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Integrated Supply Chain Planning and firms' performance: an analysis on Tuscany Rural Development Programme 2014-2022

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When I met my self in Australia,
I struggled for the very first time,
to find mozzarella in supermarkets.
Instead of it, there was something called
"shredded mozzarella", which,
and I was 100% sure about it,
wasn't mozzarella at all.
Since then, I realised that
my obstinate passion for food
has had to become officially my duty.

Abstract

Integrated Supply Chain Planning is an intervention measure provided by Rural Development Programmes, although the method is not explicitly proposed in the community legislation. Notably, it is an intervention strategy that, from 2000-2006 programming period, Italy started to experiment to favour integrational processes in the agri-food sector. Indeed, integrated projects are a tool to promote rural development policies implementation, encourage systemic relations between subjects and actors of different nature, and provide complex and articulated solutions to sectorial and territorial issues. The traditional Italian rural background meets several necessities and barriers specially in the agricultural sector, and integrated intervention represents an opportunity to set efficient solutions and strategies for rural development and overcome the limits of structural organisation of the primary sector.

Integrated Supply Chain Planning is conceived to improve competitiveness among producers, agricultural firms and organisations, as well as to support cooperation between different members; the overall purpose is to improve the performance of the agricultural sector, obtain higher profits, infrastructures, and organisational skills of Italian firms. This thesis has the primary aim to investigate Integrated Supply Chain Planning, understand why subjects and actors of different nature decide to cooperate among each other, and determine the differences in terms of economic performance between ISCP firms, thus those companies that joined integrated projects, with respect to those companies that did not participate, as not-ISCP firms.

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List of Acronyms

CAP	Common Agricultural Policy
EAFRD	European Agricultural Fund for Rural Development
EAGF	European Agricultural Guarantee Fund
EC	European Commission
ESF	European Structural Funds
EU	European Union
FA	Focus Areas
FSC	Food Supply Chain
ICT	Information and Communication Technologies
ISCP	Integrated Supply Chain Planning
MA	Managing Authority
MB	Member State
NGEU	Next Generation EU
RD	Rural Development
RDP	Rural Development Programmes
SC	Supply chain
SME	Small Medium Enterprise
VA	Value Added

Chapter 1. Rural Development Strategies in the European Union: recent evolution

This first chapter presents the evolution and strategies of the policies that contributed to the formulation and application of integrated planning. Indeed, it also introduces the Italian background, taking into consideration especially the Tuscany Region, case of study of the thesis.

1.1 Some steps towards rural development policy

Rural development (RD) is a relatively new policy in the context of the CAP: in fact, it was born in the mid-1980s (the reform of Structural Funds) to carry out interventions in favour of disadvantaged areas. Integrated programmes are a first sign of a complex European project for a structural intervention on territorial level that could, on one hand, overcome the agricultural sectorial intervention logic and, on the other hand, involve a better coordination of European Structural Funds (ESFs). RD policy introduced important innovations to meet needs and opportunities and redefine the overall system, make interventions on local and regional basis and involve territorial entities (Leader approach)[1]. To promote the new system designed around an innovative territorial approach, the European Union committed to co-finance and fund the project to improve a set of interventions for Rural Development Programmes (RDPs). Soon the innovation became part of regional and local programmes including strategies for product differentiation, environment valorization, and improvement of life condition in rural areas. With the Agenda 2000, RD became officially part of the second CAP pillar, complementing the system of direct payments to farmers and measures to manage agricultural markets, which constitutes the first Pillar. The development of the policy favoured the understanding of the European agricultural model, as well as the promotion of multifunctional development of agriculture. The progress of the model involved the integrated approach for the agricultural sector, which allowed the achieving of economic and social viability of European farms; as result, farmers reduced their dependence on CAP financial support measures and the employment rate in the agricultural sector was promoted and increased. (A. Miteva et al., 2019).

[1] The Leader ("Liaison entre actions de dévelopement de l'économie rurale") approach, based on Local Action Groups, introduces opportunities for innovative governance through locally based, bottom-up projects.

Another important implementation regards the Leader approach, which was extended for the 2000-2006 programming period on the whole EU rural territory, enforcing the bottom-up approach and the principles of partnership, innovation, integrated development, cooperation and network, with the scope to reinforce and structure the European RD policy[2]. The first half of the last decade saw a general reformation of CAP financing modalities as well as structural measures for RD; the main goal, especially for 2007-2013 programming period, was to define an adequate regulatory framework for a new model of rural development, and valorize the Leader approach improving its potentiality and value on the territory, with respect to the previous seven years period (Bruzzo, 2012). Concerning RD financing systems, a co-financing structure is provided where the European Agricultural Fund for Rural Development (EAFRD) is combined with national contributions. The strategy has seen a transformation from an initial system in favour of only disadvantaged territories, into a new strategical system that could take care of the whole European territory. Renewed policies provided several important features, such as the decentralization of responsibilities and a flexible programme based on a set of measures to meet specific needs of Member States (MSs), and reflect the diversities of rural areas. Notably, CAP contributes to the sustainable development of rural areas through three main long-term objectives:

- Fostering the competitiveness of agriculture and forestry
- Ensuring the sustainable management of natural resources and climate action
- Achieving a balanced territorial development of rural economies and communities (European Commission, 2022)[3].

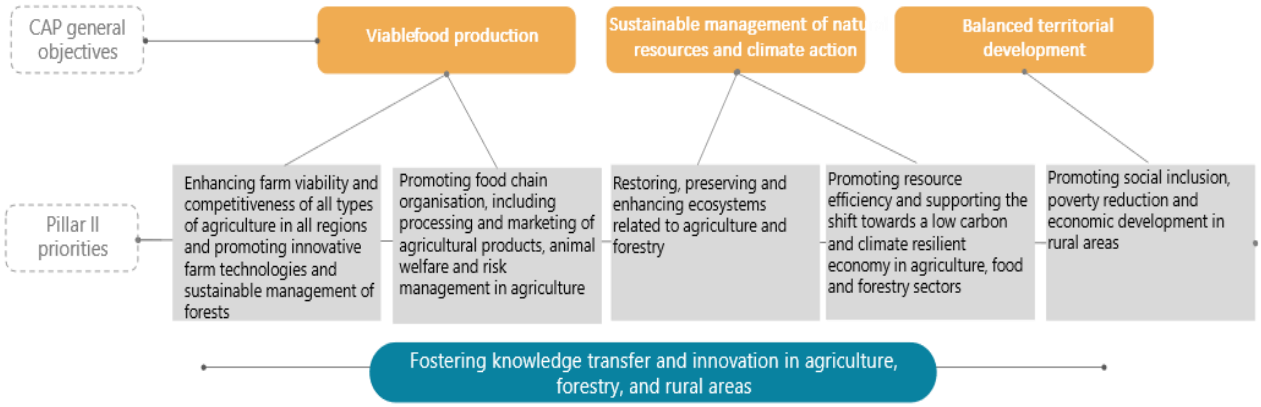
Moreover, EU countries implement the support of EAFRD through RDPs, which is co-financed by national budgets and designed on a national or regional basis. Despite the European Commission (EC) approves and monitors RDPs, the selection of projects and the decisions regarding the granting of payments are handled by national and regional managing authorities. Following, the next paragraph presents in more details the main features of RD policies for 2014-2020 programming period.

[2] European Commission, 2003
[3] https://agriculture.ec.europa.eu/common-agricultural-policy/rural-development_en

1.2 The program for Rural Development for the period 2014-2020

In 2014–2020, the CAP contributes to three general objectives, which together feed into the Europe 2020 objectives for a smart, sustainable and inclusive growth: viable food production; sustainable management of natural resources and climate action; balanced territorial development. Rural Development policy purposes are articulated in 6 priorities, broken down into 18 specific areas of interventions and financed by European Structural and Investment Funds (Figure 1).

Figure 1 - Union Strategic Priorities for Rural Development



Source: Cagliero et al., 2021

The priorities represent the basis from which is elaborated rural areas support, translated in RDPs that each country designs, addressing at least four of the six priorities. These general policies are then specified in detailed areas of intervention or Focus Areas (FAs) for which are defined targets, measures and funds provided to reach those targets. Priorities are listed as follows (European Network for Rural Development, 2022)[4]:

1. Knowledge transfer and innovation: the relative FAs are specified in fostering innovation, cooperation and development of the knowledge base in rural areas; strengthening the links between agriculture, food production and forestry and research

[4] https://enrd.ec.europa.eu/policy-in-action/rural-development-policy-figures/priority-focus-area-summaries_en

and innovation; fostering lifelong learning and vocational training in the agricultural and forestry sectors.

2. Farm viability, competitiveness and the related FAs decline to improve the economic performance of all farms and facilitate farm restructuring and modernization, ensuring the entry of adequately skilled farmers into the agricultural sector and generational renewal.
3. Food chain organisation and risk management: FAs regard improving competitiveness of primary producers by better integrating them into the agri-food chain and supporting farm risk prevention and management.
4. The importance of restoring, preserving, and enhancing ecosystems: FAs are specified in restoring, preserving, and enhancing biodiversity; improving water management; preventing soil erosion and improving soil management.
5. Resource-efficient and climate-resilient economy: FAs are declined in increasing efficiency in water use by agriculture; increasing efficiency in energy use in agriculture and food processing; facilitating the supply and use of renewable sources of energy; reducing greenhouse gas and ammonia emissions from agriculture; fostering carbon conservation and sequestration in agriculture and forestry.
6. Social inclusion and economic development: relative FAs regard on facilitating diversification, creation, and development of small enterprises, as well as job creation; fostering local development in rural areas; enhancing the accessibility, use and quality of Information and Communication Technologies (ICT) in rural areas.

The current programming period is characterised by some important changes in policy terms, such as the linkage between rural development and the ESF inside a single Common Strategic Framework. Accordingly with the guidelines of this strategy, each MS[5] is due to present to the EU an agreement with the purpose to coordinate its own action plan coherently with European strategic goals, take care of territorial coordination, integrate strategies to territorial needs, carry on the efficiency and efficacy of the interventions. The agreement provided to outline each countries' strategic goals and investment priorities is known as "Partnership Agreement"[6] that is negotiated and signed between the EU and MSs and sets the use of funding under the European Structural and Investment Funds, among which is included the EAFRD.

[5] Each MS can structure its own rural development policy on a central basis or, rely on regional authorities and assuming a role of coordinator.
[6] The Partnership Agreement is specifically managed by a multilevel governance formed by the European Commission, MSs, competent regional and local authorities, and economical and social partners.

To identify the areas that can benefit of CAP funds, Regions are classified by the regulation 1303/2013, art. 90[7] into different development stages: less developed regions are those which pro-capite GDP is less than the 75% of the average of the GDPs of the 27-EU; transitional regions are those with a pro-capite GDP between the 75%-90% of the average; the more developed regions, finally, are classified as those with a pro-capite GDP above the 90% of the average. Besides, MSs must demonstrate to have enough human and technical resources to put in action the initiatives proposed by their RDPs, and must have appropriate procedures for local development projects, control, and evaluation capabilities.
For the 2014-2020 programming period there are 118 national and regional RDPs among 28 MSs, with 20 single national programmes and eight MSs opting to have two or more (regional) programmes. The provided spending on rural development amounts to 100 billion of euro through the EAFRD and 61 billion of euro for public funding in the MBs. Under the CAP transitional regulation, which ensures continued support for agriculture, forestry and rural areas, RDPs have been conditionally extended for 2021 and 2022. During these years RDPs were provided with about 27 billion of euro from the EAFRD budget for 2021-2027 and an extra 8,1 billion from the next generation EU recovery instrument, employed for generation renewal and as a tool to support young farmers.

1.2.1 Rural development measures in Italy and Tuscany's RDP 2014-2022

Italy's rural development strategy for the 2014-2020 programming period is activated through 22 RDPs, one set on a national [8] level and 21 regional RDPs.
Besides, a national Rural Network programme is instituted to support activities of sharing innovations and knowledge among different members and actors of the network.
In Italy RDPs have always been focused on measures that favour cooperation, especially actions towards territorial and local development. Integrated measures and actions have showed to be

[7] Regulation (Eu) no 1303/2013 of the European Parliament and of the Council of 17 December 2013

[8] National RDP points out topic areas correlated to prevention and firm risk management, protection of animal biodiversity and efficient use of water resources for which infrastructures and financial resources are provided to make a structured irrigation system. To pursue the selected requirements for the RDP, there have been identified three priority aspects: the first regards food supply chain organisation, including agricultural products transformation and commercialisation stages, animal welfare and risk management of the agricultural sector. The second aims to preserve, restore and valorize ecosystems connected with agriculture and forestry. Last priority is centred on resource efficiency, climate protection and mitigation.

an efficient solution to barriers and necessities typical of the Italian rural background and represent an opportunity to place a set of shared strategies and provide a collective development governance. The selection of the most appropriate measures to apply within the integrated planning are relied on the Management Authority (MA) of each RDP, which provides methods and procedures for the financial support. This system of norms is based on some criteria and consider several aspects, including i) the identification of supply chains that need a priority action of public support; ii) the identification of measures conferred to finance integrated planning among other measures provided by the RDP; iii) valorization of synergies and complementarities; iv) adoption of procedures that respect the principle of competition between economic operators. The RDP of Tuscany has been extended to the 2022, due to the Covid-19 pandemic. The total amount provided to the Italian public spending for the 2014-2020 programme[9] was to 20.85 milliards of euros from which the half was assigned by the EAFDR. For the reviewed 2014-2022 programme, the priorities public participation provided for Tuscany RDP amounted to 1.291.647.584,54 euros, from which 582.576.819,65 euros from EAFDR and NGEU (EU Next Generation). The public spending provided for the Region amounted for about the 5% of the total Regional RDP spending. The most favoured priority was the n°4 focused on preserving the ecosystems that amounts to a 34,32% of the total fund for the region (Table 2).

[9] Ministero delle Politiche Agricole, Alimentari e Forestali, Luigi Ottaviani; PSR 2014-2022: Report di avanzamento della spesa pubblica dei programmi di sviluppo rurale.

Table 2 - Public Participation per Priority

Priorities	Priority Description	Public Spending	EAFDR and NGEU	%
Priority 2	Strengthen agricultural competitiveness and profitability of agricultural companies	306.362.998,12	143.439.866,70	24,62%
Priority 3	Promote the organization of the agri-food chain and risk management in the agricultural sector.	243.201.124,77	108.281.125,00	18,59%
Priority 4	Preserve, restore and improve ecosystems dependent on agriculture and forestry	453.812.475,69	199.949.588,00	34,32%
Priority 5	Encourage efficient use of resources, the transition to economy low carbon and climate resilient	155.874.434,68	73.816.846,97	12,67%
Priority 6	Preserve, restore and enhance ecosystems, social inclusion, poverty reduction and development economy of rural areas	114.103.859,00	49.201.584,00	8,45%
	FEASR participation rate: 45,10%	1.291.647.584,54	582.576.819,58	100,00%

Source: Tuscany RDP 2014-2022

According to regional analysis provided by the RDP (Tuscany RDP 2014-2022, 2021), the main structural disadvantages of the agricultural and forestry sector in Tuscany are characterized by: low operators qualification that cannot be resolved by technical assistance and services; low generational renewal, which brings to a progressive ageing of operators and the reduction of stable employment substituted by temporary and less efficient employment; the progressive reduction of the agricultural sector dimension, in numerical terms as well as in terms of firms' dimension reduction; insufficient infrastructures for firms and rural communities, especially for the distribution and efficiency of water resources. On a general point of view, the analysis highlighted a low innovation and production development, a weak commercial valorization and improvement system, a scarce development of supply chains and the crisis of some productive sectors. The set of structural disadvantages that affect the sector shows the need of interventions

and improvements of several sectors, such as economic profitability and production quality, workplace safety conditions and environmental features. Regarding the social-economic framework, the situation in Tuscany reflects agricultural competition issues linked to difficulties for social and economic growing evolution: the regional system is characterized, as a matter of fact, by a reduced growth, connected to both exogenous factors (market and finance situation) as well as to endogenous factors correlated to reduced dimension of firms and to working dynamics and financial power which rarely invest on innovations and improvement for the whole development system. The rural development strategy defined by the region Tuscany have been declared and analysed in its own RDP: the region has set 5 main goals connected to relative specified focus areas, which aim is the correct distribution of financial resources. The first goal regards the improvement of firms' competition and supply chains, creating job opportunities specially for young generations. The relative FAs regard the improvement of competition in food and forestry supply chains and the development of aggregation and integration forms of organisation: the integration must be favoured along the supply chain through investment incentives to enhance a better coordination among the different actor of the supply chain and to reach more equal relationships between the agricultural segment and the commercialisation and transformation stage. Moreover, the scope aims to increase new firms managed by young farmers and favour the generational renewal; improve the competition and efficiency of firms as well as the quality level of production; ease the credit access; allow the diversification of activities in agricultural firms; improve risk management and favour the prevention and restoration of firms' structural damages; improve female job occupation opportunities in agricultural firms and in rural areas. The second goal puts on a focal point the position of farmers and foresters in taking care of agricultural ecosystem and in the fights against climate changes. The relative FA commits on the protection of agricultural and forestry territories against phenomena of desertification, floods, landslides, and hydrogeological instability; promotion of mitigation and adaptation strategies to climate changes; take care of biodiversity, landscape and forests; improve of water resources management and protection; increase energy resources diversification and energy saving. The third main goal regards the production and share of innovations: focus areas are about the empowerment of knowledge system and innovation transfer, promotion of novelties and innovations through cooperation forms and shared projects, promotion of trainings. The fourth scope highlights the importance to create more opportunities for rural territories and people who love live there, improving the development potentiality in rural areas and increasing the population services access. The last main goal focuses on creating an easier access system to regional development politics, simplifying the regulatory framework, and improving

administrative structures (Tuscany RDP 2014.2022, 2021). The following table describes in detail the principal measures and under-measures adopted by Tuscany RDP and promoted for integrated projects, which are the translation of FAs and goals set by the Region showed above (Table 3).

Table 3 - Tuscany RDP 2014-2022 measures for ISCP

Measure code	Measure description
1.2	Support for demonstration activities and information actions
3.1	Support for the new adherence to quality schemes
3.2	Support for information and promotion activities carried out by producer groups in the internal market
4.1.3	Participation in integrated planning by farms
4.1.5	Encourage the use of renewable energies in farms
4.2.1	Support for investments in favour of the processing/marketing and/or development of agricultural products
6.4.1	Diversification of farms
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 as for the development/marketing of tourism
16.6	Support for supply chain cooperation for the sustainable procurement of biomass for use in production of food and energy and in industrial processes
16.8	Support for the drafting of forest management plans or equivalent tools

Source: Licciardo et al., 2022

The highest spending progress percentage is amounted to about the 89% of the total programmed spending on the measure n°13 about the compensation for areas subjected to natural or specific constraints, which is also in line with the favoured priority on preserving the environment. The measure that gained more funds is the n°4 ("Tangible assets investment"), which amount is about to the 27% of the total spending. Coordination and integration projects funds are included in the measure n°16 and represent about the 4,3% of the total programmed spending. Both last two measures are however part of the Priority 3 that focuses on the supply chain organisation improvement and producers' competitiveness. Integrated Supply Chain Planning (ISCP) is as well part of the financed programmes within the Priority 3 and the key

element is the innovation which plays a strategical role. Other important projects come from operational groups for the European partnership for innovation: these groups represent a cooperation strategy with the scope to spread innovations in the agri-food and forestry sector and to identify operational solutions to afford specific issues and promote opportunities for agricultural firms. Other projects promote the know-how system in the agricultural sector and the measures activated are often the 1 "Exchange of knowledge" and 2 "Consultant and assistance services for agricultural firm management"[10].

1.3 European agricultural policy future perspectives: the 2023-2027 programming period

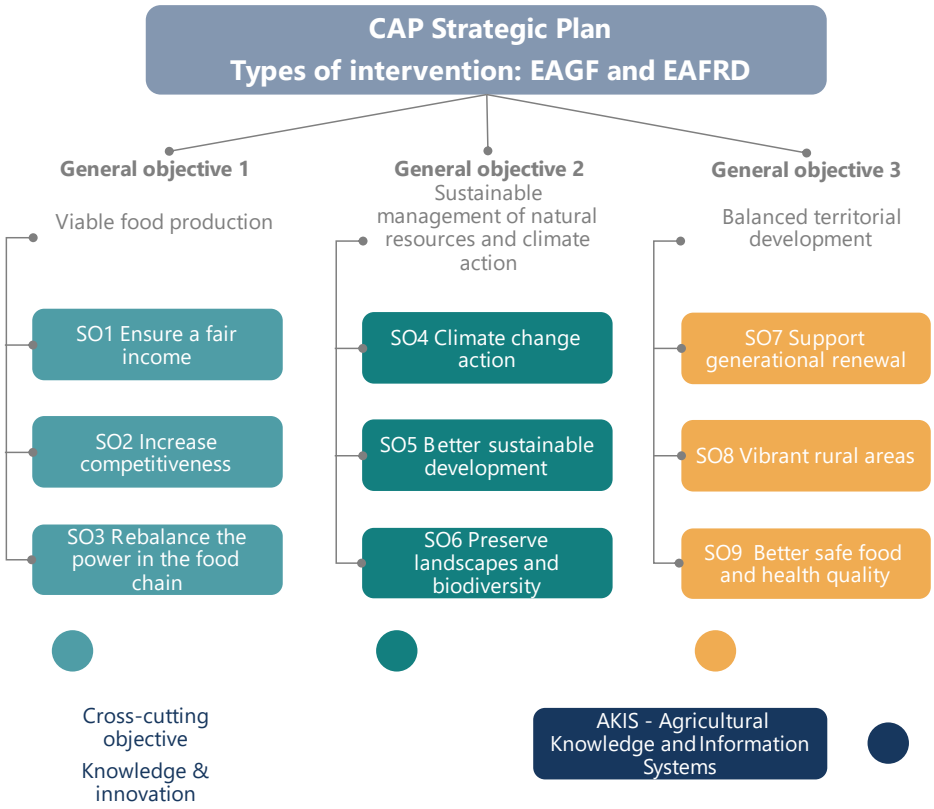
For the post-2020 programming period, the main innovation planned by the CAP is the so-called new delivery model which, instead of a "compliance" structure of norms, that focuses mainly on the implementation of rules, is based on a more flexible "performance" structure of results and pays more attention on how they are achieved coherently with policy objectives. Moreover, as local specific conditions and needs are recognized as fundamental, new norms are required to be sufficiently flexible and adaptable to address the real necessities of the territory. As a matter of fact, post-2020 CAP regulation EU 2021/2115[11] allows MSs to shape measures designed on their own requirements thanks to a simplified but common EU framework, in which countries can benefit from enhanced versatility to manage interventions, measures and details. The new structure gives the opportunity to gain benefits and increase the effectiveness of the system with balanced costs.[12] The future of RD will be held and supported by the new CAP in which programmes and actions are included under a framework of national strategic plans from the 2023 onwards; within this framework the Commission aims to make more responsive actions to current and future changes such as climate change and generational renewal, while continuing to support European farmers in a sustainable and competitive agricultural sector. RDPs will be considered part of Commission's key priorities and strategies and the introduction of the European Green Deal[13] is a great example of this renewed commitment, whose main goals are to make a new EU resource-efficient and competitive economy that could guarantee a no net emissions of GHGs by 2050 and an economic growth

[10] Ministero delle Politiche Agricole, Alimentari e Forestali, Luigi Ottaviani; PSR 2014-2022: Report di avanzamento della spesa pubblica dei programmi di sviluppo rurale.
[11] Regulation (EU) 2021/2115 of the European Parliament and of the Council of 2 December 2021
[12] "*One of the great strengths of our Rural Development concept is that we have core priorities, but it is up to each Member State or region to design a programme which suits its challenges and opportunities",* Phil Hogan, ex European Commissioner for Agriculture and Rural Development.
[13] The European Green Deal, Communication from the Commission, COM/2019/640 final.

decoupled from resource use, among other specific targets towards climate change and environment degradation prevention challenges.

For the 2023-2027 the CAP will be based on 10 key goals[14] focused on social, environmental, and economic aspects and will represent the basis on which EU countries will elaborate their own individual strategic agricultural policy plan (Figure 4).

Figure 4 - The objectives of the CAP 2023-2027



Source: Cagliero et al. 2021

The first CAP objective is to support and guarantee equal and sufficient salary to farmers: the main purpose is to reinforce the long-term food safety and agricultural diversity, as well as guarantee the economic sustainability of the agricultural production. The second goal is to improve market orientation and increase its competition in a middle and long-term through a better attention to research, technology, and digitalization. Improve farmers position along the supply chain is the following objective which focuses on farmers' cooperation to increase

[14] https://agriculture.ec.europa.eu/common-agricultural-policy/cap-overview/new-cap-2023-27/key-policy-objectives-new-cap_en

market transparency and set an efficient mechanism against unfair commercial practices. The 4th scope is to take actions for the climate mitigation and environment protection, and it focuses on greenhouse gases emissions and reduction, as well as on sustainable energy promotion. The 5th and 6th key CAP objectives are to take care of environment and biodiversity: the main purpose is to favour sustainable development and an efficient management of natural resources like water, soil and air, including chemicals addiction reduction, as well as contribute to stop and invert the biodiversity loss, improve ecosystem services and preserve environments and natural habitat. Support generational renewal is the 7th goal which aim is to support young and new generations of farmers to improve a sustainable business development in rural areas. The 8th objective regards the development of dynamic rural areas, employment, and economic grow: here the focal point is to promote employment, gender equality including women participation in agriculture, social inclusion and local development in rural areas exploiting also circular bioeconomy. The 9th key goal is to protect food and health quality, to improve the Eu agriculture response to social needs for alimentation and health, including high quality food products, nutrient and safe, reducing food waste as well as improve animal welfare. The last CAP goal is to promote knowledge and innovation to renew agriculture in rural areas sharing innovation and digitalization and encouraging them through an easier research and development access, as well as through knowledge and training exchanges. Italy has been subject of an important recommendation from the EU for the CAP strategic plan: after an analysis based on the current situation about needs and priorities for agriculture sector and for Italian rural areas, the recommendation stressed environmental, economic and social goals, in particular linked to the Farm to Fork strategy and to the EU Biodiversity strategy for the 2030[15]. The EC invited Italy to highlight, within its own strategic plan for the CAP, explicit national values for the Green Deal goals, taking into account its own specific situation as well as the same recommendations. Among them, the EC focused on promoting the agricultural sector, environment protection and climate actions, meeting social requirements and reinforcing the social-economical structure, promoting, sharing knowledge and innovation, and encouraging the adoption of digitalization in the agricultural sector. Moreover, the Commission underlined the importance of cooperation and organisational groups to overcome traditional issues and limits of the Italian agriculture sector, typically fragmented and unable to show its value and strengths along the supply chain.

[15] Communication from the Commission to the European Parliament, the Council, the European economic and social Committee and the Committee of the Regions; EU Biodiversity strategy for 2030; Brussels, 20.5.2020 COM(2020) 380 final.

Chapter 2. Theoretical background: the agri-food system

The chapter firstly introduces the concept of agri-food system and then focuses on the meaning of supply chain, starting from prime definitions to further literature concepts that could better define in detail the process Moreover, it investigates theories about supply chain coordination mechanism and integration models, to look forward to concepts from which ISCP has emerged and developed over the last years. Lastly, it is introduced the integrated approach interpretation provided by RDP, visualizing some potentialities and criticalities.

2.1 The agri-food system between coordination and integration

The agri-food system is defined as a system that includes all those activities connected to production and distribution of food products up to the final consumption. It is composed by input, industries, agricultural sector, food manufacturing, wholesales, retailing, food services and final consumption (Banterle, 2021). The several parts of the system are connected to each other through different flows of raw materials and final products, financial and information flows. Louis Malassis can be considered the father of the modern agri-food system economy and defined the agri-food system as "the set of activities that, given a socio-territorial reality in a certain historical moment, contributes to nourish the population"[16]. The system includes activities and subjects interrelated to each other that create value-added to the food product, from farm to fork, from the production to the consumption stage. The system is articulated and designed along different ways: the horizontal and vertical. The horizontal point of view of the food-system points out the functions carried out within the system, agents and sectors in which the activities are provided. Therefore, it focuses on the set of operators and services from which are articulated several operations such as production stage, transformation and distribution of elements needed for food production, retailing stage, etc. The vertical point of view highlights the set of agents and activities, thus the supply chains that collaborate in the production process of a specific final good or semi-final good, or that play a role in the production process of a specific agricultural raw material. Indeed, the articulation of the vertical food system focuses on supply chains: as a matter of fact, the food supply chain

[16] L. Malassis, G. Ghersi 1995, "Initiation à l'économie agro-alimentaire"

is described as the vertical section of the agri-food system which operates in terms of a specific product in a given geographical area.

2.2 The supply chain

The supply chain (SC) is composed by a vertical segment of the agri-food system that includes agents, members and operations interrelated to each other by technical, commercial, and financial relations. SC approach allows to outline structures and operations of each vertical stages and steps of the agri-food and industrial system, pointing out the peculiarities of single products, including intermediate and final utilization stages or operations; this system allows to overcome the traditional approach by sectors, and analyses the collocation of single stages within the individual SC as well as their allocations in the competitive background. The ultimate scope is to identify structures and relations among companies that share activities around the same raw material (production SC) or share the production stage of a specific product (product SC), stressing out the vertical concept of the chain. Its analysis can reach specific goals for private operators that can structure individual or common strategies, market evaluations and competition, as well as for public operators, to structure interventions with the aim to regulate or ease transactions, stimulate specific productions, adopt production processes, or correct disadvantageous relations among companies and consumers (Gaito, 2015). The food supply chain (FSC) describes food products pathways along the processes of the food system such as production, processing, and retailing, as well as the different flows characterizing those processes. According to the definition by Saccomandi (1999), "FSC represents the set of economic, administrative and politic agents which, directly or indirectly, settle the pathway that an agricultural product must follow from the initial stage of production to reach the final stage of consumption, as well as the whole set of interrelations between agents' activities that determine that path". SC analysis puts in the centre the distributive channel, which is the set of organisations that carry out commercial activities needed to the product commercialisation from the producer to the consumer (Mariani and Viganò, 2002).

The SC has been also described as the set of three or more organisations which are directly involved in the upstream and downstream flows of products, services, finances or information and knowledge from a source to a customer (Mentzer et al, 2001). Here, there are involved

several and different members where it is possible to distinguish and categorize different players: direct subjects are represented by suppliers, customers and the focal company from whose point of view the chain is investigated; the focal company interacts directly or indirectly with other members and organisations through its suppliers and customers, from the origin to the consumption point. Primary members are autonomous companies or strategic business units who carry out value-adding activities in the process and represents the players that perform the primary activity of the chain to produce a specific output or a service for the market. Lastly, supporting members are companies which provide resources, information, tools, or assets for primary members. Chain organisations and members interact with each other thanks to different upstream and downstream flows, that we will briefly present onward:

- The product flow is the value-added movement from raw materials to the final good from the supplier to the customer, and it can be well-defined as a flow of products. It is usually downstream, and it describes the direction from production to final consumption. The product flow can also include flow of activities and processes such as transportation, logistics, handling, maintenance etc.
- The service flow is the movement directly connected to the flow of products and includes those activities like quality certification, marketing services and research, etc. Even though this last set of activities is intangible, it provides to create value-added to the chain and it is exchanged for revenue and profits.
- The financial flow is the downstream flow of value-added activities which include credit terms, financial performances; it indicates more generally the payment given in exchange for products services and information.
- The information flow is the bi-directional exchange of information among the chain members: it includes orders, inventory information, delivery and technical information, consumer requests.
- The knowledge flow is bi-directional as well as the information flow and includes activities like networking, research and training, seminars etc. (Banterle, 2021).

The are several approaches and different schools of thought that employ SC analysis: one of the most used is the supply chain management (SCM), which is the integrated planning, coordination and control of all logistical business processes and activities in the SC. From this theoretical point of view, all operations being part of the chain communicate and coordinate with each other, participating and joining the responsibilities from the production stage to the

consumption final stage. The main goal of SCM is to improve the consumer-value and reduce costs, meeting at the same time the requirements of other stakeholders and members that join the chain. The ultimate scope is to improve the competitiveness of the whole value chain which represents the set of businesses carried out by producers, processors, distributors that bring value-added thorough stages, with the aim to achieve a common goal and create the maximum value. SCM focuses mainly on reducing costs, improving production and efficiency and developing profitable relationships with other members of the chain, including consumers and business partners, to deliver better services. SCM concerns specially two critical factors that bring success to the chain: the logistic and the traceability are the main processes for the correct flow management among firms and chain members. The logistic is the activity concerning the management of physical flows and products, to minimize costs and maximize the final products value. The traceability, on the other hand, concerns specially the efficient management of informational flows and, differently from logistic, is characterized by a bi-directional flow, from producer to consumer and vice versa. (Banterle, 2021).

2.2.1 Supply chain management strategies

According to Burgess (2006) SCM analysis should be solved through coordination theories: notably, coordination is considered as a tool to achieve common goals between chain members. Moreover, literature states that the application of coordination strategies allows to achieve a better performance of the whole chain involving all its different activities and ensuring greater results (Y. Gao and co., 2018). According to Malone and Crowston (1994) the term "coordination" refers to interdependencies management between activities: it has been noted that, when there are no interdependencies, there cannot be coordination. Besides, the definition suggests that actors involved could have conflicts of interests and that "political processes" might be an effective measure to solve them. Recalling what it has already been showed above, the SC is, by definition, a set of activities which are linked by processes and operations involving multiple actors. Therefore, it appears fundamental to determine and manage interdependencies between members to enhance an increase of efficiency through the implementation of coordination mechanism (ibidem, 1994). There are four different types of coordination mechanisms that can improve the performance of the supply chain:

- Contracts are useful to manage supplier-buyer relationships, as a tool for the SC risk management. The contract binds each decision made by SC actors and members and rewards or penalties are included within the contract rules, based on results achieved. This form of coordination can influence members' behaviour and shape them on customers' preferences.
- The information sharing (IT) is, according to Lee (2000) an efficient coordination mechanism where actors and decision-makers may share their information to avoid any distortion in the chain. Likely before, sharing information is a tool used to coordinate activities between members and can improve the performance of the whole supply chain. Notably, IT is considered by several studies as an efficient method to develop an effective communication and improve chain operations.
- Joint decision-making is the third main coordination mechanism: the SC performance can be improved when joint decision-making avoids conflicts between actors thanks to, for instance, collaborative planning or logistic synchronization.
- To conclude, collective learning is a tool that could solve the knowledge gap across organisations and develop partners skills and performances to achieve constant improvements (Handayati, 2015).

The most common coordination mechanism is the SC contract as it enhances better relationships between actors and provides a more efficient risk management. Usually, SC contract is employed to coordinate a relationship between only two actors: according to Chambers and King studies (2002), the contract is not efficient for relationship maintenance when new types of products are involved, as it would require a higher degree of monitoring. Other types of coordination mechanisms are commonly evaluated as tools to promote stronger relationships and solve conflicts between FSC actors. Moreover, several authors (Usuga. MLR and co., 2012 and Zylbersztajn D, and co., 2005) have stated that SC performance can be improved providing more than one coordination mechanism and favouring a multi-approach strategy that might reflect the multistage shape of the chain and require different development methods. Even though the literature examined does not indicate how the coordination mechanism effect is measured, most of the studies agree on the performance results that take place after the implementation, such as cost reduction, profit increase, food safety improvement, higher productivity etc.

2.2.2 Supply chain integration and implementation processes

According to Handfield and Nichols (1999) the main drivers of supply chain integration are:

- The information revolution.
- The increasing of global market competition and the consequent more demand driven markets.
- The emerging of new forms of inter-organisational relationships.

The research describes integrated SC models as systems based on three principal roles: information and financial flows management, inventory management, and SC relationships management between trading partners. The basis of integration can be compared, as showed before, with coordination models including several features such as information sharing, partnerships, and collaboration. Cottrill (1997) identified the evolution of integration concept, and noticed how it shifted from a model that operates as a corporate entity to a new interpretation as an element that can be directly driven by customer demand, apart from traditional company boundaries. Notably, Cottrill emphasizes that performance improving should be the first action to take, introducing changes within the company and then progressively amplify the enhancement to include external partners and obtain an influential role in offer and demand dynamics. Other examples showed by Power literature review (2015), considered the effectiveness of inter-company relationships for SC integration, well exemplified with the following story:

Consultant John Champion, vice president of Kurt Salmon Associates, relates the story of a vendor who spent a great deal of time and money to design special product packaging. When the vendor visited the retailer's distribution centre, it was stunned to discover that the customer was simply throwing the boxes away. The moral, according to Champion: "Get together and talk" (Bowman, 1997)

Power also indicates that, despite integration processes can highly improve business performance and service, the formula for integration is not so simple to apply. To extend organisations' SC networks is needed an overall improvement of infrastructures, based on the key role of durable collaborative agreements with trading partners, besides a significant intra and inter-organisational changes and improvement.

Beyond the implementation scope, SC integration is useful to establish a strategic outcome and a "channel consolidation" that focuses and centres its control on a restricted distribution channel of a small number of players. According to Hicks (1999) the main goal of strategic SC planning is "... to arrive at the most efficient, highly profitable supply chain system…" throughout a set of decisions that might carry hight expenditures and significant risks at the same time. Moreover, Hicks states that even though it might be efficient following a supply chain order and a specific model for integration to make aware planning decision, the dynamicity and competitiveness of the environment make the activity quite tedious and introduce to a variety of implementation issues. Concerning this last point, again Bowman (1997) suggests that many companies that result unsuccessful in implementation, show to be unable to make agreements with other partners (Power, 2015). In this regard, Tyndal et al. (2000) identified three critical elements that need to be assessed to allow a successful implementation process:

I. *Value*, in terms of trade-off between costs and benefits, specially where it is required to approach a realistic vision about results of returns and occurring costs.
II. *Risk*, in terms of probability of success and priority to focus on short-term projects where it might be easier to set an action plan, targets and time horizons.
III. *Method*, as the approach adopted by the company to balance value and risk.

The success of the implementation strategies will be dependent by the complexity of the processes provided as well as the understanding of implications for all trading partners (Power, 2015). It is also suggested that implementation results are better emerged through a progressively incremental approach, rather than a "big bang" method. In conclusion, the theme that appears to be a constant in the whole literature is the systemic nature of interactions between participants. In fact, an effective integration is supported by the recognition of the interdependency of partners relationships in a supply chain network. Furthermore, it has been pointed out that even if the systemic view appears fundamental, it is also considered as the main impediment to more extensive implementation, given the exclusivity of the selected "consolidation channel". Power literature review introduces a new good point from which consider implementation processes provided by integrational models: it might be important, however, reflect on the complexity of these processes. Concerning the analysis conducted until now about RDPs and notably, regarding integrational planning models that European Commission strongly recommended to apply for Italy, and after the tedious systematic analysis about implementation process, it does not surprise that Italy, well known to be a traditional

country, in terms of culture as well as methods, is experiencing some difficulties given by the request to modernize its agricultural sector, characterized ever since by quiet outdated working and organizational systems.

2.3 Integrated projects in the rural development policy

This paragraph recalls and contextualizes the integrated approach applied in RDP. Notably, it investigates the portrayal of integrational model within measures and features employed, considering as well economic, social and territorial components and implications.
About half of RDPs provide integrated planning as a programming method to improve the sectorial complexity or to favour the sustainable management of the territory. This multi-sectorial approach involves all the actors and supply chain resources and contributes to the realization of different integrational dimensions:

- The planning integration is between actions and projects promoted by different subjects that operate within the same sector and creates synergies derived from the coordinated actions of individual interventions. (Colaizzo et al., 2000).
- The financing integration is the resource availability collection to fulfil complex strategies on behalf of agri-food supply chain operators; integrated projects are also considered an opportunity to test integrational approaches among different and additional financing sources, with the main goal to make interventions converging towards a common strategical plan.
- The programming integration is the implementation of complex strategies of interventions realized with several national and local programming tools.
- Lastly, the institutional integration is the cooperation among different subjects to solve common issues: the collaboration of members with differentiated interests and skills allows to better identify solution and intervention strategies (D'Alessio, 2010).

In order to increase the competitiveness of the agri-food and forestry system, Italy, in its 2014-2020 partnership agreement[17], has defined a strategy based on the support for the organizational and structural growth of the single enterprises, on the increase in investments in the agricultural, agri-food, forestry, aquaculture and fisheries supply chains. Special attention is paid to the

[17] Dipartimento per lo Sviluppo e la Coesione economica (2014) Accordo di partenariato 2014-2020 Italia

creation and consolidation of SCs, which emphasizes the intention to give continuity to the positive experience of integrated SC design introduced by the National Strategic Plan (NSP[18]) for the programming period of 2007-2013 (Cristiano and Tarangioli, 2010). ISCP is a method without a financial autonomy, but it exploits RDP measures to support the integration of different members that share common goals. Even though integrated projects promote a cooperative path, the financing is given individually to each partner, and the beneficiary is the single firm that commits in respecting the duties within the whole partnership. ISCP is usually organized based on specific needs of regional agricultures: for instance, in Lombardy and Emilia Romagna the members of the projects are subjects already organized such as cooperatives, consortia, producers' organizations etc; the projects involve several members of the SC and have a significative financial dimension. Furthermore, in centre-meridional regions ISCP often assumes a territorial approach, and project dimensions are bounded in terms of members and importance of endowment. Aggregated projects promote collaboration between different members but show several critical issues: the community regulation makes difficult to combine the flexibility required for these instruments with the public expenditure control provided by the RDP, and the poorly adaptable approach does not allow evaluation transparency; moreover, effective results are obtained after slow and time-consuming procedures, compared to the resources used (Tarangioli, 2019).

The regulation proposal for CAP post 2020 [19] provides, among other procedures, the cooperative measure[20] that includes all the instruments and tools of integrational policy for rural development. Notably, it involves a set of different interventions and cooperative actions which are translated into three main goals:

1. Innovation in the agricultural sector and rural area through operational groups.
2. Agricultural competitiveness given by corporate actions within the supply chain, districts, networks, and set-up of producers' organizations and groups.
3. Actions for territorial development and local communities, along with projects for territory management etc (ibidem, 2019).

[18] Three types of integrated approach are provided by NSP: for agricultural farms, for supply chains and for territorial development. Integrated planning should ensure efficacy of the interventions through procedures that are easy to access and whose leading theme is integration of objectives and action instruments.

[19] Com(2018)392, Final of 1/06/2018.

[20] Measure 16 of RDP 2014-2020

Among the different funding opportunities offered, ISCPs represent one of the most innovative instruments, both in terms of access to public funding by the economic actors of the primary sector and for the potential effects they could have on the Italian agriculture. However, there are many criticalities with these kinds of projects: the main challenge, as already showed previously, is the flexibility of integrated projects, that might require future innovations and changes hard to predict. The choice of actualization is fundamental to identify territorial and sectorial field in which the integrated project could effectively be a better alternative rather than an ordinary management of interventions. The predisposition of selected plans must be flexible in structure as well as in time, and adaptable to possible changes along with procedures improvement (Tarangioli, 2010).

Chapter 3. Integrated supply chain planning

This chapter describes the dynamics of ISCP, beginning with the Italian integrated planning application, followed by a focus on Tuscany Region case study and its main peculiarities. Integrated Projects are not new: the processes of local development policies integration are a tradition well-established in Italy due to public intervention. Since the 80s have been implemented various tools and procedures (e.g., Territorial Pacts, Leader, Integrated Territorial Projects, etc.) to support interventions organically linked and finalized to a sectoral or territorial development plan. The approach promotes the institution of systemic relations among different actors and members to find new and complex solutions suitable for specific territorial issues. There are two main methods that can summarize different project interpretations: the first approach is given by the experience of Italian south area, where the Integrated Territorial Project is the predominant feature. The partnership is public, and the social and economic actors have primarily a consultive role; in this particular case, the integrated planning is multi-sectorial and based on the potentiality of the territory. The second approach puts in the centre the role of the ISCP, where planning and intervention management is strictly correlated with the nature of the sector in which the project is developing. The management is public and interventions rely on the region, meanwhile partnerships provide programming and organizational functions (Tarangioli, 2012).

To be defined as 'integrated', a project must respect certain basic principle:

- The bottom-up approach refers to specific needs of a group of actors and determines a common strategy for a territorial or sectorial intervention.
- The intersectionality describes the complex shape of the project, which involves all those who participate in a production process or that are located in a same territory, creating specific synergies and influencing economic and social relationships.
- The coordinated use of several intervention instruments regards the possibility to rely on measures and tools of public policy and support actions considered useful for the planned strategy.
- The development strategy is the precise planning of actions proposed by the integrated project among all the members.
- Lastly, a structured partnership has specific responsibilities and guarantees the realisation of the project where members express interests, sectorial and territorial needs (D'Alessio, 2010).

3.1 Integrated planning main features

Tarangioli describes ISCP as one of the most innovative tools that assume peculiar characteristics for each region (2012). Apart from territorial differences, it is possible to identify several common aspects:

- The variety of the objectives to be integrated into a general strategy.
- The combination of support and incentive instruments at the service of intervention strategy.
- Aggregation of financial resources around a project idea.
- Integration between stakeholders of the production chain (from raw materials to marketing the finished product).
- The coordinated action, aimed at giving back economic benefits to all the stakeholders.
- The use of all the different expertise and competences needed to plan and carry out the interventions.

The project has a sectorial intervention strategy and carries out members' individual needs related to the implementation goal of the chain. At the basis of ISCP, the partnership agreement formalizes a contract in which members sign goals, operational strategies, commitments, specific roles and responsibilities. Moreover, the contract usually provides a current obligation about the selection and commercialisation of products: an ISCP member is due indeed, to assign to another member a percentage share of its own production, which is a relevant aspect to create a stable and equal relationship along the chain. According to the Italian National Development Programme, the ISCP must be based on a management procedure that respects the principle of integration for interventions and beneficiaries; the disposition of operational procedures is then assigned to Regional RDP. On a territorial level there are several differences, especially for characteristics locally developed and implemented from similar past interventions, which contributed to heterogeneous setting. The project management can be provided by the Region or by SC partnership: the process is called at "regional direction" if procedures are determined by the RDP management Authority or at "local direction", when decisional processes are assigned to an individual partnership. **Regional direction** is determined by the intervention of public subjects in different phases, that imply the sharing of action strategies and the coordination of roles and responsibilities among members; this kind of direction usually select

specific areas, interventions and criteria. Regions make their interventions coherently with the implementational process and provide the formalization of the partnership into a juridical subject, which has the duty to manage, monitor and control several measures. Moreover, ISCP manager is bounded, empowered, and made aware of its responsibilities and norms to follow, depending on the specific rural development policy. These dynamics create trustful and loyal relationships in which specific needs are driven by actors that are able to find efficient responses to their requisites. **Local direction** uses a different base approach that focuses on specific requirements, and relationships among members are already consolidated. In this case the choice of the territory or the intervention background is given to the ISCP manager including the selection of members to involve, meanwhile the Region does not play direct interventions. Although the programming process is assigned to each actor, the whole partnership assumes a limited role and a selected leader adopts the organizational function (Tarangioli, 2012).

3.1.1 Regional strategies

ISCPs support sectors and territories in which the production takes place, favouring the aggregational processes of economic subjects. The main goals are to promote integrated project, test and empower partnership norms, develop the supply of local goods, consolidate networks and create a share capital. Furthermore, there are functions more connected to the development of the production sector: the set of measures, activated through the ISCP, relates to the regional strategy, the setting of priority goals and the interventions built on a sectorial basis, in order to respond to specific requirements. Generally, there are two different types of measures that can be activated:

- System measures are planned for human capital, development of products, processes and technologies for product quality: this category includes all those interventions that can have an impact on the whole SC, while measures are managed directly by the partnership or by a selected member.
- Structural measures favour the individual supporter of the SC project. which is its final beneficiary. Among them, we can find measures in favour of investments for agriculture, agri-food or forestry firms and, if provided, measures for agricultural firms' diversification (Tarangioli, 2012).

Regions can finance several projects: usually the amount depends firstly on local production specialization, followed by direction choices, priorities, and norms provided by the regional declaration, always linked to local needs of production. Indeed, Italian regions well represent this dynamic background: the North is prevalently characterized by diary specialised ISCP, the Centre favour the cereal sector, meanwhile in South regions fruits and vegetables sector prevails. In areas where regions are strictly connected with the territorial background, integrational projects are linked with SCs that express the characteristics of the territory. Regions used to join organisations, have also reported a higher tendency to create collaborative partnerships that achieve good results: coherently, subjects that aim to participate to corporate groups report higher financial dimension, with respect to individual activities (ibidem, 2012).

3.1.2 Partnerships composition and project evaluation

The partnership can be joined by different subjects with several characteristics and different nature. The group is the representation of the social and relational dimension of the partnership agreement, and information and resources are often exchanged allowing actors to apply efficiently financial resources, know-how and competencies. The composition of the partnership shapes the project and its actuation: members are individual or associated entrepreneurs with business goals and a common development strategy. Subjects are connected with each other, although they relate also to outside actors that can favour the achievement of settled goals. The partnership must nominate a leader that commits in respecting responsibilities and duties: some Regions require that the partnership must be a juridical subject to build a unique corporate body, based on individual members and able to summarize the interests of project operators. On the contrary, other Regions leave project functions to a well identified leader or to a temporary partnership.

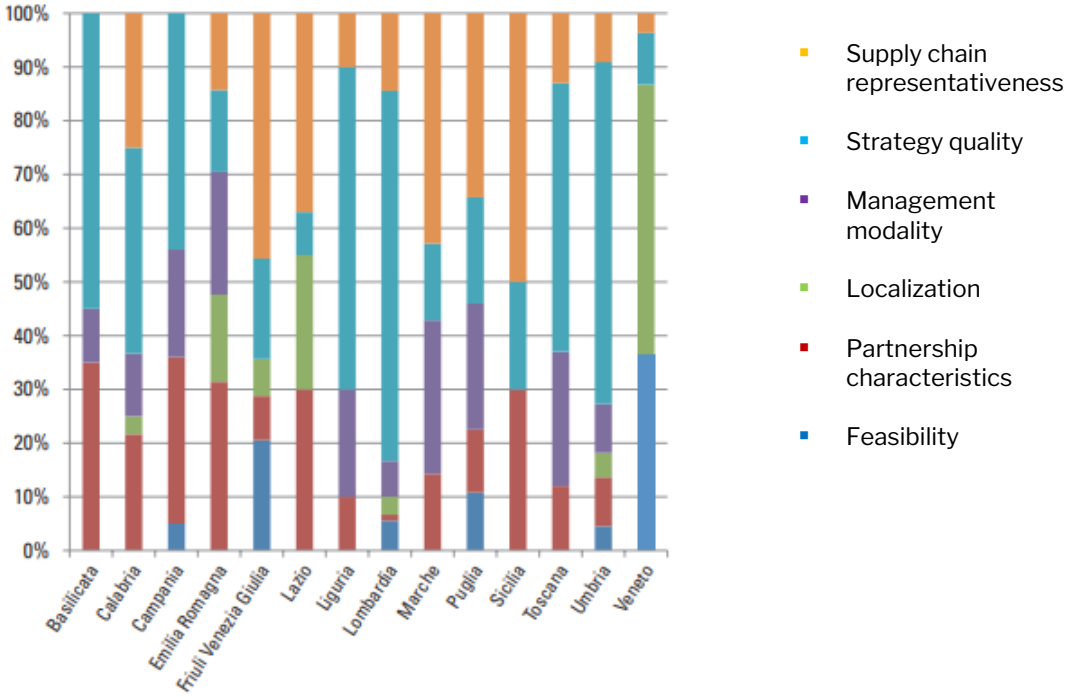
Generally, the partner's binding agreement is based on some conditions:

- Goals and operations that define the elements of the ISCP.
- The quantity of products that participants are committing to maintain along with the contract.
- The relationships within the SC related to the commitments for the realization of each individual intervention and the reciprocal responsibilities of the parts.
- The constraints that connect members related to obligations of buying and selling.

- The management of a potential support reduction in case of failure to achieve the goals (Tarangioli, 2012).

Projects are evaluated through a selection, based on specific criteria: the process allows the evaluation of integrated project, and at the same time, it takes into account the selection of individual initiatives. For instance, in Emilia Romagna is considered as a relevant criterion the "supply chain representativeness", where the project evaluation aims to favour cooperative aggregation that could guarantee common decisions and individual commitments. Another example is the Region Lazio, that attributes relevance to young farmers participation, a criterion positively evaluated for the selection of the project. The following table shows the distribution of selection criteria through regions and the relative significancy attribution (Figure 5).

Figure 5 – Selection criteria weight for ISCP evaluation



Source: Tarangioli, 2012

3.2 Case study: Tuscany

After the introduction of ISCP main features, this paragraph presents the regional case study of Tuscany's ISCP, and refers to the analysis developed by Licciardo et al. (2022)[21], in which information has been collected and related to data provided by Tuscany RDP, the Region website and ISCP documented projects' folders.

The integrated approach employed within the Tuscany RDP has been planned to valorize, coherently with the previous experience, the agricultural enterprise competitive system, as well as the agrifood and forestry system, thanks to the application of coordinated measures of investments and rural development: the main scope is to enforce the cohesion of productive systems and innovation of specific SC sectors. Moreover, considering the complex regional strategies, Tuscany ISCP promotes the application of several interventions such as, firms' investments, quality production support and agricultural activities diversification. The partnership is well built around specific scopes and, on the overall, financing requests concern specially firms' investments. Notably, it has been observed that resources concentration for each activated measure is mainly requested for agricultural activities modernization scopes (measure 4.1.3[22]): indeed, the total weight of the operation is around the 52% of the overall provided import of 73 million of euros. Another important operation is the 4.2.1 that favours investments for transformation and commercialisation of agricultural products: the related percentage is about the 22% of the total provided import (32 million of euros). Another cooperative measure for innovation is the undermeasure 16.2 with an incidence of about the 12% on the overall import of less than 17 million of euros. Tuscany partnerships' agreements represent the boost for development and integration of regional agricultural and forestry SCs, and the characteristic is indicative of a strong willingness of aggregation showed by SC members. According to data, SCs that join projects are mostly represented by agricultural and forestry sectors, although it has been noticed also the presence of multisectoral[23] SCs. Sectors reported to be more involved and in line with requests and needs on a territorial level are represented by wine production, with the 21% of the total, olive production (16%) and cereal production (13%), a background that demonstrates the strictly correlation with local specializations production.

[21] F. Licciardo, B. Zanetti, A. Giampaolo, M. Perinotto, A. Bianchi 2022, Progettazione integrata di filiera nel PSR Toscana 2014-2022, Quaderni PIF, n. 1/2022, Rete Rurale Nazionale 2014-2022, Mipaaf, Roma. ISBN 9788833852096

[22] Agricultural firms' participation in integrated planning

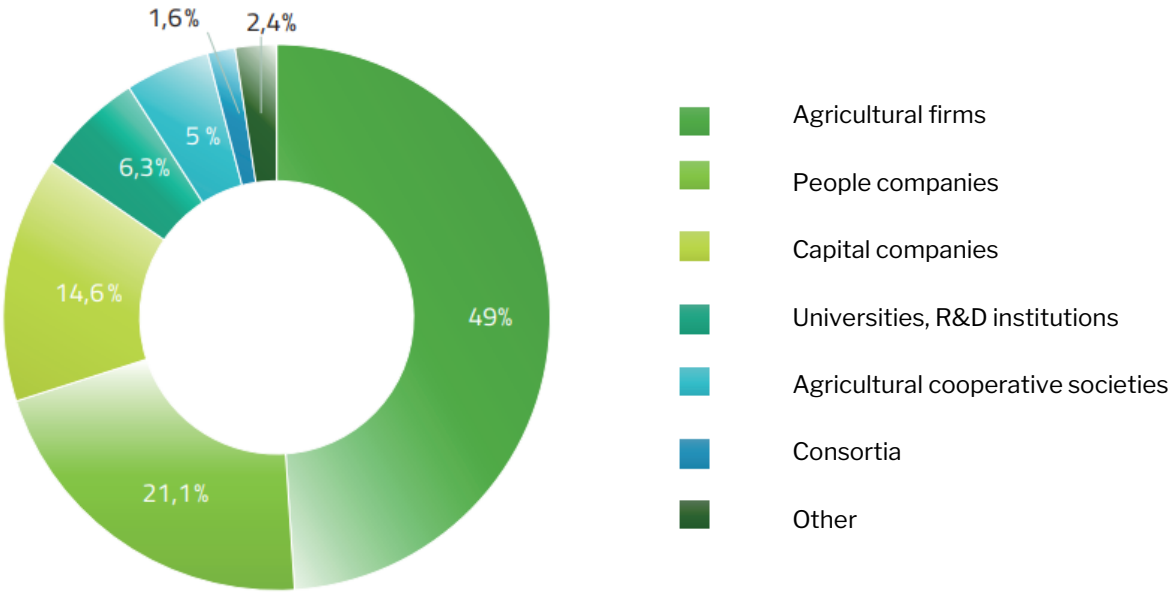
[23] The concentration of diversified SCs in a specific territory

3.2.1 Partnership composition

As mentioned above, partnerships contribute to create, enforce or amplify relations within regional productive SCs. In Tuscany beneficiary subjects are specially represented by agricultural firms, that compose more than the half of financed partners and benefit primarily of the measure 4.1.3, regarding integrated planning participation. Furthermore, processing plant or marketing structures financed within ISCP, must employ, for at least the 51% of the total quantity, raw materials or semi-transformed products derived from agricultural firms or aggregations of primary production directly or indirectly involved in the project: the ultimate scope is to crate stable and equal relations along the agri-food chain. Financed requests regard specially investment measures: most of the funds are directed to measure 4, notably 4.1.3 and 4.2.1[24]. ISCP actions promote cooperative processes on a regional level, involving more than 2000 subjects represented by partnerships juridically recognized. Tuscany ISCP are composed by 19 types of partners, categorized in 7 micro categories such as associations, agricultural firms, institutions, foundations, societies, enterprises networks, producers' organisations and Universities. Main aggregations financed by Tuscany's RDP are constituted primarily by firms: the analysis[25] shows that the partnership is composed by individual agricultural firms with a total weight of 49% of the total, as well as by subjects more structurally organised. Notably, it has been counted 294 capital companies, from which the majority is composed by limited liability companies (91%) and 425 companies of people, equal to the 21% of total partners, where the 94% is a simple partnership. Moreover, it has been evaluated the importance of other organisations, such as Universities and R&D institutions, together considered as the 6,3% of the partnership composition, and consortia counted for the 1,6% of the total (Figure 6).

[24] Financing support for transformation, commercialisation and development of agricultural products
[25] Licciardo et al. 2022, Progettazione integrata di filiera nel PSR Toscana 2014-2022, pp 19-21

Figure 6 - Partnerships actors' composition



Source: Licciardo et al. 2022, p. 19

Furthermore, resources distribution among different actors well reflects the weight of their participation in the projects: agricultural firms gain the 33% of the total allowed resources (equal to 47 million of euros), followed by legal companies whose amount of destinated resources is around the 44% of the total. Regarding leader subjects of the partnership, the Region Tuscany counts 1/3 of capital companies on a leading role, where about the 23% is represented by cooperative agricultural societies and the 20% by agricultural firms. To conclude, partnership composition is quite differentiated: on average a partnership is composed by 25 actors. However, it has been noticed a high variability, from the less numerous partnerships composed by 13 participating subjects for pig meat SC, until the largest group of 41 actors for nuts SC. Moreover, it has been reported a significative presence of subjects into wine SC sector (438 units), olive sector (395) and cereal sector (253), further evidence of how financed projects are perfectly coherent with the specialised regional production background (Licciardo et al., 2022).

3.2.2 Measures application

Tuscany's RDP measures that have been implemented for the realisation of ISCP are in total 6: half of them concern "system" interventions, hence those measures that aim to favour the overall project such as training, agrifood product quality and cooperation. The other half is dedicated to competition interventions, notably firms and forestry' investments that represent the 83% of provided loans. On the overall, it has been activated a totality of 14 measures and under measures[26]. Most of the operations provided by ISCPs are related to measure 4, dedicated to investments, as previously showed. Indeed, the total amount of actors that requested the operation, is 1413 where the final beneficiary is the individual SC project member. Moreover, it has been reported that agricultural firms showed a strong interest specially for the operation 4.1.3, aimed to favour the integrated participation (62%), and the operation 4.1.5 related to renewable energy production (57%); this information suggests that beneficiaries need to realise interventions for corporate modernization and an overall structural adaptation (ibidem, 2022). Regarding measure 16, 390 actors requested its application, with the aim to favour the cooperation within the partnership. The most demanded is the undermeasure 16.2, related to support cooperation and initiation of pilot projects: Universities have here the major weight of participation with the 30%, followed by agricultural firms (23%) and capital companies (20%). Undermeasures 16.3 and 16.6 are respectively related to cooperation support among small operators and SC cooperation, where the higher participation rate is counted for consortia and enterprise networks for the first (24%), and capital companies for the second undermeasure (67%). With respect to sectorial interventions, the measure 8 registers 79 requesting actors, especially for the undermeasure 8.6, dedicated to silver technologies, transformation investments and commercialisation of forestry products. Almost half of requests are demanded by agricultural firms with a rate of 48%, meanwhile 1/4 of subjects are represented by capital companies. The application of measure 6 for agricultural firms' development, shows the 6.4.1 undermeasure that support firms' diversification, as the most demanded. Reports indicate that agricultural firms are mostly involved, with 48% of requests provided by people companies and 16% by capital companies. Furthermore, 37 actors have demanded the application of measure 3: agricultural firms are involved for the 85% and requested undermeasure 3.1 to support quality regimes membership, meanwhile consortia for the 72%, and producer's organisations for the 12%, were especially interested in undermeasure

[26] Table 3 - Tuscany RDP 2014-2022 measures for ISCP

3.2 dedicated to information and promotional activities provided by producers' organisations of internal market.

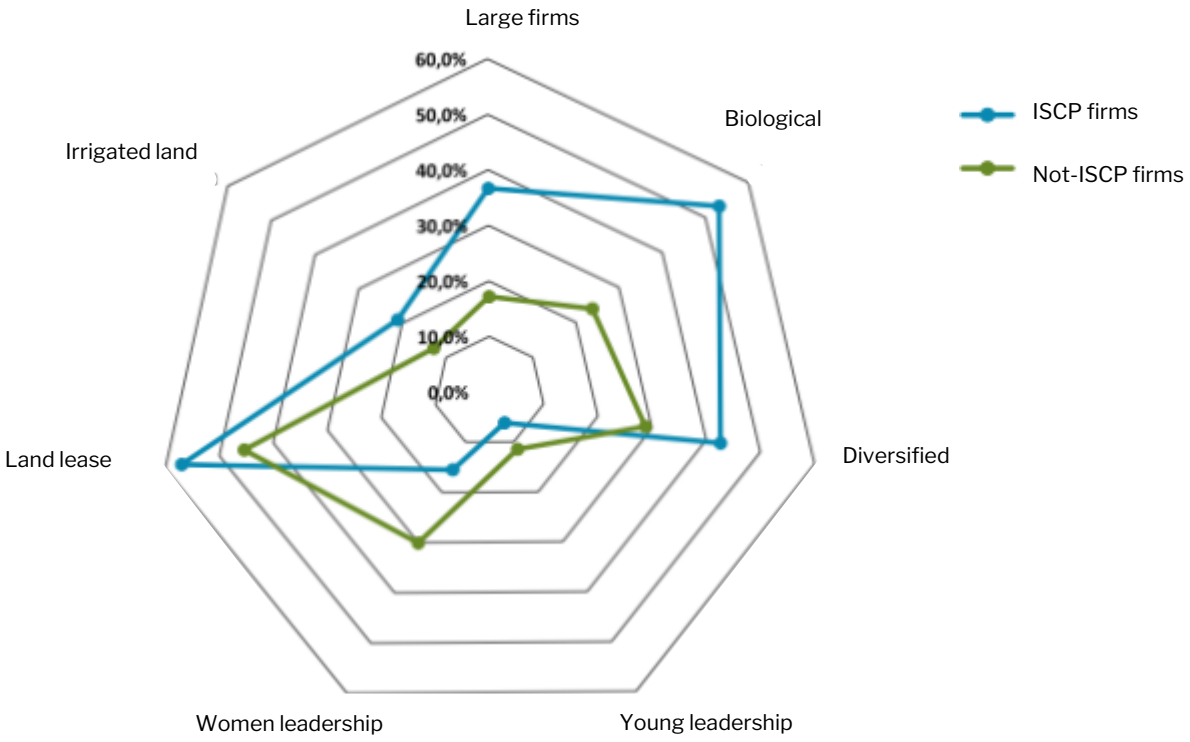
3.2.3 Agricultural firms' characteristics

This paragraph presents agricultural firms evaluated from the Italian dataset RICA[27] which provides information useful to investigate the structural and economic characteristics of firms that benefit of economic support or join organised corporations such as ISCP firms. The following analysis is based on 1695 observations from 2018-2020 triennial period, and the model is composed by 132 agricultural firms that joined RICA sample from 2008 to 2020. The data presentation provides an overview of regional agricultural characteristic, notably with respect to SC sectors and investments exploitation, concluding with economic and performance features.

The agricultural firms of the sample participated at 38 ISCP on the totality of 75 projects, especially in cereal SC sector (34%) and in olive and wine sector (32%), followed by the multi-sector SC (16%) and zootechnic sector (10%). The main measure exploited for investments are measure 4 (84%), measure 16 (13%), and co-financed interventions applied a totality of 15 operations (including undermeasures). The sectors that mostly exploited public economic support are composed by multi-sector SC (34%), zootechnic sector (21%) and wine sector (13%). The public financial support recognized to firms on average of about 67.000 euros. From a first data observation it has emerged that there is a significative difference between firms joining ISCP and firms that did not. Notably, ISCP firms are mostly bigger in both terms of agricultural area and economic dimension (above 100.000 euros of standard production), more than 53% of them practice biological agriculture and more than the 42% diversify its activities; moreover, it has reported that ISCP firms present a higher rate of leased and irrigated land. On the contrary, with respect to not-ISCP firms, it has been noticed a lower presence of women and young farmers, the latter due to the fact that the type of project might require a higher specialization of the actors involved. Concerning labour intensity and mechanisation rate, it has been reported no significative difference (Figure 7).

[27] Rete di Informazione Contabile Agricola (Agricultural Accounting Informational Network)

Figure 7 – ISCP firms characteristic with respect to not-ISCP (average data 2018-2020)



Source: Licciardo et al. 2022, p.27

The higher economic dimension of ISCP firms also reflects on economic performances: in fact, firms joining integrated projects report higher revenues and business costs[28] with respect to the rest of the regional sample. However, it has been noticed that costs incidence on total revenues are 4 percentage points more than not-ISCP firms, an effect probably due to investments and activities determining a higher financing commitment, also considering the effects of variable costs. Concerning public financing supports from I and II pillars, it has emerged that the incidence of direct payments is quite lower for ISCP firms with the 72% rate with respect to the 77% of the regional sample. On the other hand, capital financing support (provided by RDP investments measures included in ISCP) registers a higher weight on the totality (with the 28% against the 23% of not-ISCP firms); in fact, ISCP firms report a higher rate of new investments with respect to the rest of the sample. Furthermore, positive economic performances correlated to production indexes, result significatively higher for ISCP firms: indeed, gross labour productivity amounts more than 66.000 euros with respect to 46.000 euros of other agricultural firms. On the contrary, labour and land profitability are lower for ISCP firm, and the incidence

[28] Considered on absolute value

of public economic support on the net revenue is more elevated (52%) with respect to the rest of the sample (33%), due to a higher incidence of fixed costs of firms joining integrated projects. Lastly, with respect to SC sector specialization, it has emerged that specialised firms in cereal sector present the highest performances in terms of labour productivity, followed by horticultural, wine sector, and firms specialised in husbandry for diary production.

Chapter 4. Data, methods and results

4.1 Data and methods

The following paragraphs provide a further analysis based on RICA dataset, starting with a first analysis of descriptive results related to the structural and economic profile of 110 ISCP agricultural firms, which allow to show their main characteristics. In this case, data relates to those firms that joined RICA investigation in the last seven years period (from 2014 to 2020), and the sample refers to 1399 total observations from the triennial period 2018-2020. The aim is to focus on more recent years of firm's investigation with respect to the previous analysis that considered a larger timeframe (2008-2020), thus 12 years in which firms join RICA sample for the first time. As before, the analysis relates to the regional case study of Tuscany, and information have been provided by data collection from Tuscany RDP, the Region website and ISCP documented project folders. Data have been elaborated with the support of Excel programme, pivot tables and graphs. Notably, radar and bar charts have been exploited with the aim to highlight structural and economic characteristics of ISCP firms with respect to not-ISCP firms. The characteristics considered for the structural profiling are the economic dimension (notably large firms), biological and not biological firms, diversified and not diversified firms, young and women leadership, concluding with leased and irrigated land. For the economic profile, value-added, current costs and costs incidence of ISCP and not-ISCP firms have been evaluated together with other economic indexes.

4.1.1 The Regression

The second and core analysis refers to the difference between ISCP firms and not-ISCP firms' economic performances, hence between agricultural firms that obtained funds for integrated projects and those that did not. The study is based on the regression elaborated with Stata/MP 16.0[29], and the model is constituted by 1371 observations[30] identified by Stata from the triennial period 2018-2020[31], with a sample of 570 agricultural firms in total, including ISCP and not-ISCP. For the analysis, dummies have been built for the economic dimension (large, middle and small firms), biological and not biological firms, and for the altitude area where firms are

[29] StataCorp LLC 4905 Lakeway Drive Collage Station, TX 77845, USA; https://www.stata.com/
[30] On a totality of 1399 observations
[31] The triennial period includes those firms that joined RICA sample from 2014 to 2020

located (hill, plain and mountain areas). Lastly, technical-economical orientation of firms (the specialization sector of the SC) and ISCP firms, as companies that received the public contribution, are as well included in the elaboration. The model estimated is:

$$y_{it} = x^1_{it} + X^2_{it} + \mu_i + \gamma_t + \varepsilon_{it} \quad (4.1)$$

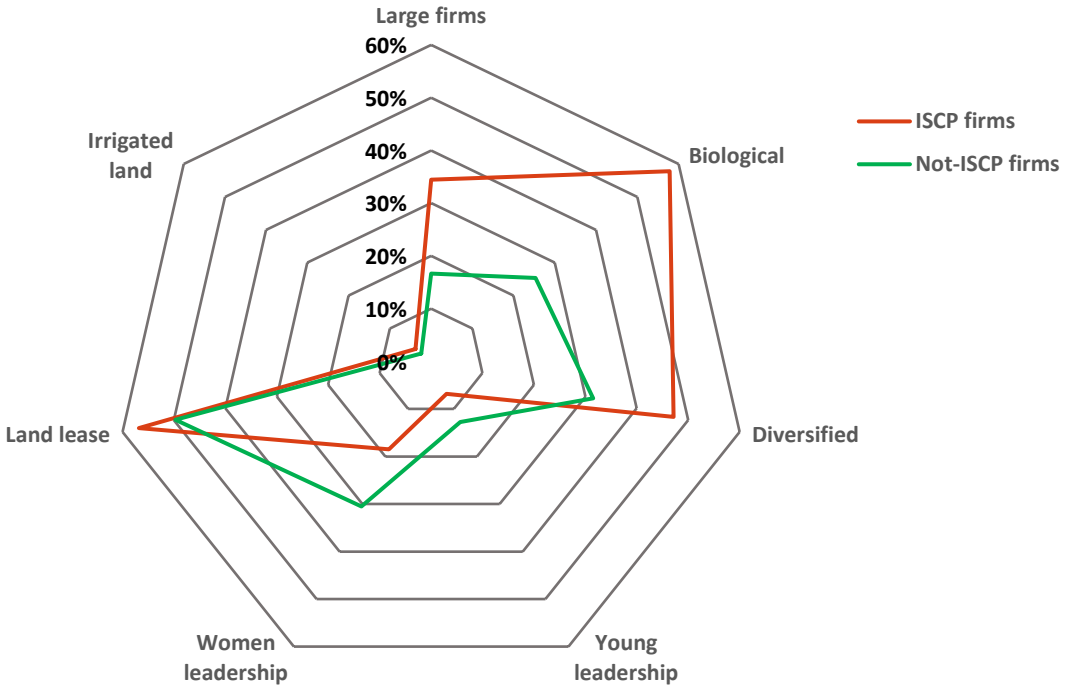
where:

- y_{it} denotes the observed economic performance for firm i at time t
- x^1_{it} represents the contribution perceived by i firm at time t
- X^2_{it} represents the dummy variables taking into account some firm characteristics: economic dimension, biological firms, altitude area where firms are located, technical-economical orientation
- μ_i are the firm fixed effects
- γ_t are the time fixed effects
- ε_{it} is the error

4.2 Descriptive results

For the first analysis of ISCP firms structural and economic profile, results are relatable to the description presented in the previous chapter. As a matter of fact, ISCP firms are biological for the 58%, and diversified for the 47%. Furthermore, mostly ISCP firms have a consistent economic dimension (with 34% of large companies), and present leased lands (57%), meanwhile the amount of women and young leaderships, as well as firms with irrigated land is less significative for both ISCP and not-ISCP firms (Figure 8).

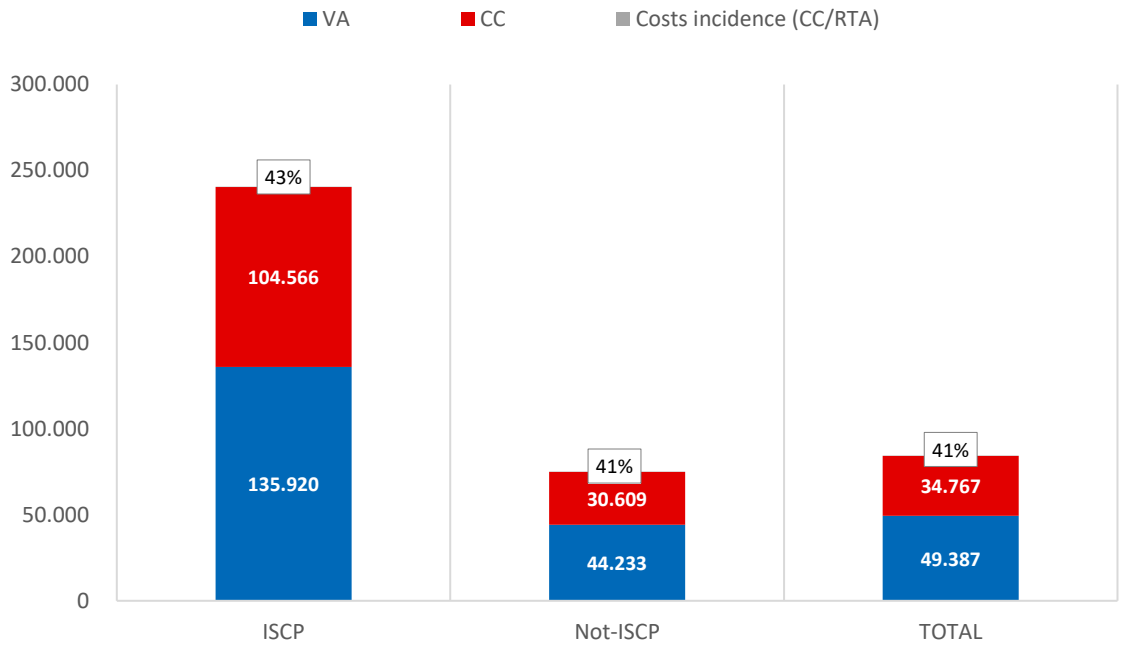
Figure 8 - ISCP firms characteristic with respect to not-ISCP (average data 2018-2020)



Source: Excel data elaborations, BDR Toscana 2018-2020, RICA

Concerning the economic profile, it has been built a bar chart to highlight value-added and current costs of ISCP and not-ISCP firms, as well as the costs incidence. The graph shows that ISCP firms have good results in terms of value-added (almost 136.000 euros) coherently with current costs (more than 104.000 euros), with an incidence of the 43%. On the other hand, not-ISCP firms report a lower value-added (almost 45.000 euros), lower costs (more than 30.000 euros) and an incidence of the 41% (Figure 9).

Figure 9 – Value-added and costs of ISCP and not-ISCP firms (average data 2018-2020)



Source: Excel data elaborations, BDR Toscana 2018-2020, RICA

Moreover, the elaboration reports positive data for economic indexes such as gross labour productivity, which amounts for more than 68.000 euros for ISCP firms, against not-ISCP firms that count less than 47.000 euros. Considering the analysis results from the previous chapter[32], they might suggest that firms joining RICA sample since last seven years period (2014-2020) report a positive trend, especially for agricultural firms that participate in integrated projects, a coherent data with the application of innovative methods for integration. Concerning gross land productivity, ISCP firms report about 2.700 euros against 1.900 euros of not-ISCP firms, again a positive trend with respect to the previous analysis that counted 2.500 euros for ISCP and, on the other hand, about 2.000 euros for not-ISCP firms, indicating a slight decrease for land productivity of firms not joining integrational projects. Considering other indexes such as labour and land income, it is reported again a positive economic performance as well for ISCP firms and a similar slight loss for not-ISCP firms. Lastly, total firms' revenue confirms a good trend for agricultural firms joining integrational projects with a total of about 240.000 euros with respect to the previous and less recent analysis that counted 214.000 euros of total revenue for ISCP firms (Table 10). In conclusion, the general positive trend might be evidence of the good efficiency of integrated planning, especially if referred to last recent years, although it is

[32] Licciardo et al. 2022, Progettazione integrata di filiera nel PSR Toscana 2014-2022

important to recall that the effect might reflects multiple factors, especially the impact of the economic contribution received as a result of RD policies application, including integrated planning.

Table 10 – Economic results of ISCP and not-ISCP firms, 2018-2020 (RICA sample 2014-2020)

Characteristics	ISCP	Not-ISCP	Total
Gross Labour productivity	68.318	46.789	49.284
Gross Land productivity	2.747	1.981	2.070
Labour income	13.345	13.956	13.885
Land income	949	1.000	994
Total firm revenue	240.485	74.842	84.153

Source: Excel data elaboration, BDR Toscana 2018-2020, RICA

4.3 Regression results

For the second core analysis, table 11 shows the regression results. Here, the dependent variable is represented by ln_va_ulP[33], which indicated the VA per unit of labour of the firms, meanwhile the explicative variables are represented by ln_iscp(variable) which indicates the contribution perceived by the firms. From the results it emerges that, an increase of 1% of funds gained by ISCP firms, determine an increase of VA per unit of labour of 0,13% with respect to not-ISCP firms, a data statistically significant. Regarding the altitude area, it has emerged that the effect of ISCP found, is larger when firms are located in hill or in mountain. Specifically, an increase of 1% of funds gained by ISCP firms, determine an increase of VA per unit of 0,13% and 0,09% in firms located in hill and mountain, respectively (Table 11).

[33] P is referrred to the weighted data

Table 11 – Regression results

	(1)	(2)	(3)	(4)	(5)
	ln_va_ulP	ln_va_ulP	ln_va_ulP	ln_va_ulP	ln_va_ulP
	Coef./std.err	Coef./std.err	Coef./std.err	Coef./std.err	Coef./std.err
ln_ISCP	0.1264***				
	(0.0194)				
ln_iscphill		0.1264***			
		(0.0194)			
ln_iscpmount		0.0917***			
		(0.0292)			
ln_iscpplain		0.0301			
		(0.0195)			
ln_iscpbio			0.1645***		
			(0.0269)		
ln_iscpNotbio			0.2585***		
			(0.0065)		
ln_iscp_dairy				0.2145***	
				(0.0649)	
ln_iscp_cereal				0.1693***	
				(0.0280)	
ln_iscp_herb				0.1638***	
				(0.0271)	
ln_iscp_fruit				0.0972	
				(0.0711)	
ln_iscp_grani				0.0000	
				(.)	
ln_iscpmixed				0.2317***	
				(0.0648)	
ln_iscp_olive				0.0000	
				(.)	
ln_iscp_horto				0.0229	
				(0.0606)	
ln_iscp_seeds				0.1630***	
				(0.0351)	
ln_iscp_wine				0.0826	
				(0.0697)	
ln_iscpLarge					0.1651***
					(0.0269)
ln_iscpMiddle					0.1190***
					(0.0335)
ln_iscpSmall					0.1079***
					(0.0361)
No. of obs.	1371	1371	1371	1371	1371
R-Sq	0.8376	0.8376	0.8376	0.8379	0.8377

Source: Stata elaboration

Concerning biological firms, column (3) shows that an increase of 1% of funds obtained by biological firms, leads an increase of VA per unit of labour of 0,16%, a value that is lower than the 0,26% increase observed for not biological firms. For what concerns technical-economical orientation of agricultural firms, the regression of column (4) shows that with an increase of 1% of funds gained by ISCP firms, it is determined an increase of VA per unit of labour of 0,23%, 0,21% and 0,17% in firms specialised in mixed SC sectors (cultivation and husbandry), dairy cattle breeding, and cereal cultivations, respectively. Moreover, results report that with an increase of 1% of ISCP funds, it is determined an increase of VA per unit of labour of 0,16% in firms specialised in herbivores husbandry as well as in seeds cultivations. Lastly, considering firms' economic dimensions, an increase of 1% of funds obtained by ISCP firms, lead an increase of VA per unit of labour of 0,16% in large firms, 0,12% in middle firms, and 0,11% in small firms. To conclude, the R-squared indicates that the regression model well fits the observed data values, and that more than the 80% of the variation of the dependent variable (the VA per unit of labour) is explained by the variance of the independent variables showed above.

Chapter 5. Conclusions

Integrated project is an innovative method and a good opportunity, especially for Italy, to renew the agricultural sector. The analysis suggests that firms receiving the ISCP contribution might reach higher economic performances especially when carrying out differentiated activities, as not biological and mixed cultivation, or activities correlated with husbandry and cattle breeding, such as meat and dairy production. On the other hand, as showed before, Italy is characterized by a traditional agricultural sector, strongly interlinked with territory and culture, that ranges from a production of horticultural, to dairy and meat products: it might not be surprising that higher economic performances are coherent with these sectors of specialization and with those activities that diversify rather than limit their productivity to a unique SC sector.

To conclude, studies about integrated planning are still recent and new, as well as the developing of the method itself. It would be interesting observe how it will evolve, and what kind of innovations will be carried out in the future, with particular regard to the agri-food sector. Moreover, the climate change and the urgency to find efficient solutions for mitigation are topics that are stealing evermore the spotlight of last years, and future RDPs including the whole CAP, could have an important role and responsibilities towards the planet.

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