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The circular economy for resilience of the agricultural landscape and promotion of the sustainable agriculture and food systems

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A B S T R A C T

The agricultural landscape is a public good to be preserved for long-term socio-economic and environmental effects. The agricultural landscape is preserved by the carrying out of agricultural activities. Through a empirical survey we examined how some young farmers in the countryside adopt conservation and resilience strategies. A common feature of the case studies examined is the adoption of photovoltaic energy production necessary for the performance of business activities. The method applied is that of the opportunity cost. The results of the research show that young farmers after graduation have returned to agriculture as they have an advantage in terms of opportunity costs compared to other economic activities. The production of clean energy, accompanied by agricultural activity, makes the company competitive and favors the conservation of agricultural landscapes.

1. Introduction

The increase in the cost of production factors in agriculture creates an avoidable increase in the cost of production with negative effects on the profitability of the farm and with negative consequences on agricultural landscapes. The decrease in the profitability of farms has led young people to abandon agriculture, with the disappearance of small and medium-sized farms, with negative effects and environmental impacts and the disappearance of rural communities [1,2]. These aspects highlight that the resilience of landscapes, with human activity, is also linked to profitability. In many rural contexts, this phenomenon has affected entire local communities in southern Italy which since the 1970s have emigrated in search of better remuneration for work. Another aspect to highlight is the lack of generational change that has occurred and still manifests itself in many municipalities where agricultural activity was in the past a prevalent activity. However, in the past decade some young people have been trying to return to agriculture. The return to agriculture by these young people is closely related to company profitability in a context of increasing production costs in agriculture. These young people, taking the production costs of non-farm origin as unchangeable data, are trying to return to agriculture with better conditions to ensure a satisfactory income and improving their visibility as farmers. They are more likely to do so by committing to sustainable, alternative agriculture than one that only sees productivity as a goal. The possibility of having the land inherited, or at a low cost, means having few barriers to entry and therefore having a competitive advantage for the production of higher value products which sometimes makes farms more viable. Even the public operator, to promote the development of rural areas, has promoted the multifunctional vision of agricultural activity, rediscovering its multiple functions that it is able to manifest. On closer inspection this function has always been carried out by agriculture, however in the past in Europe the Common Agricultural Policy (CAP) focused on the productive function of agricultural activity, on business efficiency and on the need to increase food production. With the changing of the variables the scenario has changed. In fact, since the seventies of the last century, with the growing concern expressed by the international community towards food security and agriculture sustainability, a new vision of agriculture whose purpose is to promote an activity that is able, not only to do so. produce food products, but also to preserve the environment using appropriate, profitable and socially desirable techniques begin [3]. Agriculture maintains the landscape, prevents risks and makes the territory attractive [4,5]. This study aims to analyze the competitive strategies implemented by farmers to contribute to the development and maintenance of agricultural activity in the countryside. Specifically, after the theoretical analysis, an empirical analysis was carried out on some business case studies. In particular, starting from the economic principle of cost-opportunity, we have seen how some young entrepreneurs have returned to agriculture, creating spaces for business competitiveness. Through the study of the opportunity cost we have highlighted the business strategies of entrepreneurs and how the opportunity cost affects business choices.

2. Territorial development and agriculture

Agriculture contributes to the conservation and protection of the territory through the presence of man. To talk about territorial

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development it is necessary to refer to the concept of multifunctionality of agriculture. In fact, according to some authors [6–8], the multifunctionality of agriculture is a way to indicate evolutionary paths of differentiation and integration of income for farmers, especially in marginal areas. Where the competitiveness of enterprises is particularly difficult to achieve due to the structural weaknesses of the territory. The concept of multifunctionality must be combined with that of corporate competitiveness. In fact, business management requires competitiveness that is well suited to the multifunctionality of agricultural activity: diversification of the production offer, the production of services not intended for the market, the diversity of the forms of sale are all the result of a search for business competitiveness that is combined with multifunctionality. These activities are not "new" but the farmer has always carried them out, today a greater emphasis is given to them as they represent a rediscovery of the rural world that in the last thirty years had been abandoned according to the industrialization model that has also affected agriculture. The productivity of the primary sector, in fact, must be compatible with other objectives felt by the community, such as the protection of the environment and biodiversity, the quality and safety of food, the maintenance of employment levels and the protection of human rural areas [9]. In developed economies, agriculture is increasingly considered in a systemic approach, capable of producing food commodities and to meet the new needs of the consumer, providing both public goods (biodiversity, agriculture, landscape) and services (tourism, energy, education services) and foods with specific attributes (typical products). In this way there are farms which, at the same time, contribute to food production, conservation of natural resources, employment and sustainable development of the rural territory. In the context of multifunctionality, the diversification of productive activity, which allows to satisfy the growing interest in the natural heritage and rural culture of modern society which, with the advent of new technologies and a frenetic lifestyle, is deprived of these values it is increasingly affirmative. This contributes to reducing the exodus of the population from rural areas and creating job opportunities, promoting the socio-economic development of disadvantaged areas. The diversification of production can take on various aspects regarding hospitality services on the farm that create economic value in rural areas, especially in peri-urban areas and in holiday destinations, as well as direct sales on the farm.

3. Opportunity cost as a rational choice criterion

In Economic Theory, the opportunity cost is used as a unit of measurement to understand whether a situation has a market and whether the allocation of resources is efficient or not. The idea is that if any resource has an opportunity cost, it will tend to be used efficiently for the use that has the greatest value [10]. In an efficient situation, any resource should be used for something of greater value. At this point we ask ourselves: what value? The value is what the owner of the resource attributes to the resource. From this it follows that the owner of that resource will use it in the use that he deems most valuable or because it is reflected in the price or as often happens in the reflection of professional activities. As we have said, every economic subject attributes a value to resources [11]. For example, let's take work time and free time: the economic entity must choose between one and the other. For some economic entities, working an extra hour and earning is very important because they attribute a greater value to the hour of work than free time; for others it is more valuable to take a walk and not work an extra hour.

If an allocation is efficient, each resource will be allocated to the activity that generates the greatest value. Greater value can be personal gain or personal pleasure. Another question to ask is: why do we use the opportunity cost to understand if the system is efficient? The opportunity cost is a measure of the efficiency of the system because every time I go to allocate a resource in the use of for example A where that resource earns X, we have to ask ourselves if that resource could be allocated in an alternative allocation for example B and earn Y. At this point we ask ourselves what is the distance between X and Y. The distance between X and Y measures the efficiency of the system because if the distance with what I gain with activity A and what I gain with activity B is particularly large, it means that of the two, one represents a very scarce resource, the only one to do the activity must where I earn X or there is some mechanism that allows me to exclude others and earn an extra or an income.

In an efficient system, the resources that are not very rare, that are not unique, should be allocated to the activities where they are most productive but secondly to earn their opportunity cost in that activity or to earn slightly more than what they would earn in the second. alternative immediately following in the scale of values.

All inputs have an opportunity cost. In particular, whenever an economic operator earns much more than its opportunity cost through the use of a resource, a question must be asked: the resource is truly unique, so having no competition it is the only one to be used for that resource. Activity or simply has a monopoly that allows you to earn an income or has simply built around a system of privilege for which it can also exclude from growing with it and earn in the activity it does as it has exceeded its opportunity cost. The distance between what I do with an hour of work (or even considering any input) and how much I earn with it and how much I earn with another potential activity that I could do (i.e. the distance between how much I earn and its opportunity cost) is an excellent presence or absence of competition. Whenever there is a great distance, you have to ask yourself the problem.

In advanced economies, relatively simple jobs that are poorly paid elsewhere (even in the past these jobs were paid little in economies that are developed today but were less developed before) in technologically advanced societies are paid a lot. We ask ourselves is this a bad thing or a good one? The answer is that this is good. It is an effect due to the fact that technological progress makes everyone more productive. In human activities, technological progress means that resources become more and more productive (work, materials, etc.) by adjusting production processes, changing technology, specializing in doing the same thing and doing it well. The result of this process is the increase in output per unit of input and resources consumed. This is a better effect for all of us. However, there are other activities for which this does not happen, in these cases the technological progress for physical reasons does not allow this. For the machines, through automation, for the production of shoes, all of this has occurred in recent years. So those particular activities, where technical progress does not create efficiency, will become more and more expensive than the others (as long as they have a demand or a market for that product or service).

Therefore, in the context of the choices that an economic operator can make, he chooses according to the opportunity cost. As seen, according to economic theory, the opportunity cost is what one must give up to make an economic choice and is equal to the value of the best alternative. Making a choice comes at a cost in terms of time or money (or both), and the opportunity cost is the best possible choice. Commonly the economic operator is led to consider that the cost of a specific action or a good or a service is determined by its market price and that, in the absence of this, the cost is zero. The principle of opportunity cost teaches us on the contrary that everything has a cost, even what costs nothing in terms of monetary cost. It is common to perceive the portfolio as the only constraint (cost) of human action, or rather the spending limits that the budgetary possibilities place in our choices. In reality, there are two other fundamental constraints to human action, the frontier of technological possibilities and time. Time is probably the most stringent constraint because it cannot be changed either by the growth of material resources or by technical-scientific progress. The spending constraint can be loosened as disposable income increases but we cannot lengthen the number of hours of the day. The time constraint refers to the fact that it is almost always not possible to do two things at the same time and, therefore, every choice we make, even if directed towards an activity that does not involve monetary costs, precludes another one that we could have made in the same interval of time. In reality, the more the individual's financial resources increase, the more

the relative price of time compared to money increases, that is, the most important constraint becomes time and time becomes more precious than money. It is no coincidence that in rich societies the gift of time tends to be increasingly replaced by the gift of money as individual income grows. For people who have good money and are very busy, time is worth much more than money. The opportunity cost represents the value of what we give up when we make a certain choice.

4. Materials and methods

For the purposes of this research and to analyze the opportunity cost and resilience of the agricultural landscape, we investigated how young agricultural producers are responding to changing market situations. In particular, 10 in-depth interviews were carried out with young entrepreneurs who were chosen as case studies. In order to deepen the questions on "what", "how" and "why" and to allow recursive interrogation and qualitative follow-up skills. Participants were selected on the basis of being a young farmer under the age of 35 and running their own business. No limitations were placed on the type of production in which they were involved and their management practices. Participants were recruited first through personal connections and avalanche. Following the identification of suitable participants from these sources, an introductory email was sent, accompanied by an information sheet outlining the project.

Production farms include beef, poultry, pork, flour, wine, fruit, olives, greens and vegetables. The participants are located in the western area of Sicily (Palermo, Trapani and Agrigento).

The geographic spread of the participants provided a wide range of perspectives. Furthermore, the study provides information on the development of new agri-food systems. Demographically, the participants were largely Sicilian and class between 28 and 32 years (see Table 1).

Seven of the ten interviewees collaborated with their life partner and only one of whom also worked outside the farm. The research was conducted through semi-structured, open and in-depth interviews which allowed to evaluate the experiences of the interviewees [12]. The interviews took place between October 2020 and April 2021. As these young people were widely spread geographically, in order to keep costs down, the vast majority of interviews were conducted via electronic means (Skype or telephone interviews). Three young people were interviewed on their farms or businesses which allowed for a deeper understanding of the experiences of young people as producers as I was able to better appreciate the geographical context of the farm responding to the non-verbal cues of the participants. Some questions included asking participants about the motivations for setting up their business, the barriers and enablers to business development, the role of networks, technologies, innovations and stakeholders, and the challenges and opportunities for the business.

Respondents were provided with copies of transcripts and permission for each citation was asked, reflecting member control technique for assessing the reliability of qualitative results [13]. This allowed for an iterative process where the meaning was clarified and respondents were empowered through increased ownership. The data were assessed using an inductive approach, which allowed the identification of emerging issues and the analysis of the underlying structure of the interview participants' experiences. Following the transcription, themes common to all cases were identified through reflection and an in-depth reading of the transcripts.

Table 1
Characteristics of respondents.

man	female
8	2
Age <30	Age >30
7	3

5. Results and discussions

The ten case study exams refer to companies in the western area of Sicily. All production facilities are run by young entrepreneurs. Three entrepreneurs find themselves with production structures in the third generational turnover. The other seven at the second exchange. Regarding the qualification in all cases we find entrepreneurs with a degree. However, we encountered two different situations in the business management activity. In seven out of ten cases the entrepreneur is assisted by his life partner; in the remaining cases no. In the event that the life partner collaborates in the company, forms of marketing of short supply chains have been found. In the other case, the traditional form of business was found with sales in a long chain. Regarding the size of the structure, we are on average 4 ha and multi-product farms (see Table 2).

This strategy is adopted by all entrepreneurs as a function of increasing market competitiveness. We asked the entrepreneurs about the activity carried out in addition to the corporate one. In seven cases (those that sell in a short supply chain) we are in the presence of a full-time entrepreneur; in the other cases, however, we are in the presence of a part-time entrepreneur. Based on this situation, we asked the reasons for one or the other choice and the opportunity cost. The full-time entrepreneurs explained to us that after graduation they did not find employment locally with their qualifications and the only job opportunity was to move several kilometers from their residence. Accepting the job would have entailed a higher cost than the opportunities found. The young graduate preferred to give up an opportunity, which in monetary terms made him less than his father's business. In the other three cases, these are entrepreneurs who, having graduated in agri-food disciplines, have preferred to apply the theoretical knowledge acquired during their studies in the field. They also told us that they have not found jobs that are monetarily paid higher than what they get today in the company that was run by their father. From an economic point of view, both chosen are efficient as the young people interviewed have efficiently allocated resources.

In all the cases examined, the business activity is the result of a choice in terms of opportunity cost and therefore the efficiency of economic resources. These efficient choices determine the resilience of the agricultural landscape and the permanence of man in the territory. The choice to stay in the company and to adopt new successful entrepreneurial formulas (short supply chain) contributes to the resilience of man in the countryside and therefore to always create agricultural landscapes that constitute an economic value according to the externalities that creno to the populations living in the environments neighbors or to tourists who want to enjoy these agricultural landscapes. In all the cases examined, the production of energy from photovoltaic panels was found. The production of photovoltaic energy was present in all cases and serves to reduce business costs. Thanks to the investment, companies have lowered annual production costs and increased company production. This strategy has proved highly successful for businesses and the agricultural landscape as it has increased its resilience. The thing that unites all the cases examined is the strong passion for agriculture. With this in mind, we can say that the opportunity cost criterion represents a valid tool for measuring the resilience of the agricultural landscape from a circular economy perspective. What then the circular economy represents a form of economy that was practiced in

Table 2
Characteristics of the case studies.

Second generational change	Triad generational change
7	3
Management with life partner	Management without a life partner
7	3
Short supply chain	No Short supply chain
7	3
Full-time entrepreneur	Part-time entrepreneur
7	3

rural economies until the sixties of the last century in Italy. In these contexts everything played a role in the living conditions of the time. In this paper, reasoning with the economic criterion of opportunity cost, we have witnessed the return to agriculture of some young people who contribute to the maintenance of the agricultural landscape and its resilience. The present study has shown, as in other studies [14,15], that the entrepreneur through his strategies that he puts in place to be competitive favors the resilience of the landscape and creates the conditions for sustainable agri-food systems [16,17].

6. Conclusions

The industrialization process that has also affected the agricultural world has set its strategy on the model of exogenous development. In fact, agriculture today is based on relationships that exist with other sectors, and we can say that it depends on these both in the upstream phase (raw materials) and in the downstream phase (food industry and organized distribution). In fact, exogenous development implies a progressive dependence of agriculture on decision-making centers outside the agricultural sector itself. In this process, agriculture gradually loses its specificity - that is, the characteristics that made it a "particular" sector in relation to other sectors [18]. The increase in the complexity of operations, together with the need to have integrated packages of factors, induces a further specialization of business activities in a few phases, and the delegation of the most complex and "industrialized" production phases and processes to the outside causing a reorganization of business and work activities. In the past it was the farmer himself who produced the seeds, who determined the crop rotations. In these production systems, everything had a balance: from the production activity in the field, to the animal breeding activity. The peasant family was based on an optimization of the workforce, in the good productivity of the land and in synergy with this, the breeding of animals. Today agricultural products are no longer the result of agricultural production processes from the specificity of the final products, or products intended directly for consumption (the "quality" of the product made by agriculture becomes less important, as it is increasingly mediated by the industry of transformation etc.). The increase in the complexity of the input-output relationships along the supply chain, the removal from the territory, the homologation of techniques and knowledge and the growing dependence on external decision-making centers located outside the production area leads to the expulsion of the agricultural entrepreneur from direct contact with the final market and with the needs of the consumer. Agriculture-society relations, whether they are activated through the product or through communication practices, are increasingly mediated by other actors, whether they are market operators (processing industry, traditional retail, international markets). wholesale, large-scale distribution) and representation (agricultural professional organizations, political parties political), or simply communication vehicles (newspapers, specialized magazines, mass media). From this model of exogenous development, which has affected many territories and which has led to the distancing of the entrepreneur from the business and from the principle of sustainability and territoriality, a new model of agriculture restarts. The industrialization model that has affected agriculture has determined excellent levels of productivity, however it has determined an agriculture model that depends on other subjects, the entrepreneur is no longer sovereign in determining the success or failure of the enterprise.

This new idea of a company is aimed at recovering relations with the territory. This type of company is characterized by the marketing of part of the company's production on its own. This type of commercialization in economic theory is known as a short chain. The term "short" chain is used to indicate both the tendency to "skip" phases of commercial intermediation and therefore directly connect the agricultural producer with the consumer, and therefore with reference to the number of "physical" steps that the product carries out before reaching final consumer, both at the geographical distance that the product travels before physically reaching the consumer. This last meaning is attributable to the growing attention shown by consumers to the "environmental" aspects of production processes (see for example the theme of the so-called food miles) and to the demand for "genuineness" and safety of origin that normally local products (local food) seem more able to satisfy. It is evident that although not equivalent, these two different meanings (reduction of the number of steps and reduction of the distance traveled by the product) are united by the tendency to "bring" the consumer closer to the world of production, thus facilitating on the one hand the activities of communication and exchange of information between the protagonists, and on the other the pursuit of economic advantages on both sides: the consumer can in fact normally benefit from lower purchase prices (in fact he avoids remunerating the costs of transport and/or commercial intermediation), and the producer can obtain more profitable prices than those present on the intermediate markets. In addition, the activation of direct channels with the consumer facilitates the activation within the farm of other processing and conditioning activities of the product, allowing a further recovery of added value and a better employment of physical and human resources. present in the company. In this survey, as we have seen, in addition to producing food products, agriculture can have a positive role on many components of the territorial system in which it operates. It is precisely from this role that he must obtain the guidelines for the creation of new income opportunities for the entrepreneur and for the rural territory. Today more than in the past, in developed economies that the community has for a larger agriculture and more differentiated expectations, not only in relation to the diversification of the productive offer of agricultural products, but also to other functions (landscapes, accommodation, energy production from renewable sources, educational farms, social activities), depending on these new aspects of agricultural activity, in this study we observed how entrepreneurs were able to transform these opportunities into an opportunity to generate income. Sure enough, the results showed an entrepreneurial network characterized by young entrepreneurs who were able to reorient their business strategy to remain competitive on the market also thanks to bank credit which represented a critical success factor for the vitality and growth of the company. The most important reason that led entrepreneurs to stay in the company is related to the opportunity cost. The agricultural activity combined with the production of agro-energy in the cases examined allows to increase the resilience of the landscapes. This study represents a good basis for analyzing landscape resilience strategies in rural economies from a circular economy perspective. In the study we saw that entrepreneurs produce clean energy which they re-use in the company in a circular economy perspective. For the future it would be necessary if these entrepreneurs, according to their "competitiveness", increase the company surface, innovate in the company or in other words if the profits are reused in the company. Ultimately, the study made it possible to analyze, through the principle of opportunity cost, how agricultural activity can contribute to the maintenance of man in the territory and to favor processes of resilience of the ecosystem and therefore of the landscape.

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