of which underscored that "managing water as an economic good is an important way of achieving efficient and equitable use, and of encouraging conservation and protection of water resources". In this consideration it is very confusing to have a precise idea for this concept because it is very variable in a different contest.

Externalities

First at all we would like to explain what the concept of externalities for the water resource mean. As a fugitive resource, water results in pervasive externalities. The most common externalities are those associated with the impact of an upstream diversion of water or with the release of pollution on downstream users. There are also externalities due to over extraction from, or contamination of, common pool resources such as lakes and underground water. In general, the agriculture sector can produce externalities due, for example, to the agricultural production in irrigated areas damaging the markets for upland non irrigated agriculture or forcing them to change their inputs. The standard economic approach to externalities is to define the system in such a way as to "*internalize the externalities*", which means that political, social, or economic instruments are used to include the external costs in the economic model.

Private solutions can be based on moral or social codes like charities, contracts, bargaining or negotiation (Mankiw, 2003). "An externality arises when a person

engages in an activity that influences the wellbeing of a bystander and yet neither pays nor receives any compensation for that effect".

In this point we would like to separate the economic and environmental externalities, realizing that in some cases it will be difficult to distinguish exactly between them.

The externalities may be positive or negative, and it is important to characterize the situation in each context and estimate the positive or negative externalities and adjust the full cost by these impacts. Externalities also exist in the form of spatial externalities and inter temporal externalities. Most actions take place in one area or time, but the effects are transferred to another area or generation.

The two important types of externalities are:

Positive Externalities occur, for example, when surface irrigation is both meeting the evapotranspiration needs of crops and recharging a groundwater aquifer. Irrigation is then effectively providing a "recharge service".

However, the net benefit of this "recharge service" will depend on the overall balance between total recharge (from rainfall and surface irrigation) and the rate of withdrawal of groundwater. Under conditions where groundwater is being "mined", the recharge from a surface system provides a net benefit that will be equal to the value of net additional crop output attributable to this additional volume of water. When the total recharge is greater than total withdrawal (but still does not result in a high groundwater table), the net benefit from the recharge service will be equal to the reduction in the cost of water pumping. This saving in costs may be small (equal to the cost of fuel or electricity) if it does not result in significant savings in investment costs because of a higher groundwater table. Hence, the net benefit of the positive externalities would have to be carefully assessed against the additional capital costs of reservoirs and the costs of conveyance and distribution of the "leaky" surface irrigation systems. Water use or the use of water bodies can be subdivided into two main types: direct and indirect use.

Direct use includes all types of use, where water directly becomes part of the product or is consumed in the process of production for example hydro power, irrigation or washing water vegetables.

Indirect use includes all types of uses, where water is influenced as a side effect of the production, where the water "use" has no direct impact on the success or failure of

the production process and the resulting product, for example the erosion on agriculture sites. Excessive rainfall does not play a role for the success of agriculture. Instead during such events most rainwater is lost, because of low infiltration and fast surface run-off. Through the erosive processes and the transport of sediments, nutrients and pesticides, water bodies downstream are influenced, because they must bear the costs for sediment removal or damages due to sediments during flooding.

Negative Externalities may impose costs on downstream users if the irrigation return flows are saline, or where return flows from towns impose costs on downstream water users. One method used to account for these externalities is to impose a salinity levy on users, depending on their water use patterns. This is used in the Australian state of Victoria, and the surcharge is determined by the cost of restoring the saline water to its original condition (and is generally greater than the abstraction cost which users must pay). Where return flows from towns impose costs on downstream users, one approach (in the German Ruhr and French systems, Briscoe 1995) is to levy a charge on urban consumers for restoring the wastewater to an acceptable condition. These negative externalities should result in additional costs to users who impose these kinds of externalities on others. In practice, few pure positive externalities and few pure negative externalities exist. In most cases, the best we can do is talk about externalities in "net" terms. Agriculture sector represents an economic branch which brings multiple benefits, such as food security for all. On the other hand, this sector also gives rise to negative externalities, such as water and land deterioration due to agrochemical pollution (Adegbeye, et al., 2020) significant water resource demand and the production of pollution emissions (Maia, Silva, & Costa, 2016).

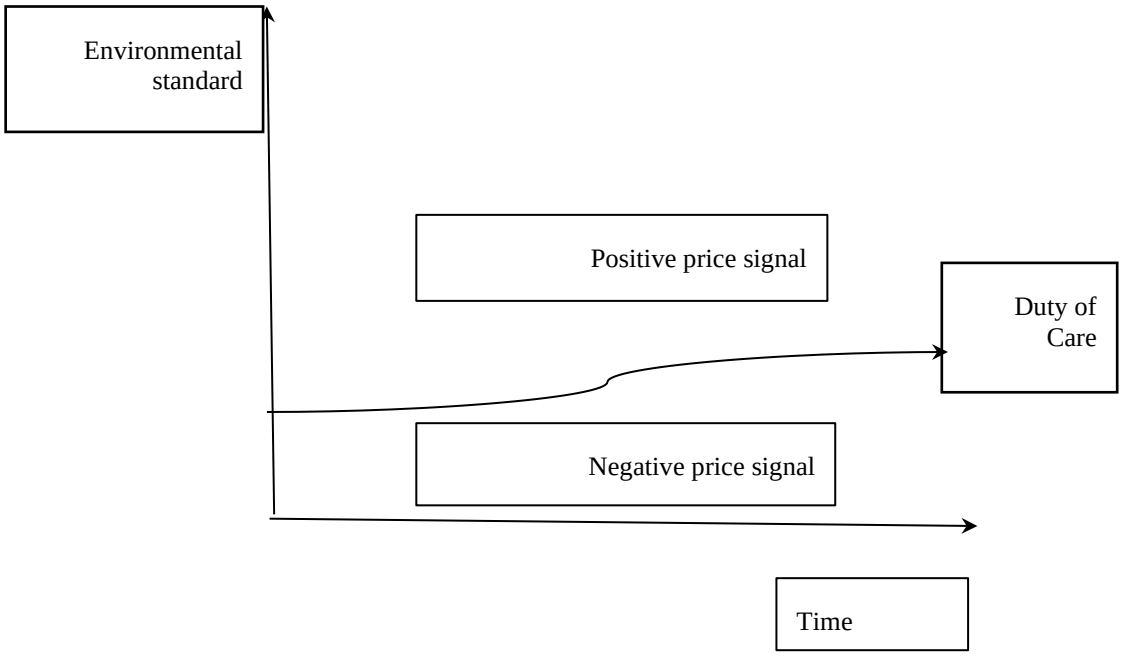
The benchmark for defining what is negative and what is positive depends upon the definition of individual rights to use the environment and natural resources. Often the benchmark chosen is the status quo. For example, if water is returned in a cleaner state than it is removed then this action is defined as a pure positive externality.

If the returned water is more contaminated than it was when extracted from the natural system, then this action could be defined as production of a pure negative externality. This is the way most economists define externalities. Generally, use rights and obligations are defined in legislation, regulations, and catchment management plans. Real property arrangements and license conditions also affect such definitions,

as do the low and the different directives. Collectively, all these mechanisms define each person's duty of care for the environment.

Duty of care for the environment is a term gaining gradual acceptance in rural areas. Duty of care is a new concept for urban water users (Gunningham, 2017). Often the implied definition of duty of care suggests some degree of social acceptance of tolerance of practices that degrade the environment.

Figure 2.3. Dynamic nature of the distinction between positive and negative externalities



Sources: CSIRO Urban Water Program, 2000. Managing Externalities: "Opportunity to Improve Urban Water Use". Policy and Economic Research Unit (CSIRO Urban Water Program, 2000).

Water users can create some "negative" externalities but not too many. As there is no market to produce externalities, complex community consultation and planning processes are used to define duty of care. Acceptance of a duty of care benchmark means that any activity that produces an outcome above this standard is a positive externality. Duty of care, however, is not a static concept. Management plans often propose to change the way duty of care is defined. Most catchment management plans

suggest an expectation that standards will be raised through time and raised without payment of compensation. For example, the discharge of secondary treated sewage to many river systems was considered acceptable until algal blooms become common. Now, in many areas, tertiary treatment is required. Duty of care is an evolving concept.

Catchment Management plans can define duty of care as a set of minimum water quality objectives that all users must pursue. This means that positive externalities may initially be most appropriately dealt with using positive price signals but, at some stage in the future, be more appropriately managed via the use of negative price signals.

Further explanation is necessary to clarify this point. To speed adjustment, initially, people causing the externality might be paid an incentive to encourage them to change practice. After an appropriate period, however, all might be expected to adopt the preferred practice. When compliance becomes a duty, those who do not comply should be penalised via the imposition of levies, fines, etc. Different tools are used for the irrigation system in Italian Regions, one of the most important is IRRINET in Emilia Romagna region. At a general level in Italian regions, different irrigation practices coexist within irrigation agencies and take into consideration different requirements of users, the requirements of different crops grown (overall, seasonal, various phases of the cycle) and the specific time of watering in each area (soil, hydrological conditions, amounts of water, etc.). The agriculture practice and the structure characteristics of agriculture holdings are associated with the different irrigation practices adopted in the common area. In the locations where greater crop diversification and high-income farming (e.g. the Liguria Region) procedures tend to be extremely variable also in circumscribed areas where one type of crop (e.g. corn) clearly prevails. There are medium-large farms in which the procedures adopted tend to be far more standardized (Zucaro, 2014).

Finally, most of the management problematic issues occur generally when the method adopted is more rigid or, in any case, when the agricultural/farming structure is fragmented. Conversely, when a more flexible method is possible, or when networks are serving an area with a predominance of large land ownerships, the problems concerning satisfaction with irrigation service are mitigated (Zucaro, 2014).

2.4 Water policies in European Context with focus in Italian Regions

Water policies and water government are two important topics for the environment and the human wellbeing in the agriculture sector. The green revolution and subsequent progresses in agronomy have helped agriculture production outpace population growth and feed an ever-increasing number of people with ever more diversified food of increasing quality. But it has also come with a large environmental cost. There is another side to these trends, however.

The absolute number of malnourished people, most of them in rural areas, does not decrease, and agricultural productivity in many developing countries remains low. The possible impact of climate change on water resources and water demand is uncertain, and likewise for the potential impact of bio-energy production on agriculture and food security. The recent surges and increased volatility of food prices since 2007 are a strong warning of the dangers of complacency about long-term food supplies. Agriculture is both a cause and a victim of water scarcity. Inter sectoral competition for water is most obvious in the hinterlands of large urban centres, but water scarcity can arise in all catchments where the intensification of agriculture in headwater areas reduces water supply downstream.

The major concern is that agriculture production will decline in highly populated areas at a time when demand is rising, and the issue of food security is coming to the fore in all regions. Currently water resources are facing several stresses in terms of quantity and quality. These pressures are closely related to the human interventions carried out in fields such as agriculture, construction, management of reservoirs, land-use, land use change, pollutant emissions, and water, wastewater treatment, among others (Bates, Kundzewicz, & Wu, 2008).

Growing pressure exerted by human activities on the environmental systems has led to widespread sensitivity towards ecological issues in countries with advanced economies, together with the introduction of regulatory provisions aimed at regulating and limiting depletion of natural assets as in Italian regions. For instance, in 1987 the General Assembly of the United Nations, World Commission on Environment and Development (WCED) published a report titled “Our Common Future”.

The aim was to propose long-term environmental strategies for achieving sustainable development by the year 2000 and beyond. On the other hand, Agenda 21 is an action plan of the United Nations regarding sustainable development. This plan has been elaborated in the Earth Summit held in Rio de Janeiro, Brazil, in 1992. Both these documents were multilateral and interdependent in terms of sustainable development concerning the formal political development sphere that can be executed at national, local, and global levels. In this context, water management in agriculture has attracted ever growing attention in European countries; they all have different laws, rules and environmental policies concerning water management (Bontempi, Broekman, Palladino, & Setti, 2005).

New environmental policies were needed since human beings realized to be the principal cause of environmental transformation because natural resources have been used without any control. Thus, different organizations and institutions were formed to prevent, protect, and manage the environment. Because the connections between global environmental change and the concepts of social sciences and human interventions are rarely obvious, social scientists who begin with important concepts in their fields have often directed their attention to low-impact human activities (Stern, 2000).

Different Scholars have discussed the sustainable theory regarding the future generation from different points of views. For instance, the present generation has a fiduciary responsibility to see that future generations should have the right to use the natural resources and can access them (Acreman & Dumbar, 2004). Other theories discussed that the present generation cannot know either the value preferences of future generations or predict the physical conditions in which they will live, especially far into the future (Braudel, 1992). Edith Weiss Brown in her book; “Principle of Conservation and Options” holds that: “Each generation should conserve the diversity of nature and cultural resources to ensure both sustainable human progress and human survival”. In this context, managing the water resource in agriculture for the present generations without enhancing the future generations makes the process of sustainability more complex. For this reason, the different directives of management of water resources on a global level do not offer a blueprint action.

One of the most important water policies is the Water Framework Directive (WFD), which established a framework for European Community action in the field of water policy. It was adopted in October 2000 and published in the Official Journal of the European Community in December 2000.

The implementation of Article 9 of the WFD (which requires Member States to take account of the principle of recovery of the costs of water services, including environmental and resource costs) is important for strengthening water efficiency. In Portugal for example the consumption of water started to be paid and for this the farmers and the stakeholders started to be more efficient in use of it. Indeed, it has been acknowledged that water pricing and non- pricing measures have a high potential to provide an incentive for more efficient water use and thus help to achieve. It is known as the Water Framework Directive (WFD), which provides for all European countries a solid legislative instrument basis for long-term integration for the protection and management of water resources. In terms of protection the Dublin Accord on Water and Sustainable Development laid an obligation to sustainable water resource management and protect the environment.

Human health, welfare, industrial development, food security, sustainable agriculture and the ecosystem are integral parts of the European economy and society. Those are all at risk, unless water and land resources are managed more effectively and tried to have a decision-making process in the present decade and implementation of the more sustainable development and sustainable agriculture decisions for the future generations (FAO., 2018).

The Dublin Accord also promoted that water should be treated "as economic good" rather than be treated as a free good, originated in the International Conference on Water and the Environment (ICWE) in Dublin in 1992. The conference Report sets out 4th important recommendations for action from everyone at local, national, and international levels.

Important principles were later summarized by Global Warming Potential (GWP), describing the water management as main tools for the equitable and the efficient sustainable management of water use, recognising the water as an integral part of the ecosystem, as a renewable natural resource and as social and economic good. Although

the importance and the link between water resource management and the sustainable development for a social equity and environment sustainability is now part of the UN's Global Goals. The 17 Sustainable Development Goals (SDGs), agreed upon in 2015 by world leaders, aim to create a better future world by 2030, with focus on clean water and sanitation and climate changing and environment degradation (topics that we discuss in this research thesis), including of course all the other goals as are all interconnected (SDGs, 2015).

Although the economic valuation provides instruments such as water pricing, property rights and the opportunity that people are willing to pay (FAO, 2006). Nowadays, water use in agriculture in the considered Southern European countries is around 70% of the total water use.

The main linkages between sustainable management of water in agriculture and policies regarding adaptation strategies is the participation of farmers. Their presence improves economic efficiency on decision making in agriculture making more effective the use of water resources. Governments play the principal role on investing and informing the farmers about all the new practices for a more sustainable agriculture and more sustainable water use.

Moreover, to consider with major observation is the motivation of farmers to participate in the meetings and their willingness to follow such policies that governments or ONG-es propose. The implementations and the diffusion of the information are the main object of the positive results in terms of collective participation. The main concerns are the different attitudes and aims of farmers, the different educational level, culture, age, and how they are influenced by the groups to which he or she belongs. Of course, very important is the individual interest in applying the new knowledge on water management and activities on performing the behaviour as their own (Deci & M., 2008).

Finally, in terms of policies the governments need to improve economic efficiency and environmental effectiveness of policies with pressure from urbanisation, industrialisation, and climate change. These policies will provide guidance to decision makers in agriculture with more competition for water resources, water supply, its status and management in agriculture.

CHAPTER III

IMPORTANCE OF AGRICULTURE EDUCATION AND TRAINING OF SOCIAL FARMING ASSESSMENT

3. Introduction

The correlation between Education and Development has been widely investigated under the point of view of Economics, referring to the labour-intensive sectors and effects on their efficiency, as well as in the Social Sciences point of view, by focusing on the characteristics of the rural population, structure and cohesion, gender issues and the output it has on the development of agriculture in a given area. Referring to access policies into Agri-environmental schemes we will discuss the adoption of new technologies for sustainable rural development, environmental enhancement of the farm and the caution laissez-faire attitude to environmental protection. The data set selected for elaboration on this article are produced by the Istat (Italian National Institute of Statistics), Crea (Council for Agricultural Research and Economics) and Eurostat series from 2010 to 2019. The methodology in producing statistical information from Istat is devoted to the navigation of metadata describing the quality of production process in primary surveys and secondary studies within its characteristics as, information content, activities to develop quality of the production process, monitoring and evaluating errors.

Level of education in agriculture represents an element of potential empowerment since the ability to improve one's lifestyle and participation in broader social and economic processes.

Different approaches of education and training of farms which have to be proven valuable in strengthening their ability to achieve sustainable agriculture and consequently to achieve food security.

The indicators such as education level, age and gender have influenced social policy makers and the decision-making of producers and the managers. The results of this research are to investigate and affect factors on agricultural development by proposing a specific framework of analysis and interpretation including correlations existing between age, education and farmer contractors, demographic density changes and the empirical approaches, adopted by rural sociologists.

This research opens a discussion in the scientific point of view and policy making processes on sustainability of water policies and environment issues in the agriculture sector, examining the intricate process of sustainable development. Sustainable Development has since a very long time been at the centre of attention of the European Commission and Agricultural Ecosystem and Environment (EC – AEE).

Sustainability means satisfying our own needs of the present without compromising the capacity of future generations, guaranteeing the balance between economic growth, care for the environment and social well-being.

The statistical information process extracted on-line from Italian national Institute of Statistics (Istat, 2021), the website allows us to consult and collect some data dissemination. The central framework of these data available is to put in evidence factors improving and responding to our perplexities and doubts.

Over the last decades development issues and the process of evolution in rural activity or farming has faced an increased emphasis on rural areas. This process seeks progress on social change and sustainable economic development for the rural community's ongoing relevance on environmental change.

Farmers' education significantly affects the farming activity itself, and at the same time it represents a tool to improve the economic, political, and social situation of farmers themselves. Furthermore, farmer's education has a significant influence on the progress, conservation, and care for the environment. (Burton, 2006) writes, the influence that farmers' have on environmental behaviour include age, education, experience, and gender. These personal features are measured because they influence the choices people make, and consequently provide an indication of how one group of farmers (e.g. older, female, less experienced, better educated) will behave given a

delicate circumstance. We need to figure out how the influence of farmers could affect economic growth, improving social conditions and workers' conditions according to a bottom-up approach, through the participation and the investigation of the intergenerational impact of farmers' educational attainment on rural development (Alphonsus & Sabran, 2016) Sustainable Rural Development Programme (SRDP) can be defined as a process of multidimensional change affecting the existence of the social and ecological conditions necessary to support human life at a certain level of well-being through future generations (Earth-Council., 1994).

Sustainable Rural Communities should integrate and internalise the process of cohesion on integrity policies, improving training on environment knowledge, adopting new technology opportunities, properly integrating them for preserving and protecting the environment (Chiodi, 2018).

However, the identification of factors with relevance over the cohesion between education and actual participation is one of the purposes of this paper. The same goes for the investigation of the connections between age and the level of education and the impact they both have on the overall economic level of farmers in different areas of Italy. Some scholars argue that conceptualizing rural behaviour of the group which farmers belong to has different attitudes and aims on educational level, age, and financial incomes (Miftari, 2019).

This research will investigate the relationship between education, age, and behaviour on farmers' choice to participate in European programmes for young farmers. In specific the strategy of young farmers will be investigated. Our interest is to show how those variables influence the welfare of farmers on agriculture activity and which is the access to financial contribution they perceive in different Regions of Italy from the European Commission. A political assessment has been discussed and implemented by the European Community. Illiteracy, the well-organized contribution of farmers and the implementation of environmental policies from the government are some of the common problems affecting the challenges in the Sustainable Agriculture and Rural Development (SARDP) process in the Italian Region (FAO, 1999). Rural Development (RDP) manages and facilitates the access of farmers promoting innovative techniques for young farmers between the ages of 18 and 40 who are

owners of an individual business or a farm. This programme under the Rural Development Programme (RDP) 2014-2020 is financed from the European Community ``Support for local development" Rural Development Programme (RDP, 2015).

We will investigate over a large scale of ages the so-called "young farmer" that is extended from 35 to 65 years old, as well as discuss which are the policies and the options to increase productivity in farming approaches in the social and environmental local context.

3.1 The role of agriculture education and training on agriculture sector

Farmers' education requires ongoing innovation for increasing the knowledge for the development of technology tools into their daily operations. Sustainable management promotes the respect versus environment affecting agricultural operations, and increasing the profit of farms income without sacrificing the quality of life i.e. food. Agriculture sector has a significant pressure on natural resources (water, land) . Its activity aims to be sustainable for protecting the environment and the society (Daci, 2012). Sustainable agriculture is defined as the ability of farmland to produce food and other agricultural products to satisfy human needs indefinitely as well as having sustainable impacts on the broader environment (Moini, 2012). Sustainable agriculture is a broad issue as we have elaborated the data here. It includes considerations of productivity goals; environmental stewardship; farm profitability and rural welfare objectives as well as consumer health; enhancing the quality of life for farmers and society (Pugliese, 2001). The social behaviour of farmers toward a greater sustainable awareness and the care of land production and conservation is correlated with the level of education and age (Burton & Wilson, 2006) (McGuire, Morton, Gordon, & Cast, 2015). Regarding age (Zagata & Sutherland, 2015) writes that the 35 - < 45 years age group, which is the focus of European policy, generates more value for agriculture than their older counterparts, and therefore may indeed be part of the driving force for Rural Development, rightly hoped for by the European Commission. The implementation of recent reforms of the European Union's (EU)

Common Agriculture Policy (CAP) focused on making agriculture more sustainable and market-oriented (European Commission, 2015). The young farmers are defined by the EU as less than 40 years old, who receive subsidies from European contributions. Of course, the greater involvement of the European Union is needed for the new entrants to farming, as entrepreneurial innovators approving to and amenable with the goals of the CAP (Hamilton, Bosworth, & Ruto, 2015).

The European Commission has identified the declining number of farmers in the European Union, especially in Italy. In the early 90's the European Commission in collaboration with agriculture and Rural Development started the new agreement on Cap reform reached in 2013 (Gravsholt Brusck, 2002). It refers to the following considerations as factors of production, commercial accomplishments, and price.

Moreover, following the publications of proposals of the CAP reform, all eligible young farmers will receive European Contributions (EC., 2013).

Other academics think that the trend of age should not be considered as the main indicator of farm performance or management practice, even though they are more open to change, be more technological and sustainable, and play a very important role in agriculture decision making (Ondersteijn, Giesena, & Huirne, 2003) (Zeneli, 2016).

In this context, we have analysed for different regions in Italy how the age of farmers influences the social dimension of the agriculture sector and the positive strategy of the orientation of sustainable agriculture.

One of the important indicators taken into consideration is the level of instruction on the age of farmers. In this paper, we critique the assessment made by the EC regarding the age of farmers as a unique indicator of considering the "young farmers" from 35 to 45 years old in the agriculture sector. Our work will examine future farming on the regional level in Italy but could be taken into consideration at the EU level too, considering the "age of farming" from 35 to 65 years old – as the most active age on efficient agriculture and the most potential group on developing and preserving their own experiences in the long term.

The Istat National Institute of Statistics in Italy conducts a survey every 10 years at the national level on the agriculture sector. The last survey was accomplished in 2010.

We have elaborated the data and we have shown the correlation between age and level of education. The division on five geographical regions in Italy have the scope to show more clearly the concentration of the percentage of age of farm manager (De Rosa, Bartoli, & Chiappini, 2013).

The region with a high percentage of farm managers is North-West of Italy 62%. Is important to mention the reason why our data is divided into three groups of ages; first group - less than 34 years old – this group of farmers is the lowest group in all the country, confirming the assumption that the number of youngest farmers is very low. The second and largest group and the most important is the analysis of distribution of farmers aged between 35 to 64 years old, the most active and more interested in agriculture. Is important to show this concentration of farmers in this group of age and try to bring some challenges while remaining coherent with other EU policies.

The enhancement and improvement of the EU contribution in supporting and encouraging producers is expected to influence the development and growth process. The young farmers in general are concentrated on achieving social and environmental aims instead of being oriented on farm business development (Zagata & Sutherland, 2015). On the other hand, authors as (Fuentes, Gallego, García, & Ayuga, 2010), (Dias & Franco, 2018) are concerned that social and economic aspects of rural farms based on entrepreneurship are becoming in the interest of the "age of farming" interest. Zagata and Southerland (2015) found that new entrants, rather than younger farmers per se, were more likely to be involved in value-added farming activities (e.g. alternative agri-food networks, local certification schemes), capitalising upon their urban network and experience.

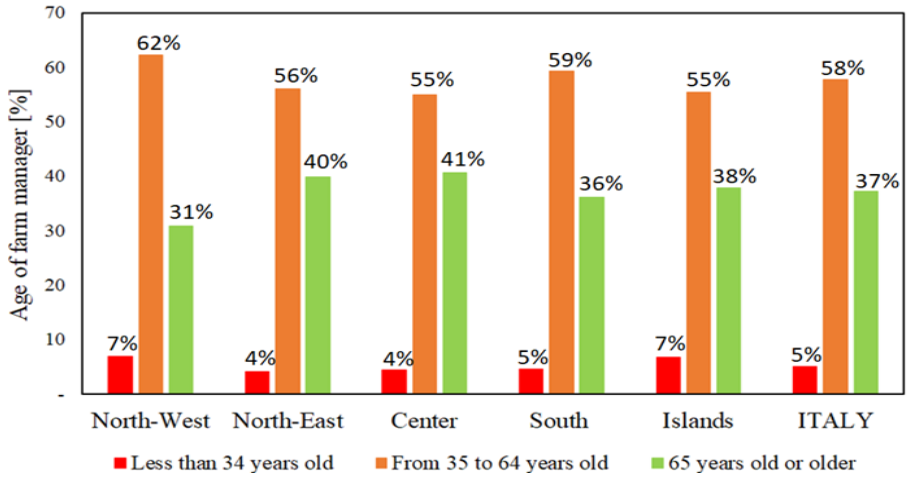
The income of farmers is low, and it is difficult to have right and exact data about this issue. Istat estimates show that agricultural households have a pre-capita average expenditure lower than families in which the reference person is employed in other sectors of activity (Istat, 2019).

The decision to put together the large group of farmers at the same cluster (35-65 years old), is because this group represents the recreationally and multifunctionality of new-old farmers so called from Miftari (2019) "age of farming". The last group of distribution shows the distribution of farmers from 65 years or over. This percentage

is almost considerable and important in the agriculture sector for the Italian regions mostly for the role and the attitudes of historical development and culture, which characterizes (Best, 2009).

The correlation between age of farming and education has been reflected in the management and the innovation of the type of farming. Where the level of education is higher in the management of farms, the tendency is to be more sustainable and more competitive for the market that follows all the new approaches and methodologies of the competition for more protection of the environment and nature. Furthermore, the sustainable farms management retained a salience and currency in contemporary society in addition to having played a prominent role not only for farmers' lives but have an important role in the historical development of Italian country.

Figure 3.1. Age of farms in different Italian geographical regions



Source: Data from ISTAT (2010). Author's calculations.

A summary of the main results realized from the 6th survey of Agriculture made by ISTAT, is showing that the number of farms decreased from the year 2000 to 2010 (Istat, Italian National Institute of Statistics, 2019). About 99% of farms operate on family labour and the 30.7% of the company leaders are female. The total number of farmers in Italy is 1.620.884. For instance, the first group of farmers less than 34 years old amounts to several farmers 82.111 expressed in percentage is 5%. The second age group from 35-65 numbered several farmers 935.387.00 expressed in average is 58% and the last age group 65 and over numbered several farmers 603.386, expressed in

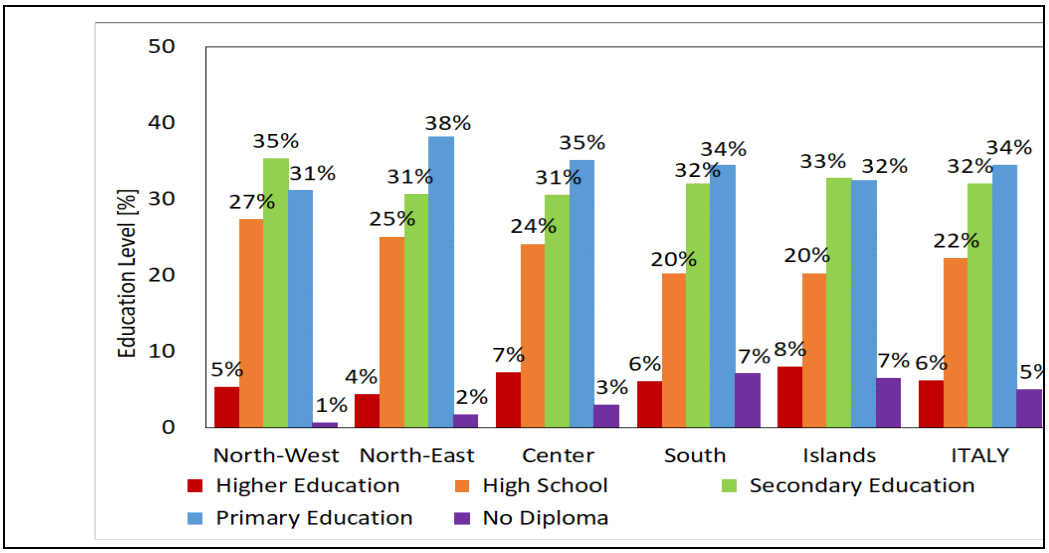
average is 37%. Statistical comparison on education level of farmers in Italian regions in a generic point of view is very low in the agriculture sector.

Above we have analysed and elaborate the variables adopted for this purpose were the following: age of the conductor, company size, level of education (divided into two classes: elementary school, secondary school, and university, aggregated into a single class), training of the entrepreneurs (divided into two classes: low and medium-high), time dedicated to training courses (h/year) and, finally, membership in forms of cooperation. Related to this indicator the education level is performed in the chart above. The comparison is made for all the farm managers of the Italian regions taking in consideration the data available from Istat.

The percentage of farmers with a high education level is only 6%. Primary education and secondary education are the biggest and representative groups of farmers. Overall, 5% of farmers in Italy do not have a degree, in this group are included the third age group of 65 years and over, of course this group of farms are a considered number of activities, and this is the principal economic activity.

From the analysis it emerged that overall sustainable agriculture grows with the increase in the size of the farm, is improves when the level of training of agricultural entrepreneurs is intermediate or high - with training acquired both through specific courses and following the acquisition of a degree, particularly in Agriculture - and also increases in the presence of forms of cooperation.

Figure 3.2. Comparison of education level of farms manager in Italian regions



Source: Data from ISTAT (2010). Author's calculations.

Is important to mention that the level of education of farmers in Italian regions as demonstrated is low, this is strongly related to the organizational culture background and the integrated system of structures as a basis for the implementation of knowledge management in the agriculture sector. Moreover, there is a relationship on the performance of education due to the differences between general education and formal agriculture education, whereas other studies support the theory that the content of the education is crucial in the overall outcome of these processes. Effectively age links to education via a cohort effect, where experience of farmers is a direct effect of age, and experience and education are connected via the tendency of both to enhance cultural capital and thus socially appropriate courses of action (Burton R. , 2014). The data above mentioned an average of 34 % in almost all the Italian regions with primary education and secondary education, respectively 65 years and over. Regional differences on education level are related with the small-scale farm and general traits to development and the opportunities for young farmers in rural areas to apply for substantial economic incentive to make business. The findings relating farm size to the number of young sole holders suggests that there could be considerable regional differences; mountainous regions, island regions, for example, are typically characterized by small-scale farming and may therefore have lower numbers of young farmers in other regions (Pinter & Kirner, 2014).

3.2 Farms' structures and engagement in sustainable agriculture

Farm structures in Italian regions are different for their form and composition. Here is the distribution of the total number of farms for all the Italian regions for the year 2018. The data is extracted from Eurostat Database and the elaboration of the data is my own elaboration. There is represented the total of Organic farming too for the same year, having in this case a comparison of the data.

The increase continues from the origins to transform organic farming into a lifestyle widely spread and consolidated in the eating habits of Italian families.

A metamorphosis made possible thanks to the increasing protagonist of the large-scale retail trade, which, through a wide range of products at competitive prices has brought organic food closer to new and broader groups of consumers, becoming today the main place of purchase.

Recognizing organic farming as an important market opportunity and taking advantage of the financial incentives available from the CAP, more and more farmers have decided to invest in the sector. In the last 10 years, the number of companies producing, and processing organic products has overall doubled and at the same time also the surfaces destined to organic farming have grown by 60%.

In 2018, spending on organic food products touched 2.5 billion euros, reaching a 3% share of the total value of agribusiness. Growth in the first half of 2019 was limited to +1.5% compared to the same period in 2018, slowing down compared to the rates to which the sector had accustomed us to in the past.

The reason for this deceleration must be sought in the now important size of the industry's turnover, which makes a smaller year-on-year increase physiological.

Table 3.1. Agricultural enterprises by legal form and classes of Utilized Agricultural Area (UAA) - Year 2018, absolute values.

Legal Status	Classe di Sau					
	Until 0,99	**1--4,99**	**5--19,99**	**20--99,99**	**100 e over**	**Total**
Individual entrepreneur	50.064	95.813	126.656	68.360	8.179	349.072
Joint Company	7.280	5.747	14.464	17.333	4.379	49.203
Cooperative society and other forms	6.862	2.250	3.646	3.496	1.216	17.470
Total	**64.206**	**103.810**	**144.766**	**89.189**	**13.774**	**415.745**

Source: Istat Author's elaboration 2021

Many farms are concentrated as individual entrepreneurs with a number of 349.072 farms unit for a total of 415.745 farms for the year 2018. The overlap from the UAA category are the two sizes from 1 to 4.99 and 5 to 19.99. In this group are concentrated the most relevant data for all the other groups of farms as Joint Farms, Cooperative society and other forms and of course the individual Farms.

The increase continues from the origins to transform organic farming into a lifestyle widely spread and consolidated in the eating habits of Italian families. A metamorphosis made possible thanks to the increasing protagonist of the large-scale retail trade, which, through a wide range of products at competitive prices has brought organic food closer to new and broader groups of consumers, becoming today the main place of purchase.

Table 3.2. Distribution and elaboration of number of farms in all Italian regions

Italian Regions	Tot. Farms Year 2018	Tot. Organic Farming Year 2018	Italian Regions	Tot. Farms Year 2018	Tot.Organic Farming Year 2018
Piemonte	31.730	3555	Marche	11.613	6138
Valle d'Aosta	874	44	Lazio	19.931	7762
Lombardia	28.631	2034	Abruzzo	10.978	3296
Liguria	5.189	207	Molise	4.527	1305
Bolzano	12.614	2000	Campania	24.806	4862
Trento	8.583	1250	Puglia	49.894	15023
Trentino-Alto Adige	21.197	3190	Basilicata	7.512	4437
Veneto	44.220	1879	Calabria	24.927	24571
Friuli-Venezia Giulia	8.066	1775	Sicilia	42.447	30320
Emilia-Romagna	36.125	7317	Sardegna	16.970	4033
Toscana	19.784	8239	Total	415.745	135.549
Umbria	6.324	2312			

Source: Eurostat 2021 - Author's elaboration

The table below shows the distribution for region of the Total number of general farms and organic farms for the year 2018, data was extracted and made an own elaboration from the Eurostat database (Eurostat, 2021).

Based on the data available from Eurostat for the year 2018, we can develop a sustainable index to assess the evolution of the Italian organic farms compared to partially organic and conventional ones. A total of 16 simple sustainability indicators were identified (Table 3.2), eight of which are focused on environmental nature issues, three of economic nature and five of a social dimension. The overall sustainability indicator was obtained by aggregating the simple indicators normalized for each sustainability dimension (index composed of for each dimension of sustainability (compound index) and from the sum of the compound indicator.

The processing of national data on Organic Operators shows, compared to the year 2017, an increase of 4%, with more than 3 thousand more operators, for a total number of 79,046 units, included in the certification system for organic agriculture. In detail, there are 58,954 exclusive producers (farms) , 9,257 exclusive preparers and 10,363 producers/preparers and 472 importers. The analysis of the regional distribution of organic operators confirms the supremacy of Calabria (11,030 units), Sicily (10,736 units) and Puglia (9,275 units). In 2018, there were double-digit increases figure, compared to the previous year, in Campania (43%), Emilia-Romagna (20%), Lombardy (18%), Autonomous Province of Bolzano (15%), Friuli-Venezia Giulia (13%), and Abruzzo (11%). Organic farms in Italy represent 6.1% of total farms; this incidence is quite uniform for the main areas of the country.

Table 3.3. The dimensions of sustainability and their indicators in agriculture sector

Dimensions of sustainability	Simple Indicators
Environmental Dimension	Crop/Breed Biodiversity (BC, BA) Forage self-sufficiency (UF) Set aside Anthropogenic nitrogen (simplified) Consumption of plant protection products (CP) Gaseous emissions from livestock Fertilizer consumption (CF) Total energy consumption (UDEN)
Economic Dimension	GVA/intermediate consumption Net value added/SAU (VAn/SAU) VAn/ULT
Social Dimension	Agricultural Employment (ULT/UAA) Presence of young people in the company management Presence of women in the company management Risk of agricultural activity abandonment Stability of agricultural employment

Source: INEA Istituto Nazionale di Economia Agraria (2013).

The simple indicators were first normalized and then have been aggregated for each dimension of sustainability and, from the sum of the three compound indicators, the synthetic sustainability indicator was obtained, whose value ranges from 0 (low sustainability) to 1 (high sustainability).

The analysis showed that just over half of the farms examined had an overall sustainability index equal to unity.

The analysis showed that the most sustainable farms are those characterized by a large physical size, led by professional farmers, young people and belonging to cooperatives and more competitive. Similarly, the author (Gomez-Limon & Riesgo, 2009) developed the global sustainability index at the farm level on a sample of irrigated farms located in the Buero basin (Spain), and with reference to six policy scenarios13, using the techniques of PCA (*Principal Components Analysis*), AHP (*Analytical Hierarchy Process*) and MCDM (*Multi-Criteria technique*).

The analysis showed that small and medium-sized farms with profitable crops size and dedicated to profitable crops, are the most sustainable under all policy scenarios.

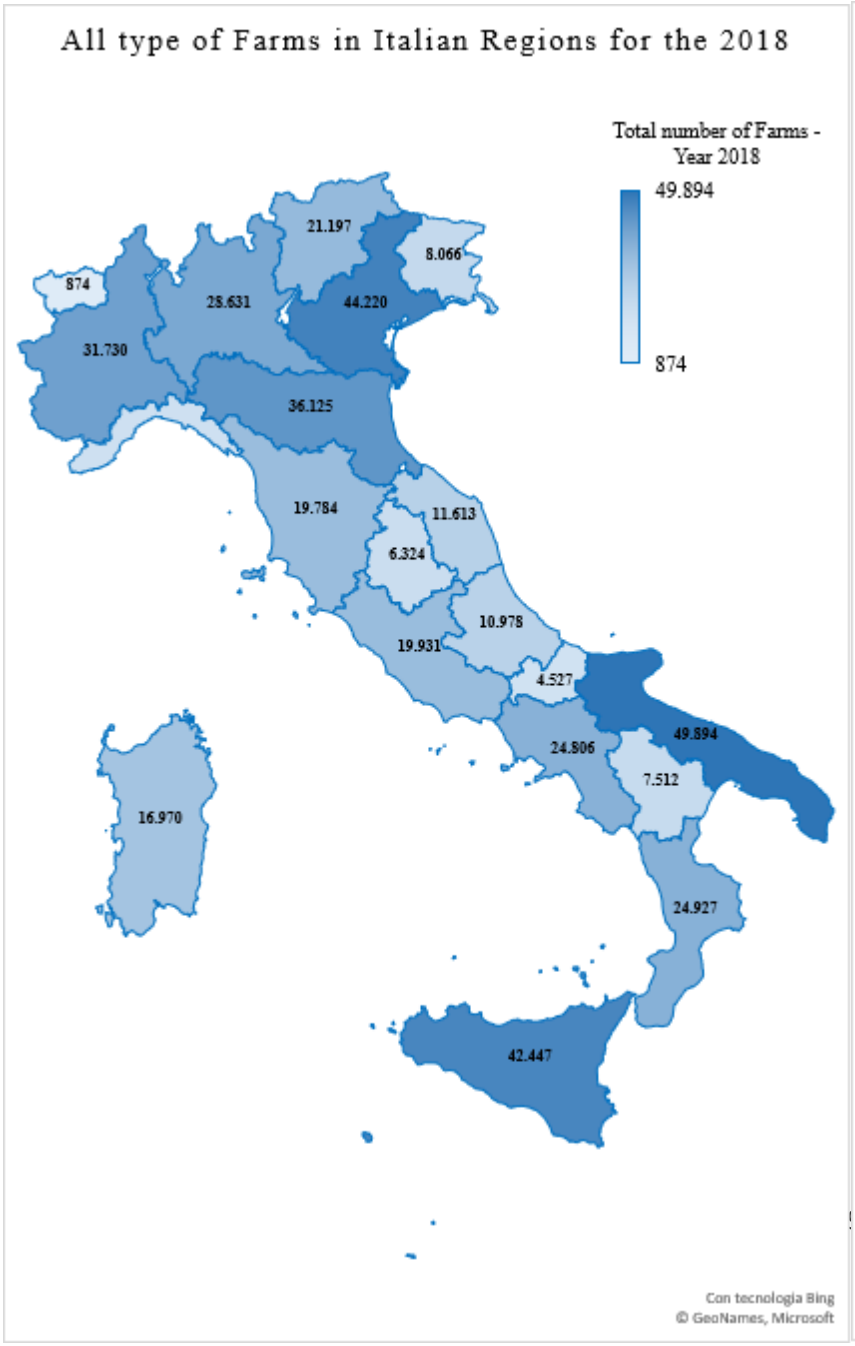
At the end of 2018, the area cultivated in Italy with organic farming is almost 2 million hectares, with several operators that comes close to 80,000 units.

The elaborations carried out by Istat indicate that since 2010 the increases recorded are more than 800 thousand hectares and 20 thousand farms (exclusive producers). Compared to the year 2017, the Organic Surfaces have increased by 3% with 49 thousand hectares in more.

In 2018, as for Italian agriculture, the 3 main orientations for organic farming production remain Pasture Meadows (540,012 ha), Forage Crops (392,218 ha) and Cereals (326,083 ha).

Figure 3.3. Comparing the total number of farming in Italian regions with Organic Farming for the year 2018.

This figure is created for showing the number of organic farming for region in Italy taking in consideration the year 2018.


All type of Farms in Italian Regions for the 2018
Total number of Farms - Year 2018
49.894
874
21.197
8.066
874
28.631
44.220
31.730
36.125
19.784
11.613
6.324
10.978
19.931
4.527
49.894
24.806
7.512
16.970
24.927
42.447
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Organic Farming in Italian regions for the 2018
Total number of Organic Farming - Year 2018
30320
44
3.190
1.775
44
2.034
1.879
3.555
207
7.317
8.239
6.138
2.312
3.296
7.762
1.305
15.023
4.862
4.437
4.033
24.571
30.320
Con tecnologia Bing
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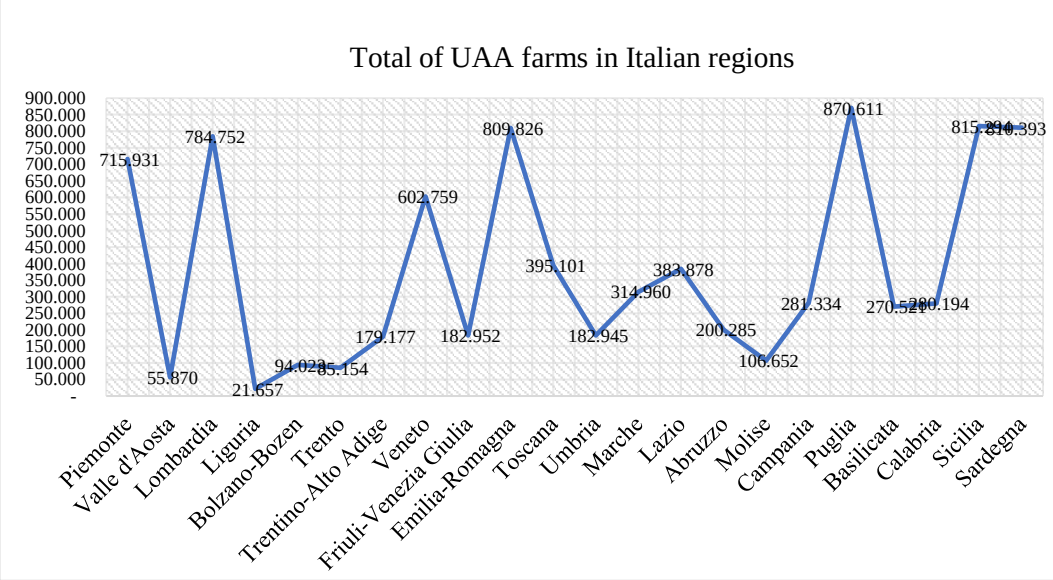
Source: Author'e elaboration from database Eurostat 2018.

The analysis of the regional distribution of organic areas, in 2018, indicates that the extensions greatest are found in Sicily, Apulia, Calabria and Emilia-Romagna, which alone account for more than half of the entire national organic surface area. The regions that have made the biggest increases in the last year are Campania (+44%), Veneto (+38%), the Autonomous Province of Bolzano (+26%) and Lombardy (+26%).

From the relation updated in 2021 from Istat we have elaborated the total Utilized Agriculture Area (UAA) for all Italian regions. For the year 2018 the complexity number of UAA is 8.265.092 (ha) as represented in this chart distributed for all the regions.

In the next chart is shown the representation of Utilized Agricultural Area (UAA) by Italian regions, geographic breakdown, and major crops.

Figure 3.4. Distribution of Utilized Agriculture Area in all Italian region- Year 2018.



Source: Eurostat Author's elaboration 2018

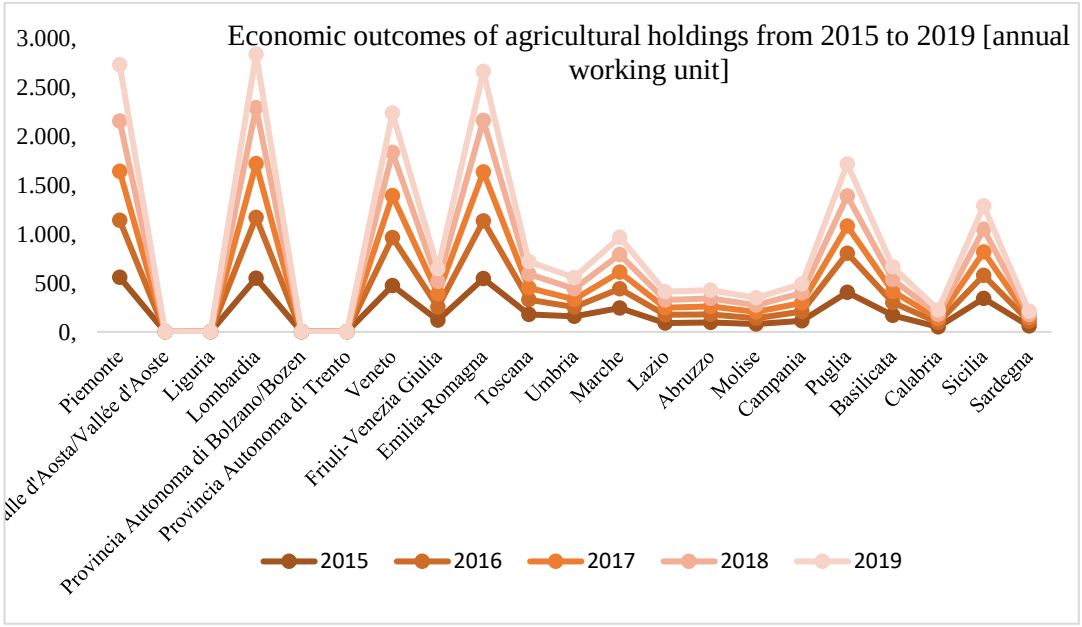
We can say that the regions such as Piemonte, Lombardia, Toscana, Puglia, Sicily and Sardinia are the most representative regions with a threshold value of UAA higher than the other regions. The three types of crops (arable crops, Wood crops and pastures

and meadows are considered as the major production in Italian regions based on total UAA (ha) for farms. Reference year is 2018, expressed in percentage value.

3.3 The economic dimension of sustainable agriculture

The Economic Accounts for Agriculture (EAA) provides detailed information on income in the agricultural sector for the annual working time unit in all the Italian regions for the time period from 2015 to 2019. We will focus on the data for Italy, the purpose is to analyse the production process of the total agricultural industry and the primary income generated by this sector.

Figure 3.5. Representation of economic outcomes of agricultural holdings from 2015 - 2019



Source: Eurostat Authors elaboration 2021.

The reference period is based on the calendar year starting from January 1st and ending December 31st from times series 2015 to 2019. The area covered for the collection of data is the entire territory of Italian country. The indicators considered for the income are described as: index of real income of factors in agriculture, index of real net agriculture farming income, per non-salaried and net farming income of agriculture

for hours of work. With respect to the agricultural economic sector, efficiency, competitiveness, and the ability to remain viable, even under conditions of environmental, economic, and social change, are considered the drivers of economic sustainability (Dasgupta, 2008).

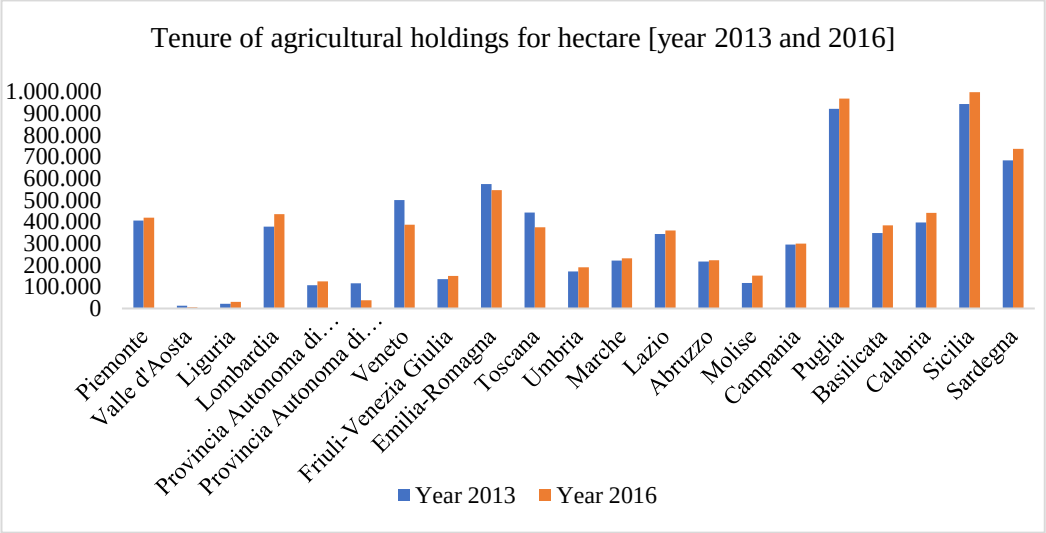
Connecting us to the internal factors of competitiveness, that is, the choices of the conductor, these can also be analysed based on marketing theories, according to which the two factors that most influence competitiveness are price and quality. The agricultural sector uses a calculating method, unlike most other economic sectors, the aggregation estimates on quantities and prices. In this context, agricultural accounts require (at both central framework level and satellite account level), statistical information available at a very disaggregated level.

Regarding exogenous factors, the natural environment influences both the magnitude and value of production and the conditions of the producer's choices (these effects are perceptible in the short term, as they manifest themselves on the income produced from year to year).

At the same time, the company has an impact on the natural environment through the exploitation of natural resources (land, air and water), which depending on the techniques used can be more or less sustainable and renewable.

Even the attitude to change, such as the adoption of new technologies, new organizational forms, then the attitude to investment, disinvestment, and dimensional changes, is an attitude related to entrepreneurial ability that can have effects on both costs and qualitative differentiation and represents a determinant factor of corporate competitiveness (Mazzarino & Pagella, 2003). It is very important for active participation in political life on the part of citizens, particularly at the local level for reaching all these attitudes and results in a competitive environment.

Figure 3.6. Tenure of agricultural holdings for hectare year 2013 and 2016



Source: Eurostat Database author's Elaboration 2019.

The distribution of the tenure agriculture holdings for hectares in the period of 2013 and 2016 represent the slow increment of this phenomena. As the chart shows in the figure 3.4 the trend is changing during the time, and all the regions show an increased number of holdings in Italian regions. In the future we will have good expectations and improvement for the mechanisms, available to the community, that allows us to identify its strengths and weaknesses.

The sustainability is seen as a positive condition of an individual within communities, fostered by the presence of a process within the same community, which can allow to reach such a condition. These conditions can be achieved through a series of principles, such as: equity of access to basic services such as transportation, health and education.

3.4 Social farming and its impact

Social agriculture is a generative approach that through the creation of networks, food production and the practice of local welfare, generates bonds and gives back lifeblood to the community. It is a proactive and innovative practice, from one hand a possible response to the needs of the population, and from the other hand an expanded offer of services to the person in terms of agricultural production. This research takes

shape from a combination composed of a vision of local and sustainable generative welfare, from the perceived need to "go back to the origins" to counteract a globalization effect, from the firm belief that social agriculture is a good practice to create networks within a community and from the awareness that the figure of the farmer in this field has yet to be discovered. Here, then, is the stimulus that animated the research. Approaching Social Farming today means rediscovering a context that has always been rooted in the community, in equal relationships based on solidarity and exchange.

It means rediscovering an approach to the person where the issues have to do with life, with the spirituality of the earth. This theme is not to be underestimated, the vital component, the vital impulse that is found using the term person, which is found in nature, having to do with living elements, is a fundamental condition to be able to take a vitalist approach. [....] Life flows there where there is life, where there is vitality and agriculture par excellence is the place where these things happen. So, if we want to move towards a regenerative process, that's where we find the real issues of discussion and the experiential issues that make change not just a meditative, theoretical action or visionary, but begins to have concrete elements of reworking (Grizza, 2020).

A theme at the centre of which is the person and his relationships. It is an encounter between the agricultural world that goes to re-signify the context, as a starting point for the construction of the social bond where the Social Farming therefore reflects a wide, active world, based on the vital and generative impulse that comes from agriculture and its tradition. Giving a definition of Social Farming may be limiting, given the wide scope of the topic and its dynamism, but sometimes it is necessary to scope of the topic and its dynamism, but sometimes it is necessary in order to be able to share and fix some meanings Early definitions saw Social Farming (as) that activity which employs the resources of agriculture and animal husbandry, the presence of small groups, family and non-family, operating on farms, to promote therapeutic actions, rehabilitation, social inclusion and recreational work, services useful for daily life and education (Di Iacovo & Cirulli, 2011). Continuing the exploration and broadening the horizons of inquiry, but also of practice, an increasingly in-depth overview is presented in this regard. Taking up the words of Francesco Di Iacovo, in the presentation of Social Farming within the research project So Far (Social Farming in Multifunctional farms).

Social Farming enhances multifunctional agriculture in the field of personal services and is characterized by linking the production of traditional goods and services to the creation of informal goods and informal networks of relationships. In addition to the production of food products and services traditional agricultural services, the Social Farming intervenes in support of the production of health actions of rehabilitation / care, education, training, organization of useful services for the daily life of specific user groups, and daily life of specific groups of users, as well as in the creation of employment opportunities for people with lower employment opportunities for subjects with lower contractual status co-therapeutic potential of the interaction with living beings, provides places and facilitates meeting with groups of people where individual skills and the life of relationships of the involved people [...]. Social Farming makes it possible to ensure actions for the promotion of healthy and balanced lifestyles, at the same time, makes available services useful for raising the quality-of-life of local inhabitants of urban and rural areas. Thanks to its resources and its peculiarities, Social Farming makes it possible to strengthen the effectiveness of the social protection network and thicken it in the most fragile and less densely populated territories (Di Iacovo F. , 2008).

The meanings encountered are therefore multiple, exhaustive and are often different from each other depending on the areas of reference and the people to whom they are addressed, different from each other depending on the areas of reference and the people to whom they are addressed reason why there cannot be a framework according to standardized and codified logics and there is the risk of a limited perspective on practices (Di Iacovo & Cirulli, 2011). The nature of Social Farming can be seen as "the result of a process of retro-innovations based on the multifactorial socialization of practices that have had traditional spread in the agricultural world". Tradition, in fact, was born in a spontaneous and silent way in the countryside, on the initiative of people who, moved by civic sense and commitment, have welcomed, and accompanied people in difficulty towards paths of life, towards a social inclusion. Along these lines, in the nineties, with the birth of the Third Sector, real inclusive projects came to life in the countryside and the creation of business initiatives in social cooperation (Di Iacovo & Cirulli, 2011).

It is therefore recognized that through the A.S. There is the possibility of giving alternative responses to the need for social protection alternative to the need of social

protection of persons at risk of marginality, thanks to the resources that there are in nature and to the net that in the social plot this can weave.

Through Social Farming the production of food and relational goods, give rise to an "ethical profit", starting from the possibility of building and consolidating relationships between people, that are different in terms of skills, problems or origin and thus contribute to the growth of human capital, social and territorial capital, in a path among the actors, of mutual responsibilities towards the common good. For this reason, the proposed activities are involving all the subjects of the territory, with the aim of giving answers to the needs of individuals and at the same time produce well-being and social cohesion. Through this practice there is the possibility, therefore, to promote businesses according to a collaborative logic, which can become, in their multifunctionality, a sort of "sustainable laboratory".

From an initial analysis it is possible to note a multiplicity of actors, roles and practices, which offer different keys to interpreting the theme and highlight three macro thematic areas:

- Social inclusion, i.e., the coordination of basic labour services in favour of subjects at risk of exclusion, through agricultural processes and rural spaces;
- Relationality, the creation of ties starting from paths of dialogue within the community; the of the community;
- Training, of which agricultural activity is an active part of educational processes aimed at increasing levels of socialization (Di Iacovo F. N., 2007).

These clarifications on the subject open a glimpse into the mode of diffusion that there has been and that is affected by "the capacity with which the local system is able to recognize, socialize and accompany in the network of services the development of the projects and initiatives of which the innovators" (Di Iacovo & Cirulli, 2011). In fact, here we mentioned the reading of Francesco Di Iacovo about the two main and distinct visions in which Social Farming can be declined are the specialized vision and the civic vision.

The Social Farming "specialized" focuses primarily on the individual person in contact with agricultural processes, towards a co-therapeutic-assistance type of action.

This is the type of practice that tends to prevail for the most part today, even at the level of legislative recognition. It is interpreted as a service offered by agricultural companies in collaboration to the extension of the welfare logic of personal services. This perspective finds recognition through an evaluation of services and accreditation of facilities of the structures. We can therefore recognize here the formula of social farms.

The Social Farming “Civic" takes shape outside the formal structures, to give a reconfiguration of the vital systems of the community, creating the basis for the paths of social justice, able to combine the paths of life with the collaborative capacity of the community of social justice, capable of combining the paths of life with the collaborative capacity of the local system, based on a "win - win" logic. This mode of process, placed on a foundation of horizontal subsidiarity, offers the possibility of building structures of meaning shared by all the actors involved and innovative visions in the reorganizing services in the form of inclusive paths and in the creation of economic value, as well as relational, through the enhancement of agricultural products "according to a ethical profit". So far we have made an exploration, certainly not exhaustive given the multiplicity of experiences of Social Farming that are underway. What we wanted to try to bring out is the fact that agriculture is social by nature, embodies a lifestyle and offers an inclusive context for all, generating inclusive context for all, generating relational and community goods.

Agriculture is linked to the term "cultivate", from the Hebrew "abad", which literally means to serve, hence "the deeper meaning of cultivate is to serve the land and the community in order to inhabit dignity in a place. In fact, we want to remember, contrary to what we are led to believe, that agriculture took shape ten thousand years ago, from a group of women, in order to create the first communities settled in one place in order not to have to be always on the move. In this perspective, "agricultural work takes on the meaning of reclamation, that is, of adapting the land and water to more civilized forms of human coexistence.

Normative level

Social Farming has only recently found recognition in the Italian legislation. The current legislation is the product obtained thanks to the commitment of the networks of operators, formed in recent years. The fact, as we have seen, that there is no unitary interpretation in this regard has contributed to promoting the initiative of paths of knowledge about the phenomenon: starting from the different experiences of everyone.

The fact, as we have seen, that there is no unified interpretation that helped to promote the initiative of paths of knowledge about the phenomenon: starting from the different experiences, a path of dialogue has been opened between operators and institutions and communities of practices based on shared values and objectives have been built. This is to demonstrate the real possibility of Social Farming to create innovative models of welfare (Pascale, L'agricoltura sociale genera comunità, 2015). A norm at the national level, of which the Veneto Region was a forerunner with Regional Law No. 14 of 2013, is given by Law 141 of August 18, 2015, Provisions on the subject of social agriculture (entered into force on September 23, 2015), which offers an attempt to regularize Social Farming practices on a unifying but not homologating basis, in an effort to provide methods of recognition and accreditation, in full respect of the relationship that they have with the needs of the community of the relationship that they have with the social and territorial needs at the local level. This law attempts not to limit these practices within overly rigid rules, the reason for which it is defined as a "soft" law, since it does not infringe on the prerogatives of the Regions, in terms of agriculture and social policies, in compliance with Title V of the Constitution. *National legislation defines Social Farming as a:* aspect of the multifunctionality of agricultural enterprises aimed at the development of interventions and social services, health, education and socio-occupational integration, in order to facilitating adequate and uniform access to essential services to be guaranteed to individuals, families and local communities throughout the national territory and in particular in rural or disadvantaged areas (4 Legge 18 agosto 2015, n.141), 2015).

Where multifunctionality is intended to highlight the characteristic capacity of agricultural processes to give shape to different types of goods and services simultaneously. This law is anticipated by Regional Law 14/ 2013 of the Veneto region,

which has laid the bases to create a regulatory environment to encourage the ferment of a solidarity-based economy that was taking shape in the territory; it thus initiated a fusion of interventions and of principles of the four regional departments for agriculture, labour, health and social.

This law, in addition to what the national one mentions, declines Social Farming, as an instrument of implementation of the policies of sector and subjects inserted in the programming zone plans of social and health services (5 Bur n. 54 del 28 giugno 2013 , 2013).

The Veneto Region foresees with respect to Social Farming the creation of practices and networks within of its Rural Development Program plan in support of social inclusion, such as to promote cooperation between agricultural enterprises, in order to counteract conditions of poverty and promote the economic development of rural areas, improving the territorial balance in social and economic terms. The intervention, in the form of grants reimbursement, therefore, aims to support expenses for the construction and organization of associated forms and the creation of networks between actors (Programma di Sviluppo Rurale per il Veneto, 2014– 2020).

This is also part of what is provided for (but poorly put into practice by the regions) by the EAFRD Regulation- European Agricultural Fund for Rural Development 2014-20, as a fight to reduce poverty and promote social inclusion and promotion of social inclusion, and by EU regional funds, the European Social Fund (ESF) and the European Social Fund (ESF) and the European Regional Development Fund (ERDF) (Pascale, 2015).

It is, therefore, a system of rules, which is slowly being outlined, that should create goals to protect and promote an agro-social system. The risk, from this perspective, is that of falling into the trap of monetizing services, in the case in which they come adopted of the procedural schemes too much rigid, tending to the sole institutionalizing practices and thus emptying them of their meaning, which by nature is given by reciprocity and a logic of gift, which instead are given to create, before an economy of profit, a relational economy (Di Iacovo F. N., 2007).

A legislative framework is necessary, to give legitimacy, but it is important to keep in mind the human contact, the values, and the spontaneity with which Social Farming has taken shape, not to lose its community aspect and the possible way it offers to regenerate welfare at the local level.

Multi-functionality

The legislation defines Social Farming according to the aspect that has the multifunctionality it was aforementioned. This dimension perspective has two distinguished branches of activity. We speak here of agricultural activities or related activities (manipulation, conservation, transformation, marketing or agritourism activities). For these subjects, the choice of agriculture as an area of support to the paths is given for its characteristic of being a potentially inclusive context, given the ways in which the productive unit is organized, there is, in fact, a variety and adaptability of forms for activities that are difficult to find in other sectors. Production processes can be carried out in a variety of ways, in fact, the objective is not only to maximize the economic parameter, but to consider the results of a social nature, such as the active participation of these people during the production and organizational phases, from a social efficiency perspective (Senni, 2015). Work, in this context, is a tool for growth and inclusion in society, through which the subjects are active protagonists of their own path: for them, expectations, motivations and interests that lead to recognition as a person.

The production and the final sale of the cultivated products, in fact, projects the result of the production towards the outside, thanks to which the person proposes himself as skilled, capable of creating interest for what he does and not for the conditions of life in which he finds himself, thus being able to feel an integral and functional part of society. The work is experienced, therefore, as a revaluation of the life of the person, according to the development of a new local economy integrated and in harmony with the territory. The areas of affection and work become the fundamental contexts for the realization of a life in which the individual person is well inserted in the community, understood as an 'us' bearer of language and tradition (Pozzobon, Biagi, & Salerno, 2014).

The second recognized line of business concerns the provision of social, educational and socio-health services, grouped into:

- social and community service benefits and activities, which implement interventions of social inclusion and useful services for everyday life, such as day care services, housing communities, agro-nurseries;
- care and rehabilitation activities, with a socio-therapeutic purpose, such as experiences of cultivation, breeding and pet therapy, aimed at people with disabilities (physical, mental/mental and social);
- projects of environmental education, food, to promote the learning of forms and contents of sensitization to the theme and offer experiences of acceptance and preschool children and people in social, physical and mental difficulties.

As we have said, multifunctionality is part of a specialized, formal social farming vision; the risk, taken to the extreme, is that it may become only an instrumental aspect of the practice, losing its substance, that of reconstructing the community bond. For this reason, it is more difficult to talk about multifunctionality compared to a perspective of civic Social Farming which is centred more on the context than on the individual, made up of otherness, which needs to be re-meaning from the point of view of landscape, knowledge and new economies. From this point of view, it is possible to speak of a form of generative welfare.

CHAPTER IV

A MODEL OF FUTURE FARMS TOWARDS ORGANIC FARMING IN ITALIAN REGIONS

4. Introduction on organic farming in European Member States and Italian Regions

This research attempts to make a more detailed analysis of the policies implemented both at European and national level on quality of food productions. Attention will be paid to the certification of quality of agro-food products and more specifically to the so-called Organic Product.

Although the first pioneering experiences date back to the sixties, it is towards the beginning of the seventies that organic farming in Italy becomes the heritage of a handful of farmers and consumers. Since the adoption to the first regulation on organic farming, EEC Reg. 2092/91, which came into force in 1991, many companies in the European Union have converted to organic production methods; it is with EC Reg. 834/2007, on organic production and the labelling of organic products, that the European Commission has recognized the social function of organic farming. In order to ensure its development, a European Action Plan is applied at national level thanks to the National Action Plan for Organic Agriculture. Italy ranks fifth in the world and third in Europe in the production of organic food. We are considered at European level as excellent producers but very bad consumers, so about 60% of production is exported.

Organic Farming was born from the competition of institutional processes and subjects within the overall reflections on the quality of life and consumption, representing the concrete hope of those who want to eat and live-in peace with the environment, those who choose organic embrace as a lifestyle (Andrew_McGuire, 2017).

Discussing the quality of food is not so simple because, despite what scholars and researchers made on these subjects, terms such as "poor", "average", "excellent" are still used in a generic and subjective way. On the other hand, it is also true that many categories interested in the problem are basically concerned with a specific and sectorial quality.

The concept of quality for the consumer will be the one which implies a food with good organoleptic characteristics and acceptable cost; for the zookeeper it will be the one deriving from subjects free from diseases transmissible to man and in excellent health conditions; for the breeder it indicates a good economic result of the production while for the hygienist a quality food will be the one free from biotic and abiotic contaminants.

Unfortunately, this kind of evaluation of quality is negatively affected by factors which are not always rational and can be traced back to fashionable consumerist philosophies which are often facilitated by a still poor dietary education and by pseudoscientific information campaigns as well as by unscrupulous marketing. In this sense, it is enough to think of the condemnations, often without appeal, regarding pork and other food substrates only based on cholesterol content without considering the quantitative aspects of diet and nutrition.

Commercial Quality has often been the subject of criticism. In fact, with the almost obligatory adoption in recent decades of production and consumption guidelines mainly quantitative, preference has been given to food substances of low cost, although with hygienic and sanitary congruency sometimes at the limits of acceptability. We need to precise that all these policies now are adopted in European level for all the member countries.

In many cases, in fact, the production technologies used have not been sufficiently studied and tested. This has conditioned the marketing of food and, more specifically, of meat, obtained from animal models that are decidedly valid from a quantitative point of view (conformation, yield at the slaughterhouse, etc.) but not always suitable for processing the performance of food before symbiosis with the technological advancement of the food industry.

Considerable efforts have been and are still being made by the scientific world to rationalize the concepts of quality, until realizing a philosophy of the *Quality System*.

Scholars of the "*Quality System*"' assume that this concept can be globally applied to any product, artifact or service, in the logic of some conceptual models, based on consumer expectations, product specifications, critical process factors, verification and control systems.

This concept stems directly from the ISO 9000 (ISO Certificazioni, 2015) standard for which "quality" is to be understood as "the set of properties and characteristics that give a product the ability to satisfy expressed or implied needs". If this definition is applicable to the various manufactured products, it is even more applicable to "protected" foods since they have a series of requirements and peculiar characteristics declared by the producer, certified by the same or by private and public, national and communitarian bodies, always however recognized.

Quality certification is a relatively recent problem. For several decades, especially in the field of industrial production, there has been the so-called "standardization", which is given by an activity of regulation of industrial products, and which takes the form of codifying standards and requirements to which these products must meet.

As is well known, standardization bodies have the twofold task to facilitate the exchange of goods and services based on precise reference standards; to facilitate and encourage collaboration between companies and nations in the technical, scientific and economic field (Gaudino, Goia, Borreani, Tabacco, & Sacco, 2014).

Thanks to the International Standardisation Organization (ISO), established in 1978, to the Comité Europeén de Normalisation (CEN) and to the Ente Nazionale di Unificazione (FUNI), "standardisation" has reached its apex both at European and Italian level.

Today, the ISO 9000 series of standards is used in over 100 countries, involving over 70,000 certified companies, of which over 50,000 are European.

The above-mentioned CEN is called to harmonize ISO standards in the European context by developing procedures and tools to allow mutual recognition of laboratory

tests and certification systems. In order to meet these objectives, a kind of agency has been created within the CEN, the EQ-NET, i.e. the European network for the evaluation of "*quality systems*".

In Italy, the National Unification Body (a branch of CEN) makes use of some Agencies, of which the main ones are SINCERT (Sistema Nazionale Accreditamento Organismi di Certificazione) and SINAL (Sistema Nazionale Accreditamento Laboratori).

The SINAL, established in 1988 on the initiative of UNI and CEI (Comitato Elettronico Italiano) and sponsored by the Ministry of Industry, CNR, ENEA (Ente Nuove Tecnologie, Energia, Ambiente) and the Camera di Commercio, has the dual task of accrediting laboratories and verifying and ensuring compliance with ISO standards.

Regulation (EC) No. 852/2004 of the European Parliament and the European Council of 29 April 2004 on the hygiene of foodstuffs, have been done a revision of Community legislation for food hygiene (EC, 2004).

This regulation emphasizes the importance of defining the objectives to be pursued in the field of food safety, leaving to the food operators the responsibility of adopting the safety measures to be implemented to ensure that food products are safe. In the context of biology, the conviction is increasingly that certification can be an input of advancement in the quality of the entire production system and, at the same time have cultural and environmental effects, as a valid factor to increase consumer confidence, even in the commercial exchanges on local and multinational markets.

Moreover, this new business philosophy, which puts at the centre of the same system the problem of a global quality, so to speak, has certain costs, that however results are inferior to those of the *"not quality*". As previously mentioned, quality is "the totality of the properties and characteristics of a product or service that give it the aptitude to satisfy expressed or implicit needs".

Some authors consider this definition objectionable and generic; in the opinion of others, it appears valid once the precise meaning of ``well points out the precise meaning of "expressed or implicit needs". On the other hand, this annotation has been made for

a generic series of products, products, and artifacts, within the scope of which could be included, with some reservations even foods of animal origin.

They possess some intrinsic characteristics that make them peculiar, and such will also be the quality found in them.

It is good to make a macro-distinction between product certification and process certification. *Product certification* is a means of communication that directly reaches the consumer, while the *process certification* is mainly aimed at customers, but it too can have positive repercussions on consumers. The two systems, therefore, are integrated.

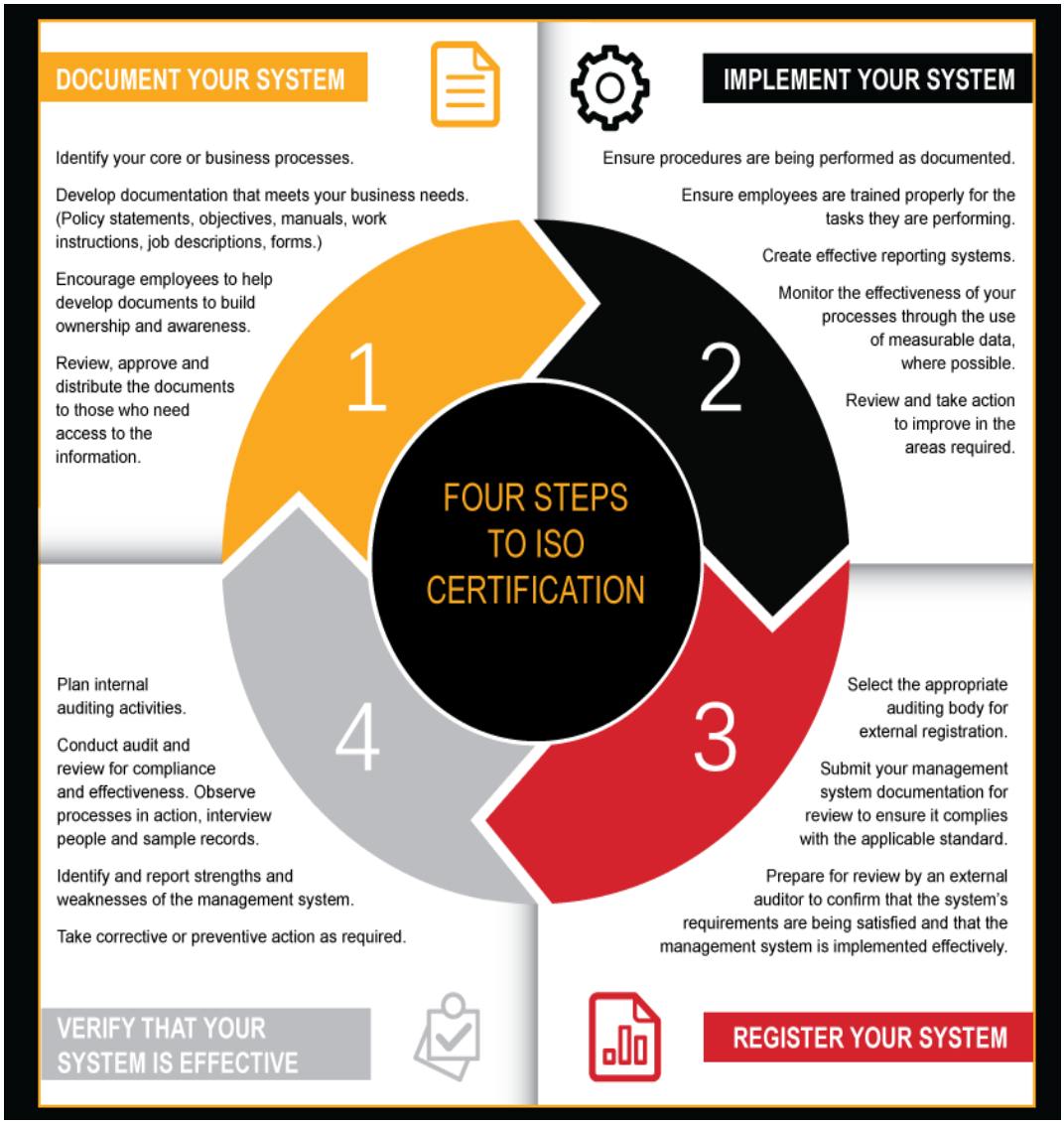
The steps of "certification" of compliance with certain objectives by a third party, can be different, for example:

- the application of ISO standards
- the implementation of production specifications protected by a trademark DOP or IGP
- the implementation of specifications that will follow the principles dictated by the organic production.

DOP (Dominazione di Origine Protetta), The Protected Designation of Origin, better known by the acronym "PDO", is a mark of legal protection of the name given by the European Union to foods whose peculiar quality characteristics depend essentially or exclusively on the territory where they were produced.

IGP (Indicazione GeograficaProtetta), The term Protected Geographical Indication, better known by the acronym (PGI), indicates a mark of origin which is attributed by the European Union to those agricultural and food products for which a certain quality, reputation or other characteristic depends on the geographical origin. At least one of the stages of production, processing and/or elaboration must take place within a determined geographical area. Italy is one of the European regions with a high number of these products recognised in all the global markets and legislation.

Figure 4.1. Fourth steps to ISO certification



Source: ISO 2016

It is necessary to clarify what the producer means with the word "*food quality*" and what an informed consumer expects from it compared to a generic or standardized product. There is no definitive answer because there are many conceptual models of quality. Quality is given by the combination of some intrinsic characteristics of the product and others associated with it that may depend on other factors. Italy, with 150,000 certified companies, is the first listed in European rankings for quality management system certifications (ISO 9001). This data emerges from a 2016 survey conducted by the International Organization for Standardization (ISO), the international standards body.

4.1 Biological Agriculture and the environmental benefits

The analysis of the relationship between biological agricultural activity and the environment has been the fundamental field of investigation of all those involved in the primary sector. However, the perspective with which these relationships are examined has changed profoundly over the years. At one time, in fact, interests were aimed at highlighting the consequences that the variability and the relative incompleteness and the relative lack of complete controllability of natural factors had on production results, environmental management and agricultural policy. In other words, what was to evaluate the effects that natural factors had on the development of the technical and economic performance of agricultural activity. Farmers are the main actors, and they have a big responsibility on conservation, management and protection of environment and biodiversity. This article has mainly dealt with the determination of organic farming with all the aspects and the effects in biodiversity, ecosystem, and society.

Socio-economic evolution and the changed techniques used in agriculture have changed the frame of reference and have made emerge, within the general problems related to the quality of life, a growing attention to environmental issues. It relieves the relation with the environment and combines to the social cultural traditions. In this context develops the demand for forms of agriculture with reduced environmental impact and a growing attention to the relationship between health and nutrition. This evolution is accompanied by the emergence of a new concept of quality which requires that account not only of the characteristics of the final product, but also of the methods used to obtain it. In fact, about agricultural activity that is, in the presence of a widespread activity, where the damage cannot be traced back to a specific or precise polluting agent and where the monitoring of damage can only be overall.

Through Social Sciences and especially from Sociological studies we will assess this process of transformation in a vertical way which is linked with society. Overall, the association between production, food security and consumption are directly interrelated with the evolution of agro-food-systems, as it is discussed within the "*production-consumption debate*" (Lockie, Lyons, Lawrence, & Mummery, 2002). Social and biological agriculture scientists contribute to the enlargement of the concept of human rights to be extended to include such things as social, environmental, and climatic

change. This influence has led within the consumption of production directly by the civil society. Other contributions have been made by the enormous conferences with the main subject the phenomena of climatic changes and social aspects linked to participation and consumption. However, this subject of study is mainly interested in both social sciences, agricultural and economics.

Organic Agriculture combines tradition, innovation, and science to benefit the shared environment and promote fair relationships and a good quality of life for all involved (IFOAM, 2008). The advanced research coming from other fields of biology or economic disciplines, as well as from other social disciplines and from observation of reality, could enable a more precise definition of sustainable agriculture. The organic product is a guaranteed product because it is certified according to EC Regulation 834/2007 that ensures the method of production that comes from organic farming, obtained without any synthetic chemical substances and in full respect of the environment. To comply with these objectives, organic farming has adopted techniques that respect the natural ecological balances with natural fertilizers and agronomic practices such as green manure. Weed control is carried out without pesticides, using mechanical, agronomic, and physical techniques.

Moreover, sustainable agriculture as organic farming contributes to reducing the ecological footprint minimized, such as fertilizers and pesticides. Significant initial evidence indicates that organic agricultural systems deliver greater ecosystem services and social benefits (Reganold & Wachter, 2016).

The animals are reared with techniques that respect their welfare and fed with plant products obtained according to the principles of organic farming, are avoided techniques of forced growth, industrial methods of management of breeding, their health is safeguarded with the use of homeopathic and phytotherapeutic remedies. These practices aim to obtain food, whether of plant or animal origin, free of toxic residues and intact in their nutritional value.

In addition, the organic farmers in Italian regions have created a network in order to intensify the challenges of the responsibility and accountability of new technologies. The farmers' participation has an important impact on social policies and the satisfaction of landless farmers in relationship with standard of living and quality of life. All these

elements are well related with the knowledge, participation, social security, and the production that farmers offer in the market.

The term organic farming or organic agriculture, as it is used in Anglo-Saxon countries, refers to an agricultural practice which allows only the use of natural substances that is present in nature, excluding the use of chemical substances synthesized by man. Since its appearance, dating back to about 10000 years ago, until the middle of the last century, agriculture could be defined as "organic" only in the last hundred and fifty years, under the impulse of the studies of the Baron Justus von Liebig, the chemical substances of synthesis make their appearance in the agricultural field.

Organic farming is therefore not a recent fad, advocated by fanatical ecologists, as some of its detractors would like to believe, but a practice that has allowed the survival and development of humanity for tens of millennia.

Among the main objectives of organic farming we can indicate: to maintain the overall fertility of the soil in the long term; to avoid any form of pollution resulting from agricultural techniques, excluding in particular the use of toxic chemicals, to achieve an agricultural system self-sufficient; reducing the use of fossil energy to a minimum; enhance local resources, cycles and natural biological processes, with the goal of moving towards integrated systems or closed cycles; enhance the value of natural resources while safeguarding the environment, the diversity of fauna and the balance of the various ecosystems. All this obviously is not separated from the desire to ensure an adequate income to farmers, including through lower costs due to farmers, also through lower costs due to external inputs, and a higher value of production.

Currently, the market value of the products is determined by the size, colour and the absence of external imperfections. Products such as apparently perfect fruits and vegetables, beautiful to look at, but with a high-water content (and probably residues of chemicals used to cultivate them), have a reduced nutritional value, independently from the possible presence of chemical residues used in cultivation. On the other hand, the issue of residues in food is of extreme importance also because of the deep environmental pollution.

To the quantity and quality of nutritional elements in food (proteins, sugars, fats, vitamins, trace elements, etc.) are not given the right value, while they are characteristics that constitute the biological quality of a food, and therefore its suitability to nourish in a balanced, complete, and healthy way. Analyses carried out on organically grown foods show higher values of vitamins, dry matter, and minerals than usual products from chemical cultivation. The greater richness of these substances is beneficial for maintaining a healthy organism, especially in our increasingly unnatural and polluted world.

4.2 Conversion into organic farms and their application in the Italian regions

Organic products have always been more expensive than those made by traditional methods, which in the past has been perceived as an obstacle to the expansion of organic farming. Now, however, there is an increasing number of consumers who are willing to pay a premium price for food that offers greater guarantees of quality and safety. While in the past organic products were once difficult to find outside of specialty stores or local markets, now outside of specialty stores or local markets, they are now directly available on the shelves of major supermarket chains across Europe.

The growth of the consumer market is one of the main factors driving farmers to convert to organic production. The more the public opinion is sensitive to the issues related to the healthiness of food, the more important it is to have accurate data on all aspects of agriculture, including organic farming. To ensure the traceability of food products from stable to plate and thus maintain consumer confidence, transparent registration systems must be established. Planning officers also need rapid information in order to be able to identify any sign of a problem or new opportunity that may arise.

The regulations concerning the control system applied to organic farming include the obligation to keep precise records. Within Eurostat, the Statistical Office of the European Communities, several initiatives have been taken to improve the collection and availability of agricultural statistics (as we have made our elaborations in the previous chapter). These analytical tools we currently use for different purposes. They

not only serve as an aid to policymakers, but trend and signal the risks and opportunities of agricultural activity, but they also provide evidence to consumer organizations seeking accurate data on food production and processing.

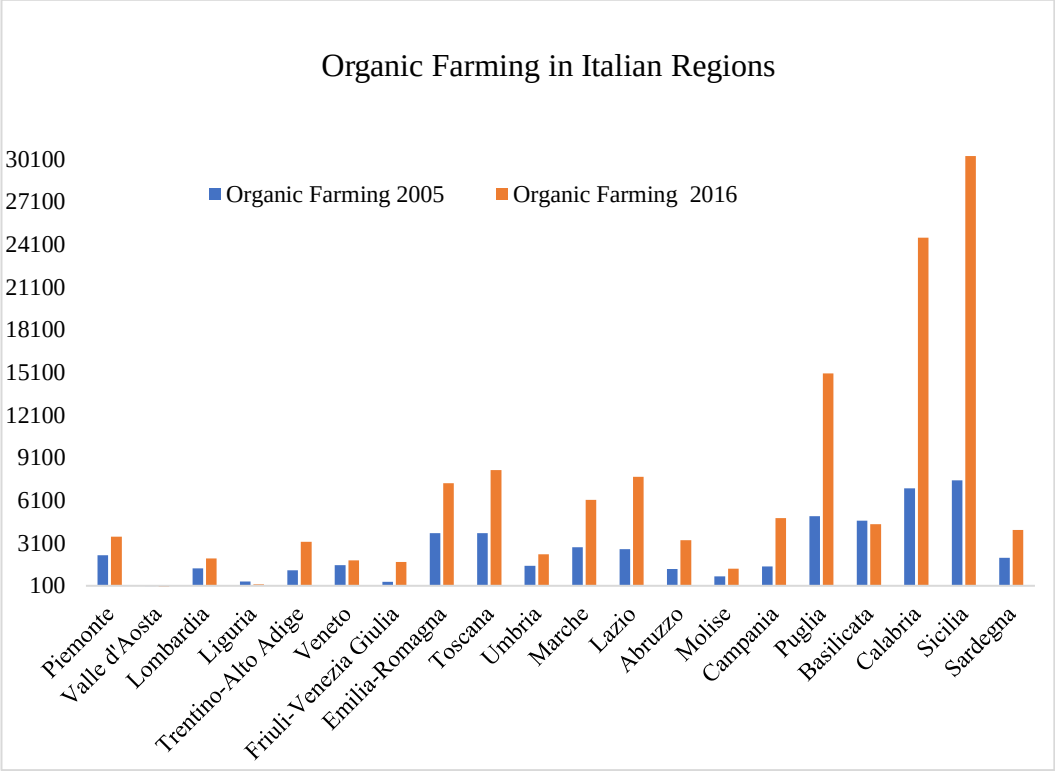
As part of the reforms of the CAP initiated in the late 1980s, it recognized the fundamental role that organic farming could play in achieving the new goals for the realization of new objectives, such as the reduction of surpluses, the promotion of quality products and the integration of environmental protection in agriculture. But for organic farming to win the trust of consumers, it was clear that it would require strict legislation accompanied by anti-fraud measures, to prevent products that did not meet this definition from being passed off as organic food.

Today's consumers are increasingly demanding access to information on food production methods - "from stable to plate" - and demand guarantees that all necessary safety and quality precautions are taken. To guarantee the authenticity of organic production methods, several regulations have been adopted, leading to the creation of a global reference framework which covers all organic crops and livestock, as well as labelling, processing, and marketing of these types of products.

Since the adoption of the first regulation on organic farming, EEC Regulation No. 2092/91, which entered into force in 1991, many of the European Members have converted to organic production methods. A minimum conversion period of two years before planting for annual crops and three years for organic crops is set for farmers who wish to obtain official recognition of their organic status.

In this chart we will show the trend of increasing the number of organic farming in Italian regions in the time frame of 11 years. The regions as Puglia, Calabria, and Sicily we can see have a considerable increased number of organic farming during the last years. This tendency brings one more time in the centre of discussion of the economic and environment elements as the main approaches for the future perspectives. We can confirm that recently the number of farmers in Italian regions is increasing and the trend is moving positively and soon this number will dominate this sector.

Figure 4.2. Trend of distribution of organic farming in Italian regions



Source: Istat Author's elaboration 2021.

Organic farming offers real opportunities and contributes to the vitality of the rural economy through sustainable development. Already now the growth of the organic sector reveals new employment opportunities in agriculture, and related services. In addition to being beneficial to the environment, these farming systems can bring considerable advantages both in economic terms and in terms of social cohesion of rural areas.

The availability of financial support and other incentives for farmers who convert to organic production should contribute to further growth of the sector and support related activities throughout the food chain.

Consumer fears, triggered by food scandals and some technological developments such as genetic modification and food irradiation, have resulted in serious concern about food safety and a growing demand for quality guarantees and more information on production methods.

Awareness of the irreversible damage done to the environment by practices involving soil and water pollution, the waste of natural resources and the destruction of delicate ecosystems. appealed to a more responsible attitude towards our natural heritage. In this context, organic farming, once considered a marginal component, aimed at meeting the needs of a niche market, has come to the fore as an agricultural method that in addition to ensuring the production of safe food is also environmentally friendly.

4.3 Evolution of Organic Farming

Even if the first pioneering experiences date back to the 60s, it is towards the 70s that organic farming in Italy becomes the heritage of growing number of farmers and consumers, within the overall reflections on quality of life and consumption. It was in the middle of that decade that the first local coordination gave life to the National Commission "*What is organic*"? representatives of all Italian regions and consumers' associations, which issued the first national legislation of self-regulation of the sector.

Beyond the regulatory aspects, in Europe, in the field of cultivation of crops, the German and French experiences in the field of organic farming are particularly important.

The birth and evolution of the organic farming movements in these two countries, while presenting profound differences, have in common strong ideological motivations which, subsequently, fade away, bringing to the forefront the problems related to production and commercial aspects. In the area under consideration, the production base of organic farming was limited. So, in France in 1984 the same was constituted by about 5000 farms for a total of 80,000 - 100,000 ha. These farms were generally smaller in size and with more manpower than conventional farms. Particularly numerous in the West of the country, they had different productive addresses among which the most horticulture, viticulture, polyculture-breeding.

In Germany in 1987 the different forms of organic farming involved 0.22% of farms and 0.26% of the UAA. The number of organic farms has increased since 1970 by about 150 units per year, while at territorial level the greatest concentration is in Bavaria and Baden-Württemberg.

In Italy, in the wake of the Anglo-Saxon "Reform House ", towards the middle of the 1970s, the first organic and whole-food outlets were opened in the mid-seventies, also centres for the development of alternative cultural initiatives. It is only recently that stores in which the commercial aspect is prevalent, if not exclusive. The numerical increase of such natural food stores, accompanied by that of herbalist stores, is the most obvious symptom of the interest shown by increasingly large groups of consumers towards a healthier diet and towards those practices of agricultural production practices that exclude the use of chemical products of high toxicity. The numerous small associations of organic producers and coordination of producers and consumers present in all regions, with the entry into force of the EEC Regulation 2092 in 1991 have started a process of reorganization, with mergers and relationships of federation. Two of these bodies, AIAB and Bio Agricoop, are among the fourteen organizations in the world accredited by IFOAM (International Federation of Organic Agriculture Movements.

In 1972, in Versailles, five countries (Sweden, South Africa, France, USA and UK) created the International Federation of Organic Agriculture Movements which represents and coordinates the organic farming movement on a global scale, promoting cooperation and exchange of experiences among its members.

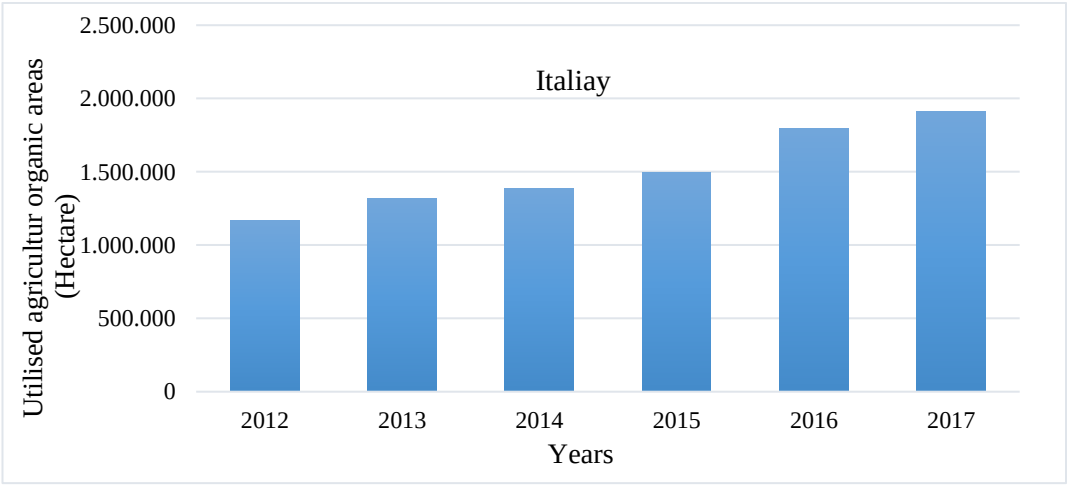
IFOAM today is the supranational body that establishes what can be certified *"Organic*" and it represents the organic sector at governmental offices constantly revises production standards, harmonizes the different local situations, guarantees the equivalence of certification programs in almost 100 countries.

Farmers as a factor of production, has clearly shown that, the expansion of human choices among the economic opportunities has changed with the variety of food available in the markets. Even though the most fundamental one is the gainful employment and the possibility to preserve the environment, biodiversity, and the cultural traditions, creating a high income for farmers (York & Dunlap, 2019). Furthermore, we will analyse the relationships between two groups of farmers, active and non-active farmers. The active farms are considered the group of which their activity is constantly, and they are meant to provide an income from the activity in the agriculture sector. The in-active farms are the farms that spend a total of hours on agriculture activity, but this is not the only activity they have at the same time, so maybe

a weekend work for helping on a property that they inherit or a part-time work that they decided to do and they don't mean to provide income even would ideally produce all needed food, year-round. This is becoming an increasingly popular mechanism among those who wish to live "off the grid" and become more sustainable farms and communities. The number of total farms in Italy in 2013 was decreased by 9.2% compared to what was reported by the 2010 in Agricultural Census (ISTAT, 2010).

The agricultural area is decreasing in the North-West (-5.7%) and in the Centre (-6.3%), more restricted in the North-East (-1.7%), in the South (-3,0%) and in the Islands (-0.9%). During 2015 the number of organic farmers in Italy is increasing and shows a positive rate during the time. The organic agriculture area with highest values in terms of share is located basically in the following areas: (Puglia, Marche, Calabria and Sicily). In this chart it is predicted the advancement of the number of organic farmers in Italy. It is also reflected in the fact that organic farming is particularly present in regions with extensive livestock production systems based on permanent grassland. The importance of the organic sector is generally lower in the regions of plains where more intensive production systems prevail (EC., 2016).

Figure 4.3 Total fully converted and under conversion to organic farming in Italy from 2012 to 2017.



Source: Eurostat 2018.Author's elaboration

This chart includes total full converted and under conversion organic farming in Italian Regions (EUROSTAT, 2018). The number of employees of the holder's family is reducing. This is due to the fall in family farms labour, defined as agricultural

entrepreneurship which are owned by individuals and followed by the cessation of many small businesses where the number of family labour exceeds the number of hired workforce. Even though the local and scientific knowledge should be integrated between farmers. The need for scientific information and analysis to inform stakeholder deliberation has been identified by many authors as an essential ingredient in any participatory process (Fischer & Young, 2007).

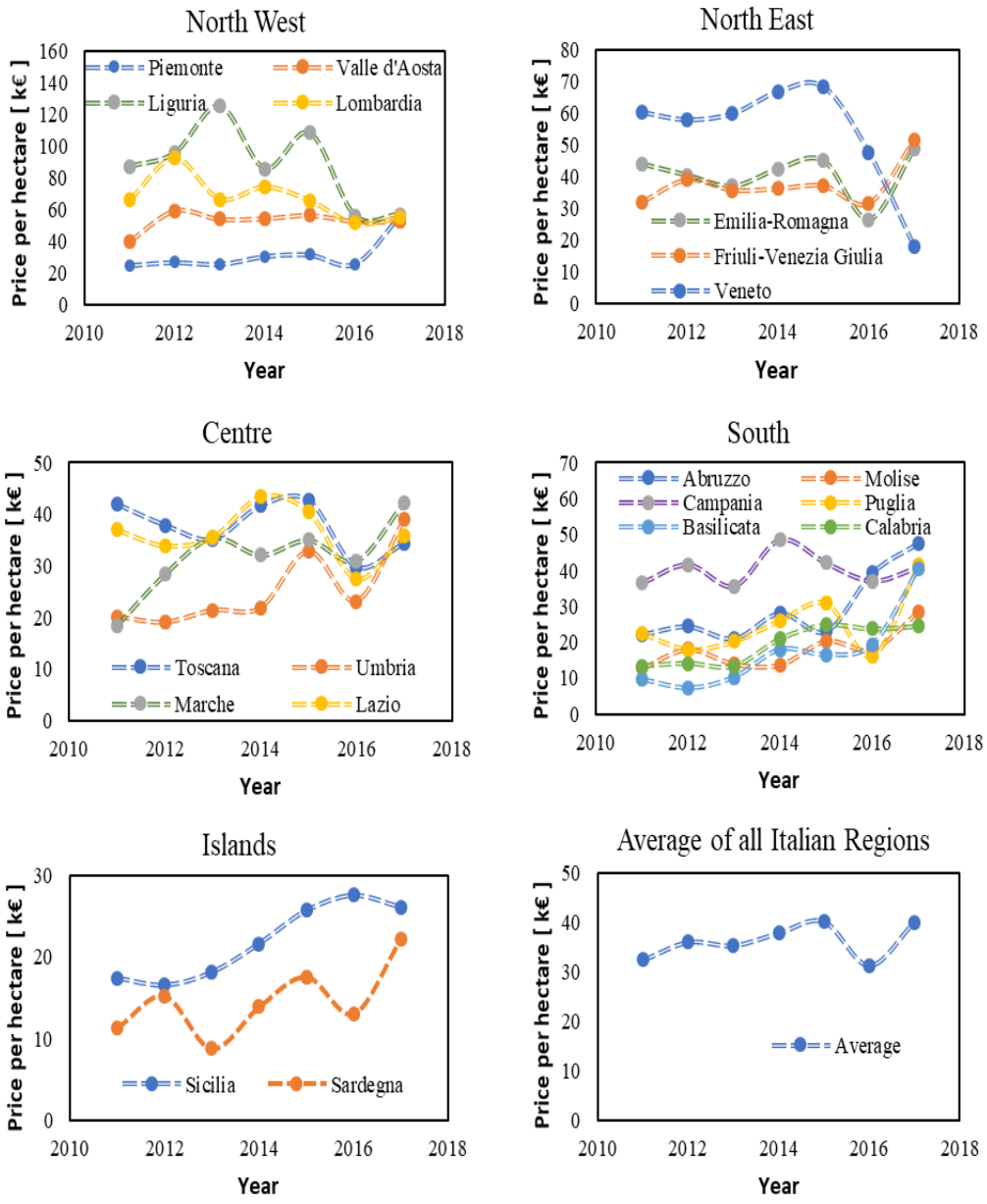
In this context, the total number of days worked in the company is almost stable (+ 0.8%), thanks to the significant increase in the non-family labour force (+ 14.3%). Managing water as an economic asset not only in the agriculture sector represents an important way to ensure the efficient use encouraging the conservation and protection of water resources and organic farming. Considering this, it is fundamental to recognise and encourage a more widespread reuse of the resource in the agriculture sector and its greater conservation proposed. A possible solution for this application could be applied the principle of "polluter pays" or "consumer pays" in the determination of water services tariffs (domestic, industrial, agriculture) and the connotation of economic good that is assigned to the resource. At this point is needed to consider an economic asset capable of market valuation, to understand the right expectation management and market solutions to resolve inefficiencies in its management.

The administration in terms of use and preservation of water and land in the agriculture sector is totally in the hands of stakeholders and cultural traditions of farmers (Turner, Davidson-Hunt, & O'Flaherty, 2003). The law and the directive of Water have been implemented by the United Nations at The Dublin Statement on Water and Sustainable Development, 1992, (UNESCO, 1992). Other Assessments and Agreements in international and global level are implemented and adopted for a more sustainable and efficient agriculture production preserving the environment issues including water issue. The Common Agricultural Policy (CAP) is the agricultural policy of the European Union. In fact, (CAP) has been destined to undergo many changes during the time. The last legislative proposal was made 1st June 2018, where European Commission presented the legislative proposals on the common agricultural policy (CAP) beyond 2020 (EC, The Future of Food and Farming, 2017). These proposals for a new EU common agricultural policy CAP aim to make more responsive to current future challenges such as climate change or generational renewal in rural development, while

continuing to support European farmers for a sustainable and competitive agricultural sector (EC, 2018). Sustainable agriculture was introduced for the first time from McClymont in his book "*New Roots for Agriculture*", considering farming in a sustainable way and a healthy environment, economic profitability, social responsibility and economic equity. Sustainability generally focuses on the stewardship business process of farmers and practices of principal government actors, rather than a specific agricultural product. In this context it is an opportunity to introduce the concentration and the attention on the development of the sustainable policies on the process of farms activities and their income perception. One of the most important objectives of the future (CAP) is to ensure a fair income to farmers. The farmers are at the heart of Europe's society and have a very important role in rural communities in providing vital and sustainable public goods (Fuentes, 2010). The contribution and support of farmers in the development of rural areas in European Union and especially in Italian reality is helping new generations of farms to join the "old profession", through mentoring of young farmers by more experienced ones. The tools for achieving those experiences are planned with the succession plans and improving knowledge transfer from one generation to the next. European Union encourages young farmers to improve access to land through more flexible rules on taxation, inheritance and giving financial support for young farmers (Atari, Yiridoe, Smale, & Duinker, 2009). Thanks to this initiative and the revival of young Italian farmers, the number of young farmers has considerably increased in Italian regions in the last three years (Coldiretti, 2017). Italy is one of the highest countries in European Union level for the number of young people under 35 in agriculture farms. From a summary of the main results realized from the 6th survey of Agriculture made by ISTAT, it is seen that the number of farms increases from year to year (Istat, 2019). About 99% of farms operate on family labour and 30.7% of the company leaders are female. The total number of farmers in Italy is 1,620,884 and the distribution in age is mixed. The number of Italian agricultural organic enterprises is 57.621 in 2018. Regarding the groups of age of farmers, we decided to put together in a large group of farmers into the same cluster (35-65 years old), representing in this term the recreationally and multifunctionality of so called new-old-farmers or "age of farming" (Miftari & Musaraj, 2019). The age of farmers is important for the distribution of subsidies that the regions permit and finance principally for the young farmers and the others. This is a very important indicator present in different regional contexts and

applications. In this matter farmers and the local government in the agriculture sector is the main actor for the progress of policies and sustainable development.

Figure.4.4 Agricultural land prices by region (unit Euro per hectare/arable land), from year 2010 to 2017



Source: EUROSTAT 2018

The charts above show the agriculture economic trend of the average price of arable land from 2010 to 2018. This chart is a panoramic image showing how the price in euro per hectare has been changing during the years that we are considering. Furthermore, the charters show the non-linear price line for Liguria, Veneto, and Abruzzo. The trend

of prices for Liguria and Veneto regions have been decreasing in terms of price per hectare for arable land from 2015. Abruzzo has undergone an increase of price per hectare for arable land from 2015. Moreover, the oscillations in terms of agriculture surplus have remained stable over time for the most Italian Regions, there has been a strong growth in agriculture trade surplus in 2017 in most regions. The average price unit per euro is 36.273 per hectare in the last 7 years of calculations and elaborations (EUROSTAT, 2018). Italian Regions have an extreme diversification on the distribution of economic growth, economic extension, and perception of income. The perception of agricultural income generated and determined from different limits, of the land owned, which are the economic activities taxed according to the calculations of this method.

4.4 Alternative Farming, Organic or Conventional

The definition of organic farming is a friendly farming system that has been existing from the ancient period of living and food production from farmers around the world. Conventional agriculture farming has been developed mostly when the demand for food started to increase because of population growth. It is led to significant increase in production, as a consequence of using very productive inputs (seeds, hybrids, etc.) and also genetically modified organisms, together with a larger mechanization of processes and large-scale usage of water pipelines, fertilizers, pesticides and bio-stimulators (Stoian & Caprita, 2019). The social sciences are one means through which researchers and practitioners can come to understand the human dimensions of conservation and natural resource management (Bennett, et al., 2017).

The transformation is much more profound than simply tweaking the existing industrial agricultural system. Conversion to organic agriculture production is most defined through regulations adopted by the Council Regulations (EC) No 834/2007 of June 2007. On organic production and labelling of organic agriculture products and repealing Regulation (EEC) No. 2092/91 (European Commission, Regolamento (CE) nr. 834/2007 del Consiglio, 2007), defines organic production as “an overall system of farm management and food production that combines best environmental practices, a high level of biodiversity, the preservation of natural resources, the application of high animal welfare standards and a production method in line with the preference of certain

consumers for products produced using natural substances and processes". It involves a given time spam as well as specific constraints and procedures, whereby organic principles must be applied to parcels and animals for more than three years (Lamine & Bellon, 2009).

The IFOAM definition for organic agriculture combines tradition, innovation, and science to benefit the shared environment and promote fair relationships and a good quality of life for all involved (IFOAM, 2008). According to the Food and Agriculture Organization of the United Nations defines, in "*Codex Alimentarius Commission*", defines organic agriculture as a "holistic production management system which promotes and enhances agro-ecosystem health, including biodiversity, biological cycles, and soil biological activity" (FAO, 1999).

Other authors define organic farming as a system which avoids or largely excludes the use of synthetic inputs (such as fertilizers, pesticides, hormones, feed additives etc.) and the maximum extent feasible rely upon crop rotations, crop residues, animal manures, off-farm organic waste, mineral grade rock additives and biological system of nutriment mobilisation and plant protection" (Gold, 2007). Organic farming should be seen as an integral part of a sustainable farming system and as a valid alternative to more traditional types of agriculture.

Since the entry into force of EU legislation on organic farming in 1992 , ten thousand farms have converted to this system, in response to a greater awareness of consumers regarding products obtained by organic methods and the consequent increase in demand for this type of product. Sustainable agriculture and environment are currently one of the fundamental objectives of the Common Agricultural Policy (CAP).

Sustainable development must reconcile food production conservation of non-renewable resources and protection of the natural environment, in a way that meets the needs of today's population without compromising the ability of future populations to meet their needs. To achieve this goal, farmers must consider the effects their activity will have on the future of agriculture and the environmental impact of the systems they use.

Organic agriculture is based on minimizing energy use, minimizing pesticide residues, minimizing water pollution, minimizing total costs, protecting biodiversity, ecosystem services, soil quality, nutritional quality, employment of workers, yield etc.

Even organic farming systems produce lower yields compared with conventional agriculture. They are more profitable and environmentally friendly and deliver equally or more nutritious foods that contain less (or no) pesticide residue, compared with conventional farming.

Moreover, initial evidence indicates that organic agriculture systems deliver greater ecosystem services and social benefits. Significant barriers exist to adopting these systems, however, and a diversity of policy instruments will be required to facilitate their development and implementation (Reganold & Wachter, 2016).

However, the new technologies application can make organic agriculture more profitable for the farmer. But high costs to adapt technology for individual farmers can be significant adoption hurdles, especially in case of limited knowledge and skills (Waltera, Fingerb, Huberb, & Buchmanna, 2017).

From the social movements rural sociologists can learn to look food in a new way, as something whose meaning and value is not exhausted by its nutritional content, its economic cost or the political agreements underpinning its production, but which is, as Fiddes says (Fiddes, 1991), “part of our way of life” (Tovey, 1997).

With the process of selecting our food which has been produced with different standards and different locations, in a vertical way we are reproducing particular social interactions and structures to not leave without weight the moral and cognitive ideas of process of production to every single farmer. Farmers who adopt organic farming aspire to produce food which is not only ‘good to eat’ but also ‘good to think’ (Beardsworth & Keil, 1992) - and in doing so, also to produce and construct a certain kind of society. So, farmers are a kind of social movement who guarantees food production systems and consumption habits and examines how the protection of the environment is handled in all the societies, regulations, by state development agencies and by farmers.

In this chapter we emphasized the importance of studies in organic agriculture as part of organisation and economic process as part of work and about food production and

consumption. In rural sociology the human dimension develops the argument of transformation towards agricultural sustainability and requires social, economic and environment changes. Social movement and social learning of this group of society become relevant in promoting important decision making based on knowledge and adoption on human-technology-environment. All these transformations came out when farmers started to know that the organic sector is driven largely by higher income earned than their conventional counterparts and attracted both to the perceived health and food safety attributes.

The research shows that the availability of financial support and other incentives for farmers who convert to organic production supported by the PAC contribute for further growth of the sector and support related activities throughout the food chain.

From our work we can show the number of organic farmers is increasing in Italian regions focusing on how local social contexts and networks are influencing the choices of farmers related to the environment. Other results obtained from this article regarding the age of farming are shown. Improving sustainable agriculture in social society the group of farmers age “giovani” are the most active in applying organic farming. This phenomenon happens not only for the simplified system of adoption and production but even for all the other constraints one can encounter during the transformation and certification process and application on their own farm.

The importance of local social context and the production together with the conservation of traditional food using the organic system is the main network and applied knowledge in a daily life behaviour of collective farmers. Altogether, it is clear to say that direct consumers and markets need to consider possible organic agriculture scenarios and their effects on climatic change and environment.

This scenario shows the weakness of organic farming that could be one of the diseases for the security of the production. The social and collaborative methods associated with NaturaSì and Slow Food in Italy in cases of bad season or natural disease reimburse the farmers the production from natural factors lost. Of course, this application and collaboration is strictly followed by the pertinent authorities.

CONCLUSIONS

The study has investigated the characteristics pertaining to the structural set-up of the farms in the Italian regions with reference to the land factor, age of farms, holdings farms, cultivation vocation and the intensity in terms of land investments incorporated - able to improve the overall sustainability.

Agriculture sustainability is the goal set, although not explicitly, also by the Common Agricultural Policy (CAP) for the new programming period. The new CAP, however, instead of treating the three dimensions of overall sustainability as sub-objectives of the latter, considers them separately. In fact, in Reg (EU) n. 1305/2013 on support for rural development, art. 4 lists the objectives that the new programming of EU funds aims to achieve, represented by competitiveness, sustainable management of natural resources and balanced territorial development of rural economies and communities, including the creation and maintenance of jobs.

This division of rural development into individual dimensions of sustainability does not consider any negative effects that measures aimed at one objective may exert on other objectives and, therefore, on the other dimensions of overall sustainability.

In the present work a synthetic index of overall sustainability at the farm level has been elaborated, obtained from the aggregation of 11 simple indicators embracing the three dimensions formulated based on data collected in the sample of farms in the Italian regions for the year 2016.

The results obtained have highlighted how as the physical endowment of land increases, a farm presents a greater probability of becoming globally sustainable. Starting from the likely hypothesis that the choice by the entrepreneur to expand the company mesh is aimed at achieving the condition of a vital farm, the latter measured by the profitability index, it was inferred that the land factor can increase company competitiveness and that this phenomenon is manifested in the plains and hills, rather than in the mountains. Also, in this analysis for the sector variables and land intensity, no causal link with business competitiveness was found.

Furthermore, considering that the increase in the physical endowment of land constitutes, on the one hand, and the opportunity to strengthen the framework of

agriculture sustainability, on the other, raise a necessity of competitiveness of Italian agriculture. Two different scenarios were hypothesized, depending on the ability of the companies to respect or not the constraint of the availability of economic resources for the achievement of the objective of improving organic farming through the increase of the number of farms. The results highlighted, on the one hand, how the production of economic resources required to expand at least one hectare of UAA increases as the farm mesh increases and, on the other hand, how this trend is manifested especially in organic farms.

In conclusion, it can be argued that the land factor plays a potentially decisive role in outlining the prospects for improving organic farming in agriculture, an outcome that cannot be considered separate from the market value of land. However, in order for a path to strengthen the overall sustainability of regional agriculture to be considered truly feasible, it is necessary to act on the variables that explain the achievement of the condition of economic readiness to improve overall sustainability, such as net farm income and land values.

In the case of net farm income, the entrepreneur's ability to make efficient choices in terms of what to produce, how to produce and how much to produce comes into play. In the case of land values, there are factors external to the company, not connected to the entrepreneurial capacity, that is, all those factors of an extra-agricultural nature which influence the land market and which, acting positively on prices, end up hindering the process of growth of the company and therefore the improvement of overall sustainability.

It is possible, therefore, to hypothesize a dynamic-functional model of the prospects of improvement of agriculture sustainability, in the sense that the endogenous factors which cannot be modified in the short term, that is, the farm structure and the productive order, and the exogenous factors, that is, the characteristics of the physical and socio-economic environment in which the farm are inserted, translate, in relation to the current situation, into opportunities for improvement for companies that are in a position to increase their size, defined as developing, and into threats for those that, conversely, show signs of a possible exit from the sector, called declining.

Nevertheless, for the far in equilibrium, the model of analysis can be defined as static, in how much a change of the actual situation is not considered probable, in consideration of the absence of the incentives coming from the inside of the farms and/or from the inability of the same ones to pick the opportunities that the external environment introduces.

The analysis carried out, therefore, indicates the possibility, above all for policy makers, to be able to act on the factors that have proved to be statistically significant, to outline a framework of improvement of the agriculture sustainability of Italian regions, allowing the movement of farms from the condition of -equilibrium to that of -development, which may possibly extend to those that are in the condition of -decline.

The issue of old-new age farming and the low level of education in agriculture is bringing problems for the future in the agriculture sector in Italian regions and in European Union. Considering the age of farmers and the level of education, our analysis has demonstrated that although further research is needed. Even so, our research clearly shows the gap between the first group of age (less than 34 years old) and the last group of age (65 years old or over) are considered. Of course, the second group “age of farming”, how we define (from 35 to 65 years old), this group is dominant and might fulfil the agreement on social, economic, and structural influences on strategic decision-making from European Union in the agriculture sector. The definition of “age of farming” needs to be conceptualized and institutionalized and be accepted at the national level.

Furthermore, this research establishes that there is significant correlation from the age of farming with level of instruction. We saw that higher is the level of education and higher is the income for farmers' families. This is important in considering the European Programmes on rising awareness on technological innovation and farmers participation. Of course, duties on being farmer holdings follow awareness and awareness awakens with education. This research illustrates that we need to rethink development strategies, so that we are not promoting educational campaigns to get them to be only trained farmers, but rather to begin enterprise farmers on using new technologies and improving the financial and welfare status of their work. If this aspect

were confirmed by the analysis and elaborations from other sources of information, it would pose an interesting question for the purpose of formulating policies.

Moreover, in terms of secondary objectives for future research, aside from age and education of farmers in Italian region, it would be beneficial for example to consider the level of income for group age and education. The European Policy might be interested in knowing this specific data for the future programming at regional level and of course at national level.

All this should not make you think, as often happens, that organic farming is a simple return to the past, a renegade of discoveries. Organic farming is a simple return to the past, a denial of scientific discoveries and scientific discoveries and technological innovations. In organic farming we recover and adopt traditional agricultural practices that still retain their original validity, but we also make extensive use of new products and innovations that scientific research puts available to us for a sustainable approach.

This research shows that the situation has changed, organic farming is considered not only an officially recognized activity, but even an activity worthy of being rewarded and incentivized with public funds.

The result was that the number of operators in the sector in a few years has significantly increased in all Italian regions and the market for organic products has begun to expand.

Finally, we confirm that today it is therefore easier to talk about organic farming because there are precise norms that regulate every minimum aspect, and this undoubtedly benefits the environment and consumers. It was clear that it is not possible to provide a univocal definition of organic farming, as numerous and very different are the schools of thought that are commonly grouped under this label. However, it was necessary to draw a precise boundary between organic farming and conventional farming, in order to avoid confusion and specially to clarify the field of investigation in this study. The interest shown from farmers, consumers and policymakers in organic farming has been clarified and justifiable.

REFERENCES

Adegbeye, M., Ravi Khan Reddy, P., Obaisi, A., Elghandour, M., Oyebamiji, K., Salem, A., Camacho-Diaz, L. (2020). Sustainable agriculture options for production, greenhouse gasses and pollution alleviation, and nutriment recycling in emerging and transitional nations - an Overview. *Journal Clean Production*, 242.

Adinolfi, F., Capone, R., & Bilali, H. E. (2014). Assessing diets, food supply chains and food systems sustainability: towards a common understanding of economic sustainability. *Conference: International Workshop "Assessing sustainable diets within the sustainability of food systems - Mediterranean diet, organic food: new challenges"At: RomeVolume: Proceedings; Meybeck A., Redfern S., Paoletti F. and Strassner C. (eds); FAO, Rome*.

Allan, J. (2003). Virtual Water- the Water, Food, and Trade Nexus. Useful Concept or Misleading Metaphor? *Water International Vol. 28, No. 1*, 4-11.

Alphonsus, I., & Sabran, M. (2016). Evaluating the Top-Bottom and Bottom-Up Community Development Approaches: Mixed Method Approach as Alternative for Rural Un Educated Communities in Developing Countries. *Mediterranean Journal of Social Sciences, 7 (4)*, 266-273.

Andrew_McGuire, M. (2017). Agricultural Science and Organic Farming: Time to Change Our Trajectory. *Agriculture and Environments Letters*.

Angelini, A., & Pizzuto, P. (2007). *Manuale di ecologia, sostenibilità ed educazione ambientale.* FrancoAngeli.

Arrojo, P. (2006). El reto ètico de la nueva cultura del agua. Funciones, valores y derechos en juego. *Estado y Sociedad Vol 139.*

Artioli, F., Acuto, M., & McArthur, J. (2017). The water-energy-food nexus: An integration agenda and implications for urban governance. *Political Geography*.

Auci, S., & Vignani, D. (2014). Climate change effects and agriculture in. *Munich Personal RePEc Archive (MPRA)*.

Barker, T., Bashmakov, I., Bernstein, L., & Bogner, E. (2007). Climate Change 2007: Mitigation. Contribution of Working Group III to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change. *Cambridge University Press*.

Bates, B., Kundzewicz, Z., & Wu, S. a. (2008). Climate Change and Water. Technical Paper, Intergovernmental Panel on Climate Change. *IPCC Secretariat*.

Berahmani, A., Faysse, N., & Gafsi, M. (2012). Chasing water: diverging farmers' strategies to cope with the groundwater crisis in the coastal Chaouia region in Morocco. *Irrigation Drain*, 673-681.

Best, H. (2009). Organic farming as a rational choice: empirical investigations in environmental decision making. *Rationality and Society, 21*, 197-224.

Blewitt, J. (2015). Understanding sustainable development. *Environment, Development and Sustainability*.

Borrelli, I. P., & Andreopoulou, Z. (2015). Knowledge, Food Systems and Well-being Sustainability. *RIVISTA DI STUDI SULLA SOSTENIBILITA'*.

Brunori, G., Galli, F., Barjolle, D., & broekhuizen, R. v. (2016). Are Local Food Chains More Sustainable than Global Food Chains? Considerations for Assessment. *Sustainability.*

Burton, R. (2006). An alternative for farmer age as an indicator of life-cycle stage: the case for a farm family age index. *Journal of Rural Studies, 22*, 485-492.

Burton, R. (2014). The influence of farmer demographic characteristics on environmental behaviour: A review. *Journal of Environmental Management, 135*, 19-26.

Burton, R., & Wilson, G. (2006). Injecting social psychology theory into conceptualizations of agriculture agency: towards a "post-productivist" farmer self-identity. *Journal Rural Study, 22*, 95-115.

Buttel, F., Larson, F., & Gillespie, W. (1990). The Sociology of Agriculture. *Greenwood Press*.

Butterworth, J., Warner, J., Moriarty, P., & Smits, S. a. (2010). Finding Practical Approaches to Integrated Water Resources. *Water Alternatives*, 3(1): 68-81.

Chiodi, G. (2018). Interpreting Global Land and Water Grabbing through Two Rival Economic Paradigms. *Academicus International Scientific Journal, 18*, 42-52.

Commission, E. (2020, Ottobre). *European Commission*. Tratto da https://ec.europa.eu/info/strategy/recovery-plan-europe_en: https://ec.europa.eu/info/strategy/recovery-plan-europe_en

CSIRO Urban Water Program, o. (2000). Managing Externalities: "Opportunity to Improve Urban Water Use". *Policy and Economic Research Unit.*

Daci, J. (2012). Protection of the Human Right to Water Under International Law-The Need for a New Legal Framework. *Academicus International Scientific Journal, 6*, 71-77.

Dasgupta, P. (2008). Nature in Economics. *Environment Resource Economics*.

De Rosa, M., Bartoli, L., & Chiappini, S. (2013). The Adoption of Agricultural Extension Policies in the Italian Farms. *New Medit*, 20-27.

DEFRA, A. I. (2007). *DEFRA, An introductory guide to valuing*. Tratto da Department for Environment, Food and Rural Affairs: www.defra.gov.uk

Dias, C., & Franco, M. (2018). Cooperation in tradition or tradition in cooperation? Networks of agricultural entrepreneurs. *Land use policy, 71*, 36-48.

Douglas, M., & Wildavsky, A. (1982). *Risk and Culture: An Essay on the Selection of Technological and Environmental Dangers.* University of California Press.

Dunlap, R., & Catton, W. (1980). A New Ecological Paradigm for Post-Exuberant Sociology. *American Behavioral Scientist*, 15-47.

Earth-Council. (1994). *Earth Council: Inter-American Institute for Cooperation on Agriculture (IICA).* San Hose, Costa Rica.

EC. (2017). Modernising and Simplifying the CAP. Socio-Economic challenges facing EU agriculture and rural areas. *Agriculture and Rural Development*, 1-37.

EC. (2017). *The Future of Food and Farming.* Brussels: European Commission.

EC, E. (2004). *REGULATION (EC) No 852/2004 OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL*. Tratto da https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=celex:32004R0852

EC. (2013). *European Commission Overview of CAP Reform 2014-2020. Tratto da Agricultural Policy Perspectives Brief: https://ec.europa.eu/agriculture/sites/agriculture/files/policy-perspectives/policy-briefs/05_en.pdf.*

EC. (2016). *Facts and figures on Organic Agriculture in European Union.* Agriculture and Rural Development.

Elliott, J. (2013). An Introduction to Sustainable Development. *Publisher of Humanities, Social Science & STEM Books*.

European Commission, E. (2000). *Introduction to the EU Water Framework Directive*.

European Commission, E. (2013). *A 2030 framework for climate and energy policies.* Bruxeles: Green Paper.

Eurostat. (2021). *Eurostat European statistics*. Tratto da Eurostat.

Evans, S. S., Evans, W. H., & Gable, R. A. (1989). *An Ecological Survey of Student Behavior*.

FAO. (1999). *Committee on Agriculture fifteenth session. Roma: Food Agriculture Organization, Organic agriculture (8).* Roma: Food Agriculture Organization, Organic agriculture (8).

FAO. (2017). *Rome Statement on Water Scarcity in Agriculture.* Rome: WASAG.

Fergus, A., & Rowney, J. (2005). Sustainable Development:Epistemological Frameworks and an Ethic of Choice. . *Journal of Business Ethics*, Vol. 57 (2) pp.197-207.

Fischer, A., & Young, J. (2007). Understanding mental constructs of biodiversity: Implications for biodiversity management and conservation. *Biological Conservation 136*, 271-282.

FNCA, F. (2005). *European Declaration for a "New Water Culture"*. Tratto da Declaration for a "New Water Culture", URL:

Fornés, J., Hera, A., & Llamas, M. (2005). The Silent Revolution in Ground- water Intensive Use and its Influence in Spain. *Water Policy, Vol. 7, No. 3*, 253-368.

Fuentes, J., Gallego, E., García, A., & Ayuga, F. (2010). New uses for old traditional farm buildings: the case of the underground wine cellars in Spain. *Land use policy, 27*, 738-748.

Gale, R. P., & Cordray, S. M. (1994). *Making Sense of Sustainability: Nine Answers to 'What Should Be Sustained.* Oregon State University: Making Sense of Sustainability: Nine Answers to 'What Should Be Sustained.

Gallie, B. (1955). Essentially Contested Concepts. *Proceedings of the Aristotelian Society*, 167-198.

Gaudino, S., Goia, I., Borreani, G., Tabacco, E., & Sacco, D. (2014). Cropping system intensification grading using an agro-environmental indicator set in northern Italy. *Ecological Indicators*, 76-89.

Ghaffari, A., Cook, H., & Lee, C. (2003). "Climate change and winter wheat management: A Modelling scenario for southeastern England*." Climatic Change. Volume 55*, 509-533.

Gomez-Limon, J., & Riesgo, L. (2009). Alternative approaches to the construction of a composite indicator of agricultural sustainability: An application to irrigated agriculture in the Duero basin in Spain. *Journal of Environmental Management*.

Gómez-Limón, J., Gutiérrez-Martín, C., & Montilla-López, N. (2020). Agricultural water allocation under cyclical scarcity: the role of priority water rights. *Water Vol. 12(6)*.

Gravsholt Brusck, A. (2002). Farmers landscape decisions: Relationships between farmers values and landscape practices. *Sociologia Ruralis*.

Groenfeldt, D. (2019). *Water ethics: A values approach to solving the water crisis.* Oxon: Routledge.

Gunningham, N. (2017). Should a general "duty of care" for the environment become a centerpiece of a "next generation" environment protection statute? *Environmental and Planning Law Journal 34*.

Hamilton, W., Bosworth, G., & Ruto, E. (2015). Entrepreneurial younger farmers and the "young farmer problem" in England. *Agriculture and Forestry*, 1-7.

Hoegh-Guldberg, O., Jacob, D., Taylor, M., Bindi, M., Brown, S., Camilloni, I. Engelbrecht, F. (2018). *Impacts of 1.5°Cof Global Warming on Natural and Human Systems.* Intergovernmental Panel on Climate Change (IPCC).

Hoekstra, A. (2003). Virtual water: An introduction. *Virtual water trade*.

ICWE, U. (1992). *The United Nations Conference on Environment and Development (UNCED)*. Tratto da http://geog.ucsb.edu/~carr/DCarr_Publications/Norman_Carr_Rio_07.pdf

Iglesias, A., Garrote, L., Quiroga, S., & Moneo, M. (2009). Impacts of climate change in agriculture. PESETA-Agriculture study. *JRC Scientific and Technical Research series EUR 24107*.

INEA. (2013). *Istituto Nazionale Economia Agraria*.

Intergovernamental Panel on Climate Change, I. (2008). *Climate Change and Water, IPCC Technical Paper VI*. Genevra.

Isaksone, S. (2014). Food and Finance: the financial transformation of agro-food supply chains. *The Journal of Peasant Studies*, 749-775.

ISO Certificazioni, U. (2015). *ISO Certificazioni*. Official Website.

ISTAT. (2010). Caratteristiche strutturali delle aziende agricole. Roma: Istat. *Roma, Istat*.

ISTAT. (2010). *Istituto Nazionale di Statistica.* Roma. Official website.

Istat. (2019). *Italian National Institute of Statistics*. Official Website.

Istat. (2021, January). *Italian National Institute of statistics*. Tratto da Italian National Institute of statistics: Italian National Institute of statistics

Jacobs, E., Greenwald, P., & D, O. (1995). Developmental differences in base rate estimates of social behaviours and attitudes. *Social Development*.

Jianguo Liu, V. H.-W. (2018). Nexus approaches to global sustainable development. *Nature Sustainability*.

Jickling, B., & Wals, A. (2008). Globalization and environmental education: looking beyond sustainable development. *Journal of Curriculum Studies*, 1-21.

Kagan, S. (2011). Art and sustainability: connecting patterns for a culture. *Transaction Publishers*.

Kambites, C. (2014). Sustainable Development: the unsustainable development of a concept in political discourse. *Sustainable Development*, 336-348.

Karami, E., & Keshavarz, M. (2009). Sociology of Sustainable Agriculture. *Sustainable Agriculture*, 19-40.

L. V. Dicks, P. V. (2014). EU agricultural reform fails on biodiversity. *Science*, Vol.344 pp. 1090-1092.

Lafferty, M. (2004). Introduction: form and function in governance for sustainable development. *Cheltenham: Edward Elgar*, 1-31.

Law, W. E. (1987, April). *https://sustainabledevelopment.un.org/content/documents/5987our-common-future.pdf*. Tratto da https://sustainabledevelopment.un.org/content/documents/5987our-common-future.pdf: https://sustainabledevelopment.un.org/content/documents/5987our-common-future.pdf

Lawhon, M., & Murphy, T. (2012). Socio-technical regimes and sustainability transitions insights from political ecology. *Progress in Human Geography*, 354-378.

Leach, M., Scoones, I., & Stirling, D. (2010). Dynamic sustainabilities: technology, environment, social justice. *London: Earthscan*.

Leach, S., Walsh, K., & Stewart, J. (1994). *The Changing Organisation and Management of Local Government.* Red Globe Press.

Lele, S. (1991). Sustainable Development: A critical review. *Science Direct*, 607-621.

Llamas, M. (1997). Transboundary water resources in the Iberian Peninsula. *Conflict and the Environment Springer*.

Llamas, M., & Martínez-Santos, P. (2005). Intensive Groundwater Use: Silent Revolution and Potential source of Conflicts. *Invited editorial in Journal on Water Resources Planning and Management, American society of Civil Engineers*, 337-341.

Llamas, R., & Martínez-Santos, P. (2005). Intensive Groundwater Use: Silent Revolution and Potential Source of Social Conflicts. *JOURNAL OF WATER RESOURCES PLANNING AND MANAGEMENT*.

Lockie, S., Lyons, K., Lawrence, G., & Mummery, K. (2002). Eating 'Green': Motivations behind organic food consumption in Australia. *Sociology Ruralis*.

López-Gálvez, J., & Nardo, M. (1994). Información técnica y gestión económica del uso del agua en los regadíos españoles. *Madrid, Fund. Argentaria y Visor Distribución*.

Maia, R., Silva, C., & Costa, E. (2016). Eco-efficiency assessment in the agricultural sector: the Monte Novo irrigation perimeter. *Journal Clean Production*, 217-228.

Malthus, T. (1798). *An Essay on the Principle of Population, as it Affects the Future Improvement of Society with Remarks on the Speculations of Mr. Godwin, M. Condorcet, and Other Writers.* London: Printed for J. Johnson, in St. Paul's Church-Yard.

Mankiw, G. (2003). Principles of economics. *Dryden Press*, 204.

Massarutto, A. (2005). Partecipazione pubblica e politiche idriche: spunti di riflessione a partire dal progetto Harmoni COP. *Convegno "Partecipazione pubblica nell'attuazione della Direttiva Quadro Europea sulle acque 2000/60". IEFE, Bocconi, Milano. URL: http://www.gruppo183.org/area_tematica.asp?ID_AREA_TEMATICA=23;*. Milano.

Massarutto, A. (2005). Water pricing and full cost recovery of water services:economic incentive or instrument of public finance? *Paper presented at the 11th International Sustainable Development Research Conference*. Helinski.

Maxey, L. (2006). Can we sustain sustainable agriculture? Learning from small-scale producer-suppliers in Canada and the UK. *The geographical Journal*, 230-244.

Mazzarino, S., & Pagella, M. (2003). Agricoltura e mondo rurale tra competitività e multifunzionalità, Franco Angeli, Milano. Milano: Franco Angeli.

McGuire, J., Morton, L., Gordon, A., & Cast, A. (2015). Farmer identities and responses to the social–biophysical environment. *Journal of Rural Studies, 39*, 145-155.

McNeill, D. (2009). Water as an economic good: the value of pricing and the failure of markets. *Natural Resources Forum 22(4)*, 253-261.

Mekonnen, M., & Hoekstra, A. (2016). Four billion people are facing severe water scarcity. *Science Advances*.

Michael Carley, I. C. (2000). *Managing Sustainable Development.* Published May 1, 2000 by Routledge.

Miftari, A. (2019). Sustainability of water use in agriculture. Southern European farmers participation and social impact. *Academicus International Scientific Journal, 19* , 131-145.

Miftari, A., & Musaraj, A. (2019). Sustainable Rural Development and the Effects of Education, Demography and Access in Agricultural Sector Structure and Efficiency. *CBU International Conference Proceedings*, 7.

Miller, T. (2013). Constructing Sustainability Science: Emerging Perspectives and Research Trajectories. *Sustainability Science*, Vol 8 (2) pp. 279-293.

Moini, G. (2012). *Teoria critica della partecipazione. Un approccio sociologico.* Roma: FrancoAngeli.

Molden, D. (2007). *Water for Food, Water for Life*. USA: David Molden_Comprehensive Assessment of Water Management in Agriculture.

Mouysset, L. (2014). Agricultural public policy: Green or sustainable? *Economic Literature*.

Naredo, J. (2003). La encrucijada de la gestión del agua en España. El agua: un despilfarro interesado. *Archipiélago, Vol. 57*.

Naredo, J., & Estevan, A. (2005). Ideas y propuestas para una nueva política del agua. *Bakeaz*.

Neckel, S. (2017). The Sustainability Society: *Culture, Practice & Europeanization*, 46-52.

Ondersteijn, C., Giesena, G., & Huirne, R. (2003). Identification of farmer characteristics and farm strategies explaining changes in environmental management and environmental and economic performance of dairy farms. *Agricultural Systems. Vol 78*, 31-51.

Padovani, L. M., Carrabba, P., & Mauro, F. (2003). The ecosystemic approach an innovative proposal for managing biodiversity and land use. *ENEA*.

Pahl-Wostl, C. (2002). Towards sustainability in the water sector. The importance of human actors and processes of social learning. *Aquatic Sciences*.

Parry, M., Canziani, O., & Palutikof, J. (2007). Climate Change, Impacts, Adaptation and Vulnerability". Contribution of Working Group II to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change. *Cambridge University Press, Cambridge, UK*.

Peer, G., Dics, L., Visconti, P., Arlettaz, R., Baldi, A., Benton, T., . . . Hartig, F. (2014). EU agriculture reform fails on biodiversity. *Science*, 1090-1092.

Pellow, D. N., Schnaiberg, A., & Weinberg, A. (1997). Politicizing the Treadmill of Production: Reshaping Social Outcomes of "Efficient Recycling". *RePEc*.

Pinter, M., & Kirner, L. (2014). Strategies of Disadvantaged mountain dairy farmers as indicators of agricultural structural change: a case study of Murau, Austria. *Land Use Policy, 38*, 441-453.

Pugliese, P. (2001). Organic Farming and Sustainable Rural development. A Multifaceted and Promising Convergence. *Sociologia Ruralis, 41*, 112-130.

Quevauviller, P. (2011). Adapting to climate change: Reducing water-related risks in Europe - EU policy and research considerations. *Environmental Science & Policy*, 722-729.

Quevauviller, P. (2014). European Water policy and research on water -related topics: an overview. *Journal Hydrology*, 180-185.

RDP. (2015). *European Network for Rural Development. Tratto da 2014-2020 Rural Development Programme.*

Savenije, H. (2002). Why water is not an ordinary economic good, or why the girl is special. *Physics and Chemistry of the Earth 27*, 741-744.

Savenije, H., & Van der Zaag, P. (2000). Conceptual framework for the management of shared river basins with special reference to the SADC and EU. *Water Policy Vol.2*, 9-45.

Schnaiberg, A., & Gould, K. (1994). *Environment and Society: The Enduring Conflict.* New York: Oxford University Press.

Schoolman, E., Guest, J., Bush, K., & Bell, A. (2012). How Interdisciplinary is Sustainability Research? Analyzing the structure of an emerging scientific field. *Sustainability Science*, Vol. 7(1) pp. 67-80.

SDGs. (2015). *UN 2030 Agenda for Sustainable Development.* Parigi: United Nations.

Shamir, U. (2000). Sustainable Management of Water Resources, Transition towards Sustainability. *Interacademy Panel Tokyo Conference*, (p. 62-66). Tokyo.

Shrestha, S., Ciaian, P., Himics, M., & Van Doorslaer, B. (2013). Impacts of Climate Change on EU Agriculture. *Review of Agricultural and Applied Economics XVI Number 2*, 24-39.

Simpson, G. B., & Jewitt, G. P. (2019). The Development of the Water-Energy-Food Nexus as a Framework for Achieving Resource Security: A Review. *Frontiers in Environmental Science*.

Smith, A. (1776). *The Wealth of Nations.* Glasgow.

Songa, M., Cen, L., Zheng, Z., Fisher, R., Liange, X., Wang, Y., & Huisinghg, D. (2017). How would big data support societal development and environmental sustainability? Insights and practices. *Science Direct: Journal of Cleaner Production*, 489-500.

Vineis, P., Carra, L., & Cingolani, R. (2019). Politiche per il cambiamento climatico: serve una bussola. *Scienza in Rete*.

WCED. (1987). Report of the World Commission on Environment and Development: Our Common Future. *Our Common Future*.

Wigboldus, S., & Jochemsen, H. (2020). Towards an integral perspective on leveraging sustainability transformations using the theory of modal aspects. *Sustainability Science*.

Wilby, R., Hedger, M., Forrow, D., & Blackmore, M. (2006). Risks posed by climate change to the delivery of Water Framework Directive objectives in the UK. *Environment International*, 1043-1055.

York, R., & Dunlap, R. (2019). Environmental Sociology. Companion to Environmental Studies.

Yunlonga, C., & Smit, B. (2003). Sustainability in agriculture: a general review. *Agriculture, Ecosystems & Environment*, 49 (3) 299-307.

Zagata, L., & Sutherland, L. (2015). Deconstructing the "young farmer problem in Europe": Towards a research agenda. *Journal of Rural Studies, 38*

, 39-51.

Zeneli, F. (2016). Analysis of risks and investments' opportunities in water sector. *Academicus International Scientific Journal, 13*, 128-137.

Zucaro, R. (2014). Atlas of Italian Irrigation System. *INEA*.