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The Tuscany Integrated Supply Chain Projects 2014–2022: A New Path to Support the Agri-Food Industry

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Abstract: The Integrated Supply Chain Projects (ISCP) are promoted under the framework of Rural Development Programs (RDPs). Considering the scarce literature on ISCP, the case of Tuscany, one of the Italian regions that has implemented ISCPs most aggressively, was analyzed. The aim of this work is to give evidence of the potential positive effects of ISCPs for the agricultural sector by considering the differences between ISCP beneficiaries (treated) and non-ISCP farms (non-treated). The materials used for the analysis are twofold: the Italian Rural Network database and the Italian Farm Accountancy Data Network (FADN) dataset. The analysis is based on a three-year period (2018–2020). The sample consists of 1693 farms, outliers excluded. The treated farms included in the FADN sample total 134. The variables used are both structural and economic. The statistical analysis carried out compares treated and non-treated farms using the Welch-t-test. The results show that some key variables are significant (area; labour; revenues and costs). In general, the treated farms are more likely to improve their production process through EU funding and through new investments. In conclusion, the ISCP could be a good opportunity to support the sector. This work suggests that beneficiaries could achieve higher economic performance, especially when carrying out diversified activities.

Keywords: integrated supply chain projects; agro-industrial chain; European Agricultural Fund for Rural Development; farm accountancy data network; Welch-t-test

1. Introduction

Integrated Supply Chain Projects (ISCPs), formal agreements between the actors of an agro-industrial chain, aim to improve the performance of the agricultural sector: profitability, infrastructure and farm management are the main issues [1]. This approach was introduced in Italy's 2007–2013 National Strategic Plan (NSP) for rural development policy, with the aim of creating a strong coordination between farming behaviors at all stages of the supply chain, from primary production to consumption [2,3]. Indeed, the achievement of rural development policy objectives, whether related to the competitiveness of the sector or to the development of rural areas, also depends on the identification of effective intervention tools. ISCPs are promoted under the regional Rural Development Programs (RDPs), funded by the European Agricultural Fund for Rural Development (EAFRD) within the broader framework of Member State (MS) and European Union (EU) agreement. Integrated planning is presented as a method, since it does not have its own financial autonomy, but draws on measures or packages of measures of the RDP. At the same time, it favors integration between different subjects by targeting individual planning towards a common objective. Integrated Supply Chain Projects (ISCPs) are a "morphogenetic content tool as they allow for evolutionary change while maintaining the structural identity" of the sector or territory of reference [4].

In Italy, the rural development strategy for the 2014–2020 programming period (extended to 2022 due to the COVID-19 pandemic) was implemented through 22 separate RDPs, one at national level and 21 regional RDPs; the Italian Rural Network Program provides funding for the networking of rural development actors in Italy. Regional administrations may decide to opt for different measures, depending on regional strategies and needs [5]. The ISCP is provided for by 10 RDPs. Its objective is to increase the competitiveness of the agri-food sector, enhance the value of production from both a qualitative and a commercial point of view, activate a multifunctional development process, stimulate supply-chain innovation and create and consolidate relationship networks between agro-industrial operators [6]. Ref. [1] describes the ISCP as one of the most innovative tools that takes on characteristics in each region. Many RDPs seem to propose integrated projects as tools to promote local and sectoral development with a clear negotiating and inclusive character; in others, the implementing rules tend to promote "soft" integrated planning aimed at developing cooperation between actors with common interests. In this case, the objectives are less ambitious and do not aim to initiate a stable and lasting engagement in broader local development processes [1]. Regions allocate a considerable amount of resources to the implementation of ISCPs, which underlines its strategic importance for the achievement of RDP objectives. Tuscany, Emilia-Romagna and Lazio are the three Italian regions that have focused more than others on ISCPs [7]. This may produce interesting results and policy implications for other territories where the phenomenon of cooperation in the agri-food sector is less developed. In fact, as highlighted by Ventura et al. [3], the agri-food sector is characterized by very heterogeneous arrangements and formal and informal contracts aimed at creating stable relationships between enterprises.

Co-operation, supply chain and integration are the cornerstones of the ISCP approach; they find ample space in the documents that make up the new European strategy for 2030—i.e., Green Deal and Farm to Fork—where the conditions are set for an action strategy focused on the integration of the various Common Agricultural Policy (CAP) intervention instruments. For example, article 6 of the CAP 2023–2027, Reg. (EU) No. 2115/2021, foresees common objectives and two of them emphasize the supply chain approach. The Italian CAP Strategic Plan 2023–2027 provides for sectoral interventions, targeting the main agricultural sectors (wine, fruit and vegetables, olive oil, beekeeping and potatoes). In addition, it envisages actions to support investments in rural development, cooperation initiatives and territorial development. All of these policies could improve relations between the various actors involved in the supply chains, particularly at the local level. The European Commission has strongly recommended that Italy focus policy measures on strengthening cooperative and associative forms, reducing a fragmented sector that is therefore incapable of affirming the role of agriculture and the value of its production throughout the supply chain [7].

Integrated supply chain projects aim to promote co-operation and the continuity of business activities in rural areas whose conditions are highly disadvantaged compared to other production areas. The aim of this work is to provide evidence of the co-operation between different actors and illustrate how this can generate positive effects by considering differences in terms of the economic performance of farms that applied for integrated projects (treated) compared to those that did not (non-treated). The performance of the corporation at farm level is analyzed through the regional case study of Tuscany (Italy), which has strongly implemented this strategy to support and enhance the following: the trade and market of products, the most innovative actions for the agricultural sector, supply chain innovations, profitability and production quality schemes, safe working conditions and environmental issues, especially in rural communities [8]. Furthermore, the regional rural development strategy has always been focused on measures favoring co-operation on territorial and local development actions [9,10].

Two main sources were used: firstly, information regarding the Integrated Supply Chain Design, provided by the Italian Rural Network database [11], collected by the Council

for Agricultural Research and Economics, Research Centre for Agricultural Policy and Bioeconomy (CREA—PB); secondly, the Italian Farm Accountancy Data Network (FADN).

This article is organized as follows. The following section presents the conceptual background and context of the study. This section describes the statistical approach and data collection. Section 3 presents the results, sample and structural variables. The last section (Discussion) describes the main practical implications, limitations and future lines of research.

2. Materials and Methods

2.1. Background

Local development policy integration processes are a consolidated tradition in Italy thanks to public intervention [12]. Since the 1980s, various tools and procedures have been implemented (Employment Pacts, Territorial Pacts, Leader, Integrated Territorial Projects, Sectoral Agreements, to name but a few) to support interventions organically linked and aimed at a sectoral or territorial development plan. They aim to concentrate financial resources in homogeneous intervention contexts, to involve socio-economic actors in development dynamics, to foster the process of sharing and communication with local institutions and to support administrative decentralization in order to better orient interventions towards specific local needs. Integrated projects support the creation of systemic relations between actors of different natures and propose more complex and structured solutions to sectoral or territorial problems. The main purposes attributed to ISCPs are as follows: promotion of the integrated approach, experimentation and strengthening of partnership practices, improvement of the supply of local collective goods, consolidation of networks and creation of capital, creation of conditions for a fairer redistribution of added value among the different segments of the agri-food supply chains and improvement of labor quality [2,12].

In order to be defined as integrated, a project must comply with certain basic principles [1]:

- Bottom-up approach: the integrated project starts from the needs of a group of actors who, having identified specific needs, outline a sectoral or territorial intervention strategy;
- Cross-sectorality: the integrated project is a complex project that seeks to involve all those who participate in a production process or who live and operate in a given area, creating specific synergies and influencing economic and social relations;
- Co-ordinated use of several intervention instruments: the integrated project must allow access to several RDP intervention measures, and possibly to other public policy instruments, in order to support all the interventions deemed useful for the envisaged strategy;
- Presence of a specific development strategy: integration between several subjects must be supported by a specific strategy that outlines the specific features and justifies the actions undertaken within the project;
- Creation of a structured partnership whose members are representative of the interests of the sectors and territories involved: the partnership must have precise responsibilities and guarantee the implementation of the project.

Among the various funding opportunities available, integrated supply chain projects represent one of the most innovative tools [1], both in terms of access to public funding by economic actors in the primary sector and for the potential effects they could have on Italian agriculture. Despite its different regional declinations, the ISCP is characterized by a few common aspects:

- The variety of objectives to be integrated into an overall strategy;
- The combination of support and incentive instruments at the service of the intervention strategy;
- The aggregation of financial resources around a project idea;
- The integration between the actors of the production chain (from raw materials to the marketing of the finished product);
- The coordinated action, aimed at returning economic benefits to all stakeholders;

- The use of all the different professional skills and competences needed to plan and implement the interventions.

From a procedural point of view, the supply chain project proposes a sectoral intervention strategy and at the same time brings together the various individual requests attributable to the development objectives of the supply chain [1,13]. Public funding is allocated to individual requests for intervention, which must be coherent and relevant to the collective project of reference. The ISCP is based on the supply chain agreement, which is the formal contract that establishes the objectives, operational strategies, commitments and obligations that each party is required to maintain, as well as specific roles and individual responsibilities; after approval of the project, all this is shared and signed by all stakeholders. One of the most recurring obligations concerns the concession and marketing of the product: a farm that joins the ISCP has an obligation to cede a percentage of its production to another ISCP member. This is one of the most important aspects of supply chain planning, the objective of which is to create stable and equal relationships along the food supply chain [3,12]. In this sense, the ISCP could be the tool that, thanks to the negotiation of different interests for the achievement of a common goal, initiates the re-composition processes of the fragmented landscape of the Italian agri-food sector.

2.2. The Tuscany Integrated Supply Chain Projects

Tuscany is a region in central Italy with an area of approximately 23,000 km^2, 90% of which is rural [8]. According to data from the 7th Census of Agriculture [14], in 2020 there were 52,146 farms in Tuscany, while the Utilised Agricultural Area (UAA) was 640,111 hectares with an average farm size of 12.3 hectares. In fact, 80% of the surface area is used by farms that fall into the UAA classes above 10 hectares, representing a quarter of the total number of farms. Most of the utilized area is cultivated with arable crops (39.8%), mainly cereals and fodder, followed by permanent crops (olive trees and vines). In 2021, Tuscan agriculture produced a total value of EUR 3.4 billion (current prices), an increase of 3.4% over the previous year. Net of intermediate costs, the added value was EUR 2.3 billion, an increase of 1.9% compared to 2020 [15]. The region's level of specialization in the agri-food sector compared to Europe is significantly higher than the continental averages: agriculture contributes 55% of agri-food turnover (83% in terms of enterprises). The Tuscan sector accounts for over 12% of wine exports and 6% of total national agricultural exports.

According to regional analysis [8], the main structural disadvantages of the agricultural and forestry sector are the following:

- Low qualification of operators that cannot be solved by technical assistance and services;
- Low generational turnover, leading to a progressive ageing of operators and the reduction of stable employment replaced by temporary and less efficient employment;
- Progressive reduction in the size of the agricultural sector, both in numerical terms and in terms of the size of enterprises;
- Inadequate infrastructure for businesses and rural communities, particularly for the distribution and efficiency of water resources.

Moreover, the analysis provided by the 2014–2022 RDP [8] highlighted low development of innovation and production, a weak system of valorization and commercial improvement, poor development of supply chains and crises in some production sectors. As far as the socio-economic framework is concerned, the regional situation reflects problems of agricultural competition linked to difficulties in social and economic growth: the system is in fact characterized by low growth, linked both to exogenous factors (market and financial situation) and to endogenous factors related to the small size of the enterprises and to labor and financial power dynamics that rarely invest in innovations and improvements for the whole development system. For these reasons, Tuscany's RDP, with a budget of EUR 1.25 billion, will focus on investments that can increase the economic profitability and quality of agri-food production, improve safety conditions at work and respect the environment and climate. The selection of the most appropriate measures to be applied within integrated programming is entrusted to the Managing Authority (MA),

which provides methods and procedures for financial support. This system is based on certain criteria and considers several aspects, including the following:

- The identification of the sectors that need priority public support action;
- The identification of measures that enable the financing of integrated design among other measures under the RDP;
- Exploitation of synergies and complementarities;
- Adoption of procedures that respect the principle of competition between economic operators.

For all these considerations, the Tuscany Region has managed to launch measures aimed at promoting the European objectives as shown in Table 1.

Table 1. Sub-measures and operations foreseen for the Integrated Supply Chain Planning for Tuscany Region (Source: own elaboration using regional data and [7]).

Code	Sub-Measures/Operations
1.2	Support for demonstration activities and information actions
3.1	Support for new quality assurance schemes
3.2	Support for information and promotion activities carried out by producers' associations in the internal market
4.1.3	Integrated Projects
4.1.5	Encouragement for the use of renewable energy in farms
4.2.1	Support for investments in the processing/marketing and/or development of agricultural products
6.4.1	Farm diversification
6.4.2	Energy deriving from renewable sources in rural areas
8.5	Investments aimed at increasing the resilience and environmental value of forest ecosystems
8.6	Support for investments in forestry technologies and in the processing, mobilization and marketing of forest products
16.2	Support for pilot and cooperation projects
16.3	Cooperation between small operators to organize joint work processes and share facilities and resources, as well for the development/marketing–tourism sector
16.6	Support for supply chain cooperation for the sustainable procurement of biomass to be used in production of food and energy and industrial processes
16.8	Support in drafting forest management plans or equivalent tools

2.3. The Statistical Analysis: The Dataset and Variables Used

The Italian FADN was used for processing quantitative data. It provides useful information to investigate the structural and economic characteristics of subsidized farms. It is an annual sample survey established by the European Economic Commission in 1965 [16]. It has been carried out in Italy since 1968, with a similar approach in all EU Member States. It is the only harmonized source of data on the evolution of incomes and on the economic-structural dynamics of farms, useful for understanding the impact of the measures taken under the CAP. The FADN survey represents market-oriented farms, and it is based on a stratified random sample design to guarantee statistical properties on three dimensions: region, economic size and type of farming. It is the main tool for monitoring EU farms' economic performance [17,18], allowing the Commission to make comparisons between Member States in order to address its policies. In Italy, some studies used the FADN to analyze productivity and the environment [19] or to assess the impact of rural development policies on organic farming [20–23]. Other studies assess agricultural sustainability [24] or the farms' technical efficiency, comparing organic and conventional farming [25]. Furthermore, the evaluation of rural development policies and programs has also been considered [26,27]. With the Green Deal and the Farm to Fork strategy, the green and social dimensions of the CAP have underlined the importance of having quantitative data in order to implement an evidence-based policy. The future Farm Sustainability Data Nentwork (FSDN) system is a helpful tool for both farmers and policy makers. The main idea is to provide a set of common EU-wide variables to assess the sustainability of agriculture. The aim is to create a powerful tool to support farmers and encourage them to

adopt more sustainable practices. Converting FADN into FSDN will be a great challenge for all actors involved: the common goal will be to upgrade the current system in order to strengthen its contribution [28].

In this study, the different impact assessment methods mentioned above were evaluated before a significance test was chosen. All FADN farms in the Tuscan region for the period 2018–2020 were considered. Regarding the control group, the sample was refined by excluding outliers according to the Tukey method to make the statistical population homogeneous. The highest significance was found using Welch's *t*-test (between the control group and the treated). The differences were analyzed with respect not only to economic performance, but also to the structural characteristics of farms trying to provide a picture of the development, maintenance and/or modernization of agricultural entrepreneurial activity. These types of projects promise not only better economic performance, but also an impact on the growth of opportunities and relationships between different actors of the whole territory: i.e., territorial, systemic growth rather than growth in terms of productivity.

The main steps followed to develop the analysis were as follows:

- Identifying the treated group: a panel dataset was defined (from 2018 to 2020) using the FADN regional dataset;
- Identifying the control group using non-treated farms in the FADN regional dataset: the farms selected were those that did not join the integrated supply chain program (Tuscany RDP);
- Providing statistical analysis to identify the differences between treated and non-treated farms by applying the Welch-*t*-test on main structural and economic variables;
- Evaluating the results of treated and control Tuscany farms.

The analysis was based on the regional FADN, and a three-year period is considered (2018–2020). The sample consisted of 1693 farms, outliers excluded (2018 sample consisted of 561 farms; 2019 sample consisted of 571 farms; 2020 sample consisted of 561 farms). The ISCP beneficiaries (treated) included in the FADN sample totaled 134. The tables and graphs show the general structural and economic characteristics of treated and non-treated farms, considering the following variables: economic dimension, organic or conventional farming, diversified or non-diversified, youth-led and women-led farms, Farm Net Value Added, Current Costs and other economic indexes. The statistical analysis carried out compared treated and non-treated farms (the control group) using the Welch-*t*-test for independent unpaired samples [29]. Structural variables such as UAA and Agricultural Work Units (AWU) were considered to assess differences on the economic variables such as Net income, Costs and Capital. In statistics, Welch's *t*-test, or an unequal variances *t*-test, is a two-sample location test which is used to test the (null) hypothesis that two populations have equal means. It is named after its creator, Bernard Lewis Welch. It is an adaptation of Student's *t*-test [30] and is more reliable when the two samples have unequal variances and possibly unequal sample sizes [31,32]. These tests are often referred to as "unpaired" or "independent samples" *t*-tests, as they are typically applied when the statistical units underlying the two samples being compared are non-overlapping. Given that Welch's *t*-test has been less popular than Student's *t*-test [31] and may be less familiar to readers, a more informative name is "Welch's unequal variances *t*-test", or "unequal variances *t*-test" for brevity [32]. However, Welch's *t*-test is more robust than Student's *t*-test and maintains type I error rates close to nominal for unequal variances and for unequal sample sizes under normal circumstances. Furthermore, the power of Welch's *t*-test comes close to that of Student's *t*-test, even when the population variances are equal and sample sizes are balanced [31]. Welch's *t*-test can be generalized to more than 2 samples [33], which is more robust than a one-way analysis of variance (ANOVA). It is not recommended to pre-test for equal variances and then choose between Student's *t*-test or Welch's *t*-test [34]. Rather, Welch's *t*-test can be applied directly and without any substantial disadvantages to Student's *t*-test, as noted above. Welch's *t*-test remains robust for skewed distributions and large sample sizes [35]. Reliability decreases for skewed distributions and smaller samples,

where one could possibly perform Welch's *t*-test [36]. All these considerations describe our sample and validate the choice of this test over other statistical tests.

3. Results

3.1. Participation to Tuscany Rural Development

The Tuscany Supply Chain Planning has focused its activity on increasing the competitiveness of the agricultural, agri-food and forestry business systems. These business sectors represent the whole activity characterizing the Tuscan territory. In fact, the Tuscan rural areas are rich in traditions linked to the agricultural production sector. To encourage its territory and to promote European objectives, the Tuscany Region has provided a set of sub-measures, shown in Table 1. A total of 2016 applications (referring only to integrated design) were submitted, as shown in Table 2. Measure 4.1.3 had the greater result (integrated projects), as well as measure 16.2 (support for pilot cooperation projects). Tuscan farms seem to have strong needs regarding the renewal of real estate and structural investments, technological innovation and, at the same time, cooperation in order to increase competitiveness with other products on the market. The region is rich in typical food products strongly rooted in the territory, with a high degree of diversification. Through measures 4.2.1, 6.4.1 and 3.1, many farms have diversified their production, including processed food products which create production, transformation, promotion and quality protection issues. Regarding funding, a total of EURO 141 million was distributed. Table 2 shows the values in absolute terms and percentage for each measure granted. To protect investments from tangible fixed assets, higher values were granted (measure 4.1.3); Tuscan farms appear to be backward from a technological point of view. Furthermore, importance has also been given to processing companies, whose machinery and infrastructure are obsolete. For these reasons, measure 4.2.1 was associated with a large amount of funds and investments. These measures support farmers to enhance both agricultural production and processed products using innovative technological processes. Innovation should also be linked to environmental sustainability (measures 16.2, 16.3 and 16.6): through cooperation, it is possible to evaluate different production processes to achieve the best economic, social and environmental rewards. Furthermore, common systems make it possible to support the development of services inside the local area, avoiding external ones (provided from outside the rural area considered). The goal is to fund local value chains, even if through plants and resources that can be linked to the tourism sector and to the sustainable supply of biomass. Moreover, sustainability can be extended to the wood and forestry production sector. The mountain areas are strongly affected by disadvantages: to reduce depopulation and to encourage economic activity, subsidizing the production of wood and by-products deriving from certified supply chains and sustainable forest management could be a challenge (measures 8.6 and 16.8).

Table 2. Breakdown of applications and granted funds by sub-measure referred to integrated design (values in millions of euros and in %) (Source: own elaboration using regional data and [7]).

Sub-Measures/ Operations	Number of Applications	Distribution of Funds (Million Euro)	Distribution of Funds (%)
1.2	33	1.4	1.03
3.1	20	0.1	0.06
3.2	17	3.5	2.45
4.1.3	1210	73.4	51.25
4.1.5	75	1.9	1.32
4.2.1	128	31.8	22.61
6.4.1	50	3.9	2.76
6.4.2	14	0.9	0.64
8.5	4	0.5	0.35
8.6	75	5.1	3.64
16.2	369	16.7	11.86

Table 2. *Cont.*

Sub-Measures/ Operations	Number of Applications	Distribution of Funds (Million Euro)	Distribution of Funds (%)
16.3	17	0.9	0.62
16.6	3	0.6	0.41
16.8	1	0.2	0.14
Total	2016	140.8	100

3.2. The Rural Production Chains Concerned

The regional agricultural sector is highly specialized in wine production, olive growing and the oil industry, cereal growing, the food industry, forestry and wood. The Tuscany Region has defined those sectors as priorities as they are characteristic and strongly rooted in the territory. A total of 75 rural projects involving 14 agricultural supply chains were presented (Figure 1). Viticulture involved 16 projects, followed by 12 rural projects regarding olive growing and the oil industry. Attention has also been given to the production of durum and soft wheat, which are typical varieties of the hills of Pisa, Grosseto and Livorno. There are 10 projects involved. In addition, six projects relating to the production and management of forests and wood have been included as priorities. The most involved areas are those of the Tuscan Apennines. Among regional priorities, nine multi-chain projects have also been included, i.e., on several chains concentrated in a specific area and/or with a short chain. The trend in the number of rural projects by agricultural sector appears to be proportional to the value of the loan disbursed (Figure 1). In the 2014–2022 rural development policy relating to Tuscany, little importance was given to the livestock sector. Problems relating to logistics and the health and hygiene conditions of milk and dairy products, as well as the quality of some typical products, have limited the number of participants. In general, the zootechnical supply chain has experienced a sharp increase in management costs in recent years. Despite these limitations, the Tuscany Region has extended its interest with specific measures shown in Figure 1, which zootechnical farmers can apply for.
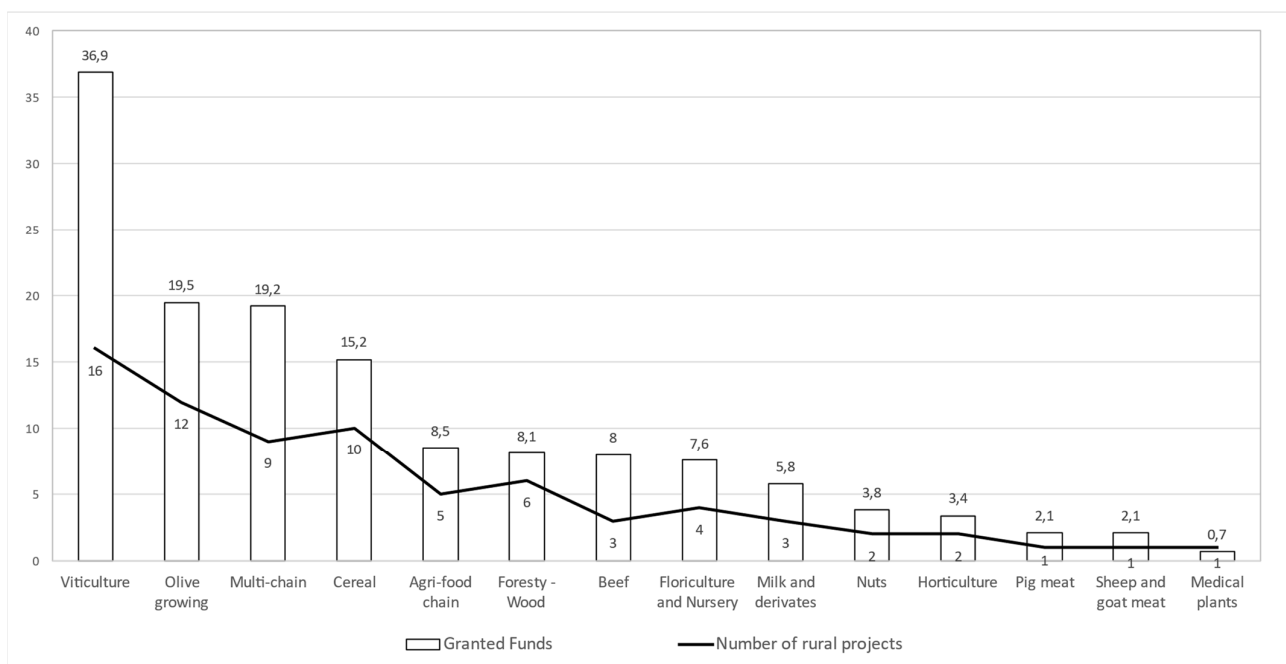

Figure 1. Number of integrated rural projects and granted funds by agricultural sector (Source: own elaboration on Tuscany data and [7]).

3.3. The Main Characteristics of the Sample

To evaluate the structural characteristics, the economic and financial performance of the two groups of farms—those subsidized by integrated projects (treated) and those not receiving that type of support (non-treated)—a preliminary descriptive analysis on FADN data has been developed as a first step. The number of control farms was 1559 and the of treated farms were 134. The results show an overall homogeneous representation of the main agricultural sectors involved for both groups. Figure 2 and Table 3 show the results in terms of absolute value on the total sample considered and in terms of percentage of treated and control farms.
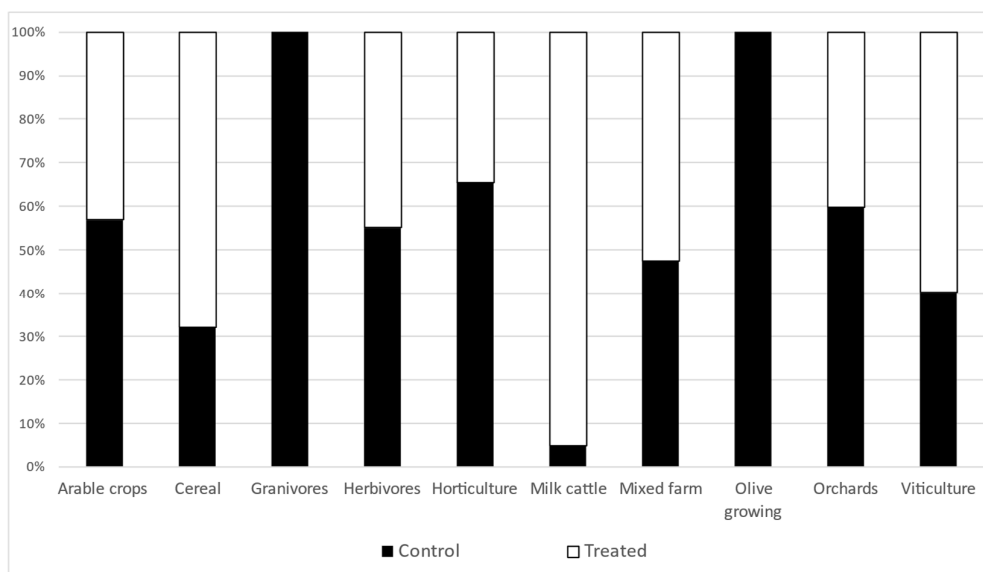

Figure 2. Distribution of farms by type of farming (%)—treated and control farms (years 2018–2020) (Source: own data processing on FADN data).

Table 3. Number and percentage of farms by type of farming—treated and control farms (years 2018–2020) (Source: own data processing on FADN data).

Type of Farming	Control		Treated	
	Value [%]	Number of Farms/Total Farms Considered	Value [%]	Number of Farms/Total Farms Considered
Arable crops	17.77	277/1559	13.43	18/134
Cereal crops	5.26	82/1559	11.19	15/134
Granivores	2.82	44/1559	-	-
Herbivores	13.73	214/1559	11.19	15/134
Horticulture	17.00	265/1559	8.95	12/134
Milk cattle	0.45	7/1559	8.95	12/134
Mixed farms	13.53	211/1559	14.93	20/134
Olive growing	5.26	82/1559	-	-
Orchards	5.58	87/1559	3.73	5/134
Viticulture	18.60	290/1559	27.63	37/134

The analyzed farms belong mainly to viticulture, arable crops and mixed farms sectors. Looking at the farms in the control group, they belong mainly to the olive and granivore breeding sectors, while the farms in the integrated projects show a more homogeneous representation of the agricultural sector, although the number of dairy cattle farms is higher than that of the control farms.

3.4. The Farm Characteristics and the Structural Variables

The analysis considered both qualitative and quantitative variables. The categorical variables concern farms led by young people, farms led by women, diversified farms and organic farms. In addition, the locations of farms in plains, mountains and hills were considered. The results shown in Table 4 highlight their weight in both absolute value and percentage. Young farmers and farms run by women participating in supply chain projects show little difference from control farms. Instead, differences are found mainly in organic farming and those with diversification. These differences are in line with the EC recommendation [37], which strongly supports and enhances both issues. Regarding the location of the farms considered, the shares of the control group and treated farms do not differ, so an immediate comparison can be made. Most of the farms participating in rural supply chain projects are in the hills or mountains, where farming conditions are much more disadvantaged than in the plains, especially in terms of labor required (Table 4). The analysis of structural variables first assessed land and labor production factors: UAA, total farm area and AWU. In addition, the index of machinery power per UAA (KW/UAA) was considered (Table 5). The data show that farms participating in rural supply chain projects have a larger total farm area and consequently a larger UAA.

Table 4. Number and percentage of farms by qualitative characteristics (years 2018–2020) (Source: own data processing on FADN data).

	Control		Treated	
	Value [%]	Number of Farms/Total Farms Considered	Value [%]	Number of Farms/Total Farms Considered
Farm characteristics variables				
Women-led farms	23.54	367/1559	20.14	27/134
Youth-led farms	10.07	157/1559	6.72	9/134
Diversified farms	27.64	431/1559	47.76	64/134
Organic farms	27.00	421/1559	47.76	64/134
Farms Location				
Plain	11.61	181/1559	11.19	15/134
Hill	70.75	1103/1559	73.14	98/134
Mountain	17.64	275/1559	15.67	21/134

Table 5. Main descriptive and Welch *t*-test on structural variables (years 2018–2020) (Source: own data processing on FADN data).

	Control		Treated		Statistical Analysis
	Mean	Standard Deviation	Mean	Standard Deviation	Welch-*t*-Test
Farm Structural Variables					
Total Area—Large Farms [ha]	42.48	77.69	114.75	190.25	****
UAA—[ha]	32.34	53.05	81.57	117.93	****
Labour Variables					
Machine power expressed by KW per Utilised Agricultural Area [KW/UAA]	22.20	59.33	11.58	17.26	****
AWU	2.00	1.87	3.89	6.37	****

Notes: *, **, ***, **** Statistical significance at $p < 0.1$; $p < 0.05$; $p < 0.01$; $p < 0.001$; ns = non-significant.

Concerning labor, treated farms have a greater need for agricultural working units than control farms. This trend is probably due to the agricultural sectors involved. In fact, in the treated group, participating farms mainly belonged to wine, mixed farms and dairy sectors. In these farm types, most of the cultivation operations are carried out manually, that

is, with little use of mechanization. This result is consistent with the data shown in Table 5, according to which the labor requirement expressed in machine power per UAA is higher on control farms, resulting in lower AWUs. In fact, in the prevailing agricultural sectors in the control sample (orchards, horticulture, arable farming, etc.), many crop operations are carried out with the help of agricultural machinery.

3.5. The Balance Sheet Variables

The farms in the FADN sample that participated in rural development projects were characterized by large size. This was also reflected in their level of economic performance. In fact, these farms had, in absolute value, higher farm revenues and costs than the rest of the regional sample considered (Table 6). Moreover, the treated companies showed a greater propensity to make new investments and receive more European aid than the others, the latter being synonymous with greater dynamism. In fact, most of the companies considered in the treated group applied for measures that support new investments in fixed assets, technological innovation and renovation of agri-food processing facilities (Table 7). The results for economic and capital variables show how policies such as those of integrated supply chain projects can contribute to the maintenance and development of agricultural activities.

Table 6. Main descriptive and Welch *t*-test on economic variables (2018–2020) (Source: own data processing on FADN data).

	Control		Treated		Statistical Analysis
	Mean	Standard Deviation	Mean	Standard Deviation	Welch-*t*-Test
Economic variables					
Farm Net Value Added—[Euro]	61,607.0	114,809.4	150,000.0	311,252.5	***
Farm Net Value Added/UAA—[Euro/ha]	9077.1	24,016.2	5476.0	13,787.6	***
Farm Net Value Added/AWU—[Euro/AWU]	24,678.6	21,459.3	32,753.3	25,359.1	****
Net Income/UAA—[Euro/ha]	5334.8	13,390.0	2752.2	7936.6	****
Variables Costs/UAA—[Euro/ha]	10,753.4	35,772.0	11,199.0	42,548.0	ns
Value Added/UAA—[Euro/ha]	9727.4	25,323.2	5776.0	13,539.3	***

Notes: *, **, ***, **** Statistical significance at $p < 0.1$; $p < 0.05$; $p < 0.01$; $p < 0.001$; ns = non-significant.

Table 7. Main descriptive and Welch *t*-test on capital variables/assets (2018–2020) (Source: own data processing on FADN data).

	Control		Treated		Statistical Analysis
	Mean	Standard Deviation	Mean	Standard Deviation	Welch-*t*-Test
Patrimonial variables					
Agricultural Capital/UAA—[Euro/ha]	2841.6	8003.5	2289.4	2446.8	ns
Fixed Capital/UAA—[Euro/ha]	35,757.4	59,326.0	27,899.3	54,691.6	ns
EU Help found—[Euro]	9171.1	16,680.0	25,322.5	34,354.9	****
EU Help found/UAA—[Euro/ha]	319.5	854.6	331.0	466.3	ns
New Investments—[Euro]	14,677.4	33,335.6	38,892.7	72,596.1	***

Notes: *, **, ***, **** Statistical significance at $p < 0.1$; $p < 0.05$; $p < 0.01$; $p < 0.001$; ns = non-significant.

4. Discussion

The EU with the CAP will support the process with its Rural Development Policy, which provides MSs with an envelope of EU funds to be managed at the national or

regional level under multi-year, co-financed RDPs [38]. In Italy, RDPs are managed by the regions, at least so far [39]. The introduction of the National Strategic Plan (NSP) is the main tool available to Member States to design agricultural activities in the EU 2023–2027 programming period [40]. In fact, rural development actions have been included in the new CAP 2023–2027. This action is an excellent strategy for Member States to highlight and improve territorial productivity. The aim of this article was to assess the structural, economic and capital impact of some farms that have joined rural development projects.

The comparison was based on the performance recorded by non-treated (control) farms within the Tuscany Region. For this purpose, FADN data were processed. The FADN database is a valuable tool to assess the impact of EU funds and to evaluate economic performance [38]. According to [22,38,41], Italian FADN data include additional information to that required by the EC. For example, in the Italian crop data repository, revenues and costs are recorded at the individual process level, from which the gross margin for the different crops practiced by the farm can be obtained. Therefore, processing FADN data is a good choice for analyzing the effect of integrated supply chain projects. In addition, through data analysis it is possible to draft the economic performance of farms in each area and assess their degree of development. According to [7], fragmentation and small-sized farms are among the factors that historically influence the competitiveness of Italian agricultural and agribusiness enterprises. This is a limitation that can undermine, for example, the ability to find and introduce innovations, and thus to access credit and services. The final effect is that of a generalized increase in production costs, which, in the current socio-economic and political scenario, is further burdened by unstable commodity prices. Furthermore, imbalances in contractual relations between the parties exacerbate vertical conflict problems in the agriculture-industry-distribution chain. These aspects have been strongly emphasized in control farms, where high fragmentation leads to lower economic returns compared to farms participating in integrated supply chain projects. ISCPs are therefore an excellent tool for increasing the local economic development of farms. Another aspect that characterizes Italian farms is the low propensity for cooperation. In this regard, the Tuscany Region [8] has promoted measures to encourage these activities (Table 1). In fact, aggregation and interaction among the actors involved in the production chain can ensure better results in terms of growth of the competitiveness of agricultural and forestry supply chains [1,12]. The diversity of the actors involved highlights a specific goal of integrated planning, namely the need to create aggregation processes that involve, in addition to farmers, other actors (e.g., University, R&D institutions, consortium) in the supply chain through agreements that will not only ensure the placement of agricultural production but also bring and share innovations, stimulate the capacity for technological and organizational renewal and encourage process and product changes. Based on the results obtained, it is possible to say that the RDP tool is helping to promote a culture of integration among the different actors in regional supply chains, showing a good propensity for collaboration. Indeed, the Tuscan territory appears persuaded to promote aggregation and the development of integrated rural supply chains, as reported in a recent study [42]. The key element that stimulates cooperation and the development of integrated supply chain projects is the participatory method of the actors involved. In this way, responding to local needs is much more coherent and easily adapted into new development policies. Participatory ideas and practices are increasingly being developed and implemented in agriculture and sustainable rural development [43,44]. The research conducted shows how participatory action can contribute to the dialogue between scientific knowledge and local practical knowledge at the level of scientific production with the goal of strengthening endogenous potential and finding solutions to problems in agriculture and rural settings [44,45]. The analysis conducted using the FADN allowed us to profile farms that participated in integrated supply chain projects, compared to farms in the same regional sample that did not participate. A structural and strategic profile of treated farms emerges from the data that, in some respects, clearly differentiates them from farms that did not participate in this measurement approach. It is possible to highlight how those that have

joined supply chain projects tend to be larger, both in terms of utilised agricultural area and farms' economic size. Other differences found are a lower presence of farms run by women and young entrepreneurs. In the latter case, this is probably due to the characteristics of this type of project design, which may require greater actors' skills, as well as a good network (of knowledge). This trend has also been highlighted in other studies conducted in the Tuscany Region [7,42]. The methodology adopted derives, in part, from the techniques used to evaluate EU funds using the so-called satellite samples, surveyed with the FADN methodology and evaluated against a baseline representing the counterfactual [22,46]. This type of analysis highlights the structural characteristics and economic performance of the farms examined and allows comparisons between similar farms under a set of structural variables. In this case, for the evaluation of the effectiveness of public funding provided within the framework of integrated supply chain projects, it might be interesting to carry out analyses, essentially of a microeconomic type, which consider the business unit before and after joining the supply chain project. However, this type of exercise requires the construction of an adequate constant sample, currently not large enough in the regional FADN, that could allow for a statistically representative analysis.

5. Conclusions

The action of ISCPs aims to ensure better integration of the different measures contained in the Rural Development Regulation at the production chain level. This tool focuses on the agricultural or agribusiness supply chain and reflects the more sectoral component of rural development. ISCPs facilitate the aggregation processes of economic actors to promote an overall approach to planning and intervention shared by actors operating in individual sectors.

Farms that have joined integrated supply chain projects have experienced greater structural, economic and financial development than control farms in the Tuscan territory. Finally, it seems worth mentioning that an accurate assessment of the effectiveness of public support can be made, in an ex-post situation, only after an adequate amount of time has elapsed since the conclusion of the commitments arising from the investment measures of the integrated supply chain project. The main limitation of this study is that only one region was examined; it would be interesting to research further in different areas to understand their effectiveness on a larger scale. In addition, a thorough study of those sectors that are particularly significant to the area under study could provide a broader picture of current development dynamics and foster a forward-looking analysis of future trends. Another aspect that should not be left out is the on-going collaborative effort with policymakers, with whom a dialogue must be maintained. Available data and information are key elements in providing impactful analysis and insights; ensuring access to them for research studies would provide a good opportunity to foster exchange between the productive world, governance and research.

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References

1. Tarangioli, S. *The Integrated Approach in the 2007/2013 RDPs*; Rete Rurale Nazionale 2007–2013: Rome, Italy, 2013. Available online: https://www.reterurale.it/flex/cm/pages/ServeBLOB.php/L/EN/IDPagina/12552 (accessed on 31 March 2023).
2. Cristiano, S.; Tarangioli, S. Valutazione on-going e progettazione integrata di filiera tra sfide e opportunità di sviluppo dei settori agricolo e forestale. *Agriregionieuropa* **2010**, *6*, 22. Available online: https://agriregionieuropa.univpm.it/it/content/article/31/22/valutazione-going-e-progettazione-integrata-di-filiera-tra-sfide-e-opportunita (accessed on 8 May 2023).
3. Ventura, F.; Diotallevi, F.; Ricciardulli, N. Evaluation of policy measures for agri-food networks in Italian rural development programmes. In *Working Paper 122° Seminario EAAE, Evidence-Based Agricultural and Ruralpolicy Making: Methodological and Empirical Callenges of Policy Ealuation*; European Association of Agricultural Economists: Ancona, Italy, 2011.
4. Cremaschi, M. I Progetti Integrati Opportunità e Vincoli. In *Quaderni di Sviluppo Locale*; Formez. Donzelli Editore: Roma, Italy, 2001.
5. Le Roy, A.; Ottaviani, F. The Sustainable Well-Being of Urban and Rural Areas. *Reg. Stud.* **2022**, *56*, 668–682. [CrossRef]
6. Ascione, E.; Cristiano, S.; Tarangioli, S. *Farm Advisory Services for the Agro-Food Supply Chain as a Foster of Innovation: The Case of Veneto Region*; University of Bonn: Bonn, Germany, 2011.
7. Licciardo, F.; Zanetti, B.; Giampaolo, A.; Perinotto, M.; Bianchi, A. *Progettazione Integrata di Filiera nel PSR Toscana 2014–2022.Quaderni PIF, n. 1/2022, Rete Rurale Nazionale 2014–2022*; Mipaaf: Roma, Italy, 2022.
8. Regione Toscana. Programma di Sviluppo Rurale 2014–2022. Regione Toscana. Versione 10.1, CCI 2014IT06RDRP010; Regione Toscana: Tuscany, Italy. Available online: https://www.regione.toscana.it/documents/10180/12144581/Programme_2014IT06RDRP010_10_1_it.pdf/da86c856-b8ee-2888-9ab0-19671f921b88?t=1634910004358 (accessed on 1 April 2023).
9. Lattanzio Advisory. Relazione Sui Progetti Integrati Di Filiera PSR Toscana 2007–2013. 2014. Available online: https://www.reterurale.it/flex/cm/pages/ServeBLOB.php/L/IT/IDPagina/23375 (accessed on 8 May 2023).
10. Buscemi, V. La Progettazione Integrata di Filiera nella Programmazione 2007–2013 per lo Sviluppo Rurale. *Agriregionieuropa Anno* **2017**, *13*, 48. Available online: https://agriregionieuropa.univpm.it/it/content/article/31/48/la-progettazione-integrata-di-filiera-nella-programmazione-2007-2013-lo (accessed on 16 May 2023).
11. Rete Rurale Nazionale. Progetti Integrati di Filiera-PIF. Available online: https://www.reterurale.it/PIF (accessed on 5 May 2023).
12. D'Alessio, M. La Progettazione Integrata Di Filiera. In *Una Guida per l'Implementazione dello Strumento a Livello Regionale*; TF Progettazione Integrata; Rete Rurale Nazionale: Roma, Italy, 2010.
13. Zezza, A. L'Esperienza dei Progetti Integrati di Filiera: Esperienze nel Settore Cerealicolo. Agriregionieuropa 12. Available online: https://agriregionieuropa.univpm.it/it/content/article/31/44/lesperienza-dei-progetti-integrati-di-filiera-esperienze-nel-settore. (accessed on 5 May 2023).
14. ISTAT (Istituto Nazionale di Statistica). *Roma 7° Censimento Generale dell'Agricoltura*; ISTAT: Roma, Italy, 2022.
15. IRPET (Istituto Regionale per la Programmazione Economica della Toscana). *Rapporto Congiunturale sull'Agricoltura Regionale*; IRPET: Firenze, Italy, 2022.
16. EEC Regulation 79/65 Updated with EC Reg. 1217/2009. Available online: https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX%3A31965R0079 (accessed on 16 May 2023).
17. Farm Accountancy Data Network (FADN). Available online: https://agriculture.ec.europa.eu/data-and-analysis/farm-structures-and-economics/fadn_en (accessed on 5 May 2023).
18. Bassi, I.; Iseppi, L.; Nassivera, F.; Peccol, E.; Cisilino, F. Alpine Agriculture Today: Evidence from the Italian Alps. *Qual. Access Success* **2020**, *21*, 122–127.
19. Coderoni, S.; Esposti, R.; Baldoni, E. The productivity and environment nexus through farm-level data. The case of carbon footprint applied to Italian FADN farms. *Bio-Based Appl. Econ.* **2017**, *6*, 119–137. [CrossRef]
20. Arfini, F.; Donati, M. Organic production and the Capacity to respond to market signals and policies: An Empirical analysis of a sample of FADN farms. *Agroecol. Sustain. Food Syst.* **2013**, *37*, 149–171.
21. Cisilino, F.; Madau, F.A. A Comparative Analysis of Organic and Conventional Farming Trough the Italian FADN. In Proceedings of the Knowledge, Sustainability and Bioresources in the Further Development of the Agri-Food System, Acts of the VI AIEA2 International Conference at the XLV SOBER Congress, Londrina, Brasil, 22–25 July 2007.
22. Cisilino, F.; Bodini, A.; Zanoli, A. Rural Development Programs' Impact on Environment: An Ex-Post Evaluation of Organic Farming. *Land Use Policy* **2019**, *85*, 454–462. [CrossRef]
23. Cisilino, F.; Cesaro, L. Organic versus Conventional Farming: A Marketing Survey on Wine Production. In *The Crisis of Food Brands*; Lindgreen, A., Hingley, M.K., Vanhamme, J., Eds.; Routledge: Gower, UK, 2009.
24. Kelly, E.; Latruffe, L.; Desjeux, Y.; Ryan, M.; Uthes, S.; Diazabakana, A.; Dillon, E.; Finn, J. Sustainability Indicators for Improved Assessment of the Effects of Agricultural Policy across the EU: Is FADN the Answer? *Ecol. Indic.* **2018**, *89*, 903–911. [CrossRef]
25. Cisilino, F.; Madau, F.A.; Furesi, R.; Pulina, P.; Arru, B. Organic and Conventional Grape Growing in Italy: A Technical Efficiency Comparison Using a Parametric Approach. *Wine Econ. Policy* **2021**, *10*, 15–28. [CrossRef]
26. Cisilino, F.; Bassi, I. *I Dati RICA per la Valutazione di Piani e Programmi di Sviluppo Rurale: Il Caso del PSR del Friuli Venezia Giulia 2000–2006*; Analisi Regionali-INEA: Roma, Italy, 2010.
27. Cagliero, R.; Cisilino, F.; Scardera, A. *Evaluating Rural Development Programmes Using FADN Data, Italian Rural Network 2007–2013*; Ministry of Agriculture and Forestry: Rome, Italy, 2011.

28. Farm Sustainability Data Network (FSDN). Available online: https://agriculture.ec.europa.eu/data-and-analysis/farm-structures-and-economics/fadn_en#conversiontofsdn (accessed on 5 May 2023).

29. Agarwala, N.; Maity, S.; Sahu, T.N. Efficiency of Indian Banks in Fostering Financial Inclusion: An Emerging Economy Perspective. *J. Financ. Serv. Mark.* **2023**. [CrossRef]

30. Welch, B.L. The Generalization of "Student's" Problem When Several Different Population Variances Are Involved. *Biometrika* **1947**, *34*, 28–35. [CrossRef] [PubMed]

31. Ruxton, G.D. The Unequal Variance T-Test Is an Underused Alternative to Student's t-Test and the Mann–Whitney U Test. *Behav. Ecol.* **2006**, *17*, 688–690. [CrossRef]

32. Derrick, B.; Toher, D.; White, P. "Why Welchs Test Is Type I Error Robust" (PDF). *Quant. Methods Psychol.* **2016**, *12*, 30–38. [CrossRef]

33. Welch, B.L. On the Comparison of Several Mean Values: An Alternative Approach. *Biometrika* **1951**, *38*, 330–336. [CrossRef]

34. Zimmerman, D.W. A Note on Preliminary Tests of Equality of Variances. *Br. J. Math. Stat. Psychol.* **2004**, *57*, 173–181. [CrossRef]

35. Fagerland, M.W. *t*-Tests, Non-Parametric Tests, and Large Studies—A Paradox of Statistical Practice? *BMC Med. Res. Methodol.* **2012**, *12*, 78. [CrossRef]

36. Fagerland, M.W.; Sandvik, L. Performance of Five Two-Sample Location Tests for Skewed Distributions with Unequal Variances. *Contemp. Clin. Trials* **2009**, *30*, 490–496. [CrossRef]

37. Commissione Europea. *Raccomandazioni della Commissione per il Piano Strategico della PAC dell'Italia. SDW. 396 Final*; Commissione Europea: Brussels, Belgium, 2020.

38. Cisilino, F.; Zilli, G.; Zanuttig, G. FADN Data to Support Policymaking: The Potential of an Additional Survey. *Econ. Agro-Aliment.* **2022**, *3*, 1–22. [CrossRef]

39. *COM/2018/392 Final Proposal for Regulation of the European Parliament and of the Council Establishing Rules on Support for Strategic Plans to be Drawn Up by Member States under the Common Agricultural Policy (CAP Strategy Plans) and Financed by European Agricultural Guarantee Fund (EAGF) and by the European Agricultural Fund for Rural Development (EAFRD) and Repealing Regulation (EU) No 1305/2013 of the European Parliament and of the Council and Regulation (EU). No 1307/2013 of the European Parliament and of the Council COM/2018/392 Final—2018/0216 (COD)*; EU: Brussels, Belgium, 2018.

40. Cagliero, R.; Legnini, M.; Licciardo, F. Evaluating the New Common Agricultural Policy: Improving the Rules. *EuroChoices* **2021**, *20*, 27–33. [CrossRef]

41. Carillo, F.; Licciardo, F.; Corrazza, E. Investments Financing at Farm Level: A Regional Assessment Using FADN Data. *Food Econ.* **2022**, *23*, 27–33. [CrossRef]

42. Scaramuzzi, S.; Belletti, G.; Biagioni, P. Integrated Supply Chain Projects and Multifunctional Local Development: The Creation of a Perfume Valley in Tuscany. *Agric. Food Econ.* **2020**, *8*, 5. [CrossRef]

43. Pretty, J.N. Participatory Learning for Sustainable Agriculture. *World Dev.* **1995**, *23*, 1247–1263. [CrossRef]

44. Padilla, M.C.; Ramos Filho, L.O. Participatory action research initiatives to generate innovations towards a sustainable agriculture a case study in Southern Spain. In *System Innovations, Knowledge Regimes, and Design Practices towards Transitions for Sustainable Agriculture*; Barbier, M., Elzen, B., Eds.; INRA: Paris, France, 2012. Available online: https://inra-dam-front-resources-cdn.brainsonic.com/ressources/afile/246879-c218b-resource-system-innovations-knowledge-regimes-and-design-practices-towards-transitions-for-sustainable-agriculture.html (accessed on 5 May 2023).

45. Idziak, W.; Majewski, J.; Myslony, P. Community Participation in Sustainable Rural Tourism Experience Creation: A Long-Term Appraisal and Lessons from a Thematic Villages Project in Poland. *J. Sustain. Tour.* **2015**, *23*, 1341–1362. [CrossRef]

46. Cagliero, R.; Cisilino, F.; Scardera, A. L'Utilizzo della RICA per la Valutazione di Programmi di Sviluppo Rurale. In *Rete Rurale Nazionale 2007–2013*; Mipaaf: Roma, Italy, 2010.